Universitat Internacional de Catalunya
Facultat de Ciències Bàsiques

Tesis doctoral

Uso de pantallas y su relación con la salud de la población infantil espanyola.

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USO DE PANTALLAS Y SU RELACIÓN CON LA SALUD DE LA POBLACIÓN INFANTIL ESPAÑOLA

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para optar al título de Doctor en Ciencias de la Salud

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- Sant Cugat del Vallès, Barcelona, 2021 -

uic barcelona

When "I" is repleced with "we" even illness becomes wellness
Malcom X

Agraïments

Com faig referencia a la cita, *When "I" is replaced with "we" even illness becomes wellness*, aquesta tesi no és cosa d'una sola persona, jo sóc la cara visible però han estat diverses persones que han contribuït, col · laborat, ajudat o donat suport, que m'agradaria mencionar.

Primer de tot m'agradaria agrair la confiança que em van donar en el seu moment els ideòlegs d'aquesta tesi, el Dr. Jose M Martínez Sánchez i la Dra. Cristina Lidón Moyano. Jose, moltes gràcies per ensenyar-me tot el que he après amb la passió que et caracteritza i de forma molt propera. Cris, vaig arribar a la UIC per reemplaçar el teu lloc perquè tu marxaves a Califòrnia a realitzar el teu post-doc (quina pressió però quin honor al mateix temps), qui ho diria que tu estaries en la meva defensa de tesi com a directora. Moltes gràcies per la teva professionalitat tan propera, els teus consells, la teva fortalesa, la teva sinceritat i per posar llum en els moments de foscor.

Als meus companys de l'Àrea de Bioestadística, al meu *dream team*, Adrián, quan penso en tu penso en família, per mi ets com un germà i això és per a tota la vida, Juan Carlos, no és difícil connectar amb tu jo ho vaig fer des de el principi ets un gran professional (estadístic pur de la UPC) però millor persona i amic, i Queralt, quan et vaig conèixer sabia que m'emportaria la teva amistat per sempre, per mi també ets com una germana i això també és per sempre. També vull agrair a la Nuria pels coneixements de epidemiologia, els teus consells, les converses sobre coses de la vida i la seva sinceritat, t'he trobat molt a faltar aquests dos anys. No vull excloure dels agraïments als meus companys del Departament de Ciències Bàsiques i de la Facultat de Medicina, la Laura, la Sílvia, la María, la María (Boss), la Carla, l'Anna, la Iris, el Franco, el Carles, l'Hipólito, la Begoña, la Claudia, la Reyes, la Paloma, l'Ana, la Pia, l'Albert, l'Esteve, el Iasim, l'Ignacio, el Pere, el Carlos, la Samantha i el Néstor.

Per últim a la meva família, la meva mare (Imma) per inculcar-nos a la meva germana i a mi la importància de la formació contínua, per demostrar-nos que el saber no té límits i per la seva bona perspectiva als problemes, al meu pare (Joan) per ser la persona que més ha confiat en mi, per emocionar-se quan em van confirmar que entraria a treballar a la UIC i per dir les coses en el moment precís, a la meva germana (Ariadna) perquè per mi tu ets la meitat bona de la parella i jo tinc la sort de ser l'altra meitat. Per últim, al Marc, com canta l'Eros Ramazzoti, però en la versió remember, “gracias por existir”.

Resumen

Debido a la gran variedad, la fácil accesibilidad y portabilidad de los dispositivos de pantalla, además, de la amplia oferta de contenido multimedia, el tiempo de pantalla ha pasado a ser un aspecto muy importante en nuestras vidas, especialmente entre la población infantil y adolescente. Además, la situación de pandemia que estamos afrontando podría haber aumentado el tiempo de pantalla debido a que la población está más en casa, las relaciones sociales en persona han disminuido, aumentando el contacto vía los dispositivos de pantalla y las lecciones educativas han pasado a ser online. El tiempo de pantalla, especialmente por los teléfonos móviles y tabletas, está en constante evolución, hecho que hace que actualmente no sepamos exactamente como es el comportamiento que tienen los más pequeños con las pantallas y el efecto en su salud. A partir de la evidencia previa, sabemos que períodos más largos de pantalla, basados en el visionado de televisión y uso de ordenador, están relacionados con una gran variedad de problemas fisiológicos y psicológicos. Por esta razón, han sido varias las instituciones de salud que durante la última década han propuesto y promovido un conjunto de recomendaciones sobre el tiempo de pantalla: evitar las pantallas para aquellos niños menores de 2 años, limitar el tiempo de pantalla a una hora diaria en niños de entre 2 y 4 años y limitar a 2 horas el tiempo de pantalla recreativo en niños de entre 5 y 17 años.

Los objetivos de la presente tesis son: (1) describir la prevalencia de uso de pantallas de los niños españoles de entre 1 y 14 años. Así como, evaluar la relación del tiempo de pantalla con (2) la duración de sueño según la edad de los niños españoles de entre 1 y 14 años, (3) tener exceso de peso en niños españoles de entre 2 y 14 años, (4) la frecuencia de consumo de dulces, refrescos, comida rápida y aperitivos en niños españoles de entre 1 y 14 años, y (5) los problemas emocionales y de comportamiento en niños españoles de entre 4 y 14 años. Finalmente, (6) describir el uso de teléfonos inteligentes y tabletas durante el confinamiento total de la primera ola de la pandemia del COVID-19 en niños menores de 48 meses residentes en Barcelona.

La presente tesis doctoral la forman un compendio de 5 artículos científicos, tres de ellos publicados y los otros dos en revisión en revistas indexadas en Web of Science, y una carta al editor publicada en una revista indexada en Web of Science. Además, durante mi etapa como estudiante de doctorado he sido primera autora de otros tres artículos científicos publicados en revistas indexadas en Web of Science.

En conclusión, la presente tesis doctoral muestra que 4 de cada 10 niños españoles de entre 1 y 14 años en 2017 estuvieron expuestos a las pantallas por ocio al menos dos horas diarias. El tiempo de pantalla aumentó con la edad y los niños de familias con niveles socioeconómicos y educativos más bajos fueron más susceptibles de pasar períodos más largos de ocio frente las pantallas. Además, en población infantil, períodos más largos de tiempo de pantalla estaban asociados con duraciones de sueño insuficientes, exceso de peso, alta frecuencia de consumo de dulces, refrescos, comida rápida y aperitivos, y estar a riesgo de desarrollar problemas emocionales y de comportamiento. Durante el confinamiento total de la primera ola de la pandemia del COVID-19, 2 de cada 3 niños menores de 48 meses residentes en Barcelona estuvieron expuestos a los teléfonos inteligentes y las tabletas a diario.

Abstract

Due to the great variety, the easy accessibility, and portability of screen devices, and besides, the wide offer of media content, screen time has become an essential part of our lives, specially among pediatric and adolescent population. Moreover, the pandemic situation that we are facing up might have increased the screen time due to the population spends more time at home, social relationships face to face has decreased, increasing video calls and educative lessons have become online. The screen time, specially for smartphones and tablets appearance, are in constant evolution, fact that makes currently we do not know exactly how is the behaviour of children and adolescents have with the screens and the effect on their health. From the previous evidence, we know that longer periods of screen time, based on TV viewing and computer usage, are related to great variety of physiological and psychological issues. For this reason, some health institutions during the last decade have purposed and promoted a set of recommendations about screen time: to avoid screens for those children under 2 years old, to limit the screen time to 1 hour daily for those children between 2 and 4 years old, and to limit the leisure screen time to 2 hours daily for those children from 5 to 17 years old.

The objectives of this doctoral thesis are: (1) to describe prevalence of screen time among Spanish children aged from 1 to 14 years. Furthermore, to assess the relationship between screen time with (2) sleep duration according to age among Spanish children aged between 1 and 14 years (3) excess weight among Spanish children aged from 2 to 14 years, (4) frequency of sweets, soft drink, fast food, and snack intake among Spanish children aged between 1 and 14 years, and (5) emotional and behavioural problems among Spanish children aged from 4 to 14 years. Finally, (6) to describe the smartphone and tablet usage during COVID-19 pandemic first wave's complete lockdown among children under 48 months living in Barcelona.

This doctorate thesis is made up of a compendium of 5 scientific papers, three of them are published and the other two are under review in scientific journals indexed in Web of Science, and editor letter published in a scientific journal indexed in Web of Science. Moreover, during my stage as PhD candidate I have been first author in three scientific papers, published in scientific journals indexed in Web of Science.

To sum up, this doctorate thesis shows that 4 out to 10 Spaniards aged from 1 to 14 years were exposed to screens for leisure at least 2 hours daily. Screen time for leisure increased according to the age of the child and those belonging families with lower socioeconomic and education level were more likely to spend longer periods in front of screens for leisure. Further, for paediatric population, longer periods of daily leisure screen time were associated with short sleep duration, excess weight, high frequency of sweets, soft drink, fast food, and snack intake, and to be at risk of developing emotional and behavioural problems. Finally, during COVID-19 pandemic first wave's total confinement, 2 out of 3 children under 48 months living in Barcelona were exposed to or used daily smartphones and tablets.

Resum

Degut a la gran varietat, la fàcil accessibilitat i la portabilitat dels dispositius de pantalla, a més a més, de l'amplia oferta de contingut multimèdia, el temps de pantalla ha passat a ser un aspecte molt important en les nostres vides, especialment en la població infantil i adolescent. A més a més, la situació de pandemia que estem afrontant podria haver augmentat el temps de pantalla degut a que estem més temps a casa, a que han disminuït les relacions socials en persona, augmentant les videotrucades i les lliçons educatives han passat a ser en línia. El temps de pantalla, especialment per l'aparició del telèfons intel · ligents i tauletes, esta en evolució constant, fet que fa que actualment no sapiguem exactament com es el comportament que tenen els més petits amb les pantalles i l'efecte en la seva salut. A partir de l'evidencia prèvia, sabem que períodes més llargs de pantalla, basats en el visionat de televisió i l'ús d'ordinador, estan relacionats amb una gran varietat de problemes fisiològics i psicològics. Per aquest motiu, han estat varies les institucions sanitàries que durant la última dècada han proposat i promogut un conjunt de recomanacions sobre el temps de pantalla: evitar les pantalles en nens menors de 2 anys, limitar a 1 hora diària el temps de pantalla en nens d'entre 2 i 4 anys i limitar 2 hores diàries de temps de pantalla per lleure en nens d'entre 5 i 17 anys.

Els objectius d'aquesta tesi són: (1) descriure la prevalença d'ús de pantalles dels nens espanyols d'entre 1 i 14 anys. Tanmateix, avaluar la relació del temps de pantalla amb (2) la duració de son segons l'edat dels nens espanyols d'entre 1 i 14 anys, (3) tenir excés de pes en nens espanyols d'entre 2 i 14 anys, (4) la freqüència de consum de dolços, refrescos, menjar ràpid i aperitius en nens espanyols d'entre 1 i 14 anys i (5) els problemes emocionals i de comportament en nens espanyols d'entre 4 i 14 anys. Finalment, (6) descriure el ús de telèfons intel · ligents i tauletes durant el confinament total de la primera onada de la pandèmia del COVID-19 en nens menors de 48 mesos residents a Barcelona.

Aquesta tesi la formen un compendi d'articles científics, tres d'ells publicats i els altres dos en revisió en revistes indexades en Web of Science, i una carta al editor publicada en una revista indexada en Web of Science. A més a més, durant la meva etapa com estudiant de doctorat també he estat primera autora d'uns altres tres articles publicats en revistes indexades en Web of Science.

En conclusió, la present tesi mostra que 4 de cada 10 nens espanyols d'entre 1 i 14 anys al 2017 estaven exposats a les pantalles per lleure com a mínim 2 hores diàries. El temps de pantalla dedicat al lleure augmentava amb l'edat i el nens de famílies amb nivells socioeconòmics i educatius més baixos eren més susceptibles de passar períodes de lleure més llargs davant les pantalles. En la població pediàtrica, períodes més llargs de temps de pantalla per lleure estaven associats amb duracions de son insuficients, l'excés de pes, l'alta freqüència de consum de dolços, refrescos, menjar ràpid i aperitius, i estar en risc de desenvolupar problemes emocionals i de comportament. Per últim, durant el confinament total de la primera onada de la pandèmia del COVID-19, 2 de cada 3 nens menors de 48 mesos residents a Barcelona van estar exposats o van utilitzar els telèfons intel · ligents o tauletes a diari.

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Capítulo 1

Introducción

1.1. Exposición a las pantallas: un cambio de paradigma

Según la Red para la Investigación en el Comportamiento Sedentario [1] (Sedentary Behavior Research Network: SBRN) el tiempo de pantalla se ha definido como:

> *"El tiempo dedicado a comportamientos que involucran el uso de pantallas. Estos comportamientos pueden ser sedentarios o activos."*

Esta definición fue consensuada en 2017 por un panel de 87 miembros expertos de la SBRN [1], debido al crecimiento exponencial durante los últimos años de estudios e investigaciones relacionadas con el comportamiento sedentario y el tiempo y uso de pantalla [2].

Como se observa en la figura 1.1 los primeros estudios sobre el tiempo de exposición a las pantallas en la población pediátrica se sitúan en la década de los 80, siendo en los 2000 cuando empieza a crecer exponencialmente la existencia de trabajos que estudian el tiempo de pantalla en los niños y adolescentes, superando los 150 estudios registrados en PubMed en el año 2020.

Aunque cada vez existen más trabajos abordando el tiempo de pantalla en la población pediátrica el comportamiento de los niños y adolescentes con los dispositivos de pantallas y su efecto con la salud aún es incierto. Esta incertidumbre es debida a que el patrón y tiempo de uso en pantalla está cambiando constantemente, especialmente en la última década debido al avance tecnológico. En este sentido, varias revisiones sistemáticas sobre el tiempo de pantalla en la población pediátrica y su efecto en la salud recalcan la falta de estudios incluyendo en el tiempo de pantalla el uso de otros dispositivos que no sean la televisión o el ordenador [3–5]. En la actualidad, la exposición a las pantallas no se limita exclusivamente en el visionado de televisión o los juegos de ordenador, existiendo una gran variedad de dispositivos de pantalla cada vez más accesibles a toda la población infantil. Además, estos dispositivos son más portables, hecho que hace que se puedan utilizar en cualquier momento, y más intuitivos, permitiendo su uso a edades tempranas [6]. La pantalla –ya sea un ordenador, un teléfono móvil, una tableta o un televisor– es un símbolo de nuestra era moderna. Para los niños, los "nativos digitales" que han crecido rodeados de información digital y entretenimiento en dispositivos conectados a Internet, el tiempo de pantalla es una parte importante de sus vidas.

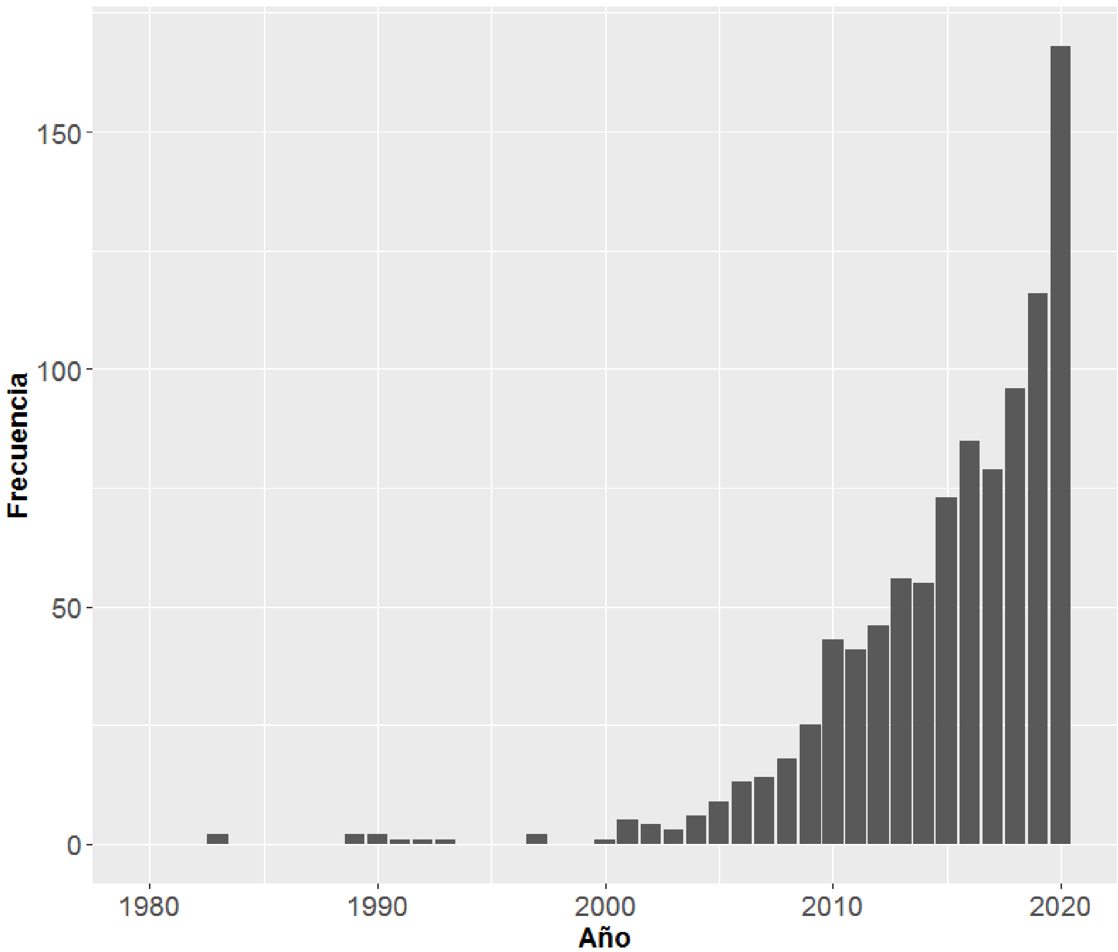

Figura 1.1: Publicaciones relacionadas con el tiempo de pantalla por año (1980-2020) Fuente PubMed. Consulta de búsqueda: (screen time[Title] OR sedentary screen based behaviour[Title] OR sedentary screen based behavior[Title] OR screen viewing[title] OR TV viewing[Title] OR smartphone use[Title] OR Tablet use[Title] OR computer use[Title] OR laptop use[Title] OR video games[Title]) AND (children[Title/Abstract] OR toddlers[Title/Abstract] OR babies[Title/Abstract] OR preschoolers[Title/Abstract] OR schoolage children[Title/Abstract] OR infants[Title/Abstract] OR adolescents[Title/Abstract] OR teenagers[Title/Abstract]). Fecha consulta: 15-02-2021

Por todo ello, podemos decir que se ha producido un cambio de paradigma en la exposición a las pantallas. A medida que ha avanzado la evolución de la digitalización han ido apareciendo nuevos dispositivos de pantalla, desde la televisión hasta los asistentes de voz, pasando por consolas, ordenadores, teléfonos inteligentes y tabletas. Esto a hecho que el tiempo de pantalla durante muchos años se centrara exclusivamente en la televisión, perdiendo terreno con la aparición de otros dispositivos como los teléfonos inteligentes debido a sus características y prestaciones.

1.2. Recomendaciones relacionadas con el tiempo y el uso de dispositivos de pantalla en la población pediátrica

Han sido varias las instituciones de la salud que durante los últimos años han propuesto y promovido un conjunto de guías y recomendaciones del tiempo y uso adecuado de pantallas. Entre estas instituciones están el Ministerio de Sanidad, Servicios Sociales e Igualdad (MSSSI) del Gobierno de España en 2015 [7], la Academia Americana de Pediatría (American Academy of Pediatrics: AAP) en 2016 y 2017 [8, 9], la Sociedad Canadiense de Pediatría (Canadian Pediatric Society: CPS) en 2017 y 2019 [10, 11] o la Organización Mundial de la Salud (OMS) en 2019 y 2020 [12, 13].

En resumen, todas ellas se basan en proponer una duración del tiempo frente a la pantalla para diferentes grupos de edad. Para los más pequeños, menores de 2 años, todas ellas coinciden en la recomendación de evitar el uso o exposición [7, 8, 10, 12]. Sin embargo, la AAP matiza que en el caso de que se quiera introducir las pantallas a los niños de entre 18 y 24 meses, se haga siempre acompañado de un adulto y seleccionar contenido de alta calidad [8]. A partir de los 2 hasta los 4 años, todas están de acuerdo en limitar el uso de pantallas a la hora diaria como máximo [7, 8, 10, 12]. Para este grupo de edad, la AAP matiza que el contenido tiene que ser de alta calidad y siempre acompañado de un adulto [8]. Además, tanto la AAP como la CPS, también recomiendan mantener períodos de tiempo libres de pantalla como las comidas, evitar el uso de pantallas como mínimo 1 hora antes de irse a la cama y apagar los dispositivos de pantalla mientras no se estén utilizando [8, 10]. Finalmente, para los mayores, desde los 5 hasta los 17 años, sólo el MSSSI propone una recomendación para el tiempo de pantalla siendo no superar las dos horas de tiempo de pantalla dedicado a fines recreativos [7]. Aunque, la AAP y la CPS no proponen una duración concreta de tiempo de pantalla saludable para niños de entre 5 y 17 años ambas coinciden en que deben gestionar el tiempo de pantalla haciendo y revisando regularmente un plan familiar de consumo de contenido multimedia, además de evitar las pantallas una hora antes de irse a la cama y durante las comidas [9, 11]. En el caso de la OMS, para este grupo de edad, incluyen que aunque existe evidencia de que un uso prolongado de tiempo de pantalla recreativo está relacionado con factores adversos a la salud, la evidencia es débil para establecer un punto de corte [13].

En las tablas 1.1 y 1.2 se muestran las recomendaciones sobre el tiempo de pantalla de forma más detallada y una breve comparativa sobre el tiempo y uso entre las distintas guías de las instituciones sanitarias.

Organización	Año	Edad	Recomendaciones
OMS	2019	Menores de 5 años	Evitar el tiempo de pantalla en niños menores de 2 años. Limitar el tiempo de pantalla sedentario a 1 hora al día: menos es más.
OMS	2020	Entre 5 y 17 años	No hay recomendaciones sobre el tiempo exacto que deben dedicar a las pantallas
AAP	2016	Hasta 5 años	Evitar el uso de contenido multimedia (exceptuando el video chat) en niños de 18 a 24 meses. Para los niños de entre 2 y 5 años, limitar el tiempo de pantalla a 1 hora diaria de contenido de alta calidad.
AAP	2017	Entre 5 hasta 18 años	No hay recomendaciones sobre el tiempo exacto que deben dedicar a las pantallas
MSSSI	2015	Menores de 17 años	Evitar el tiempo de pantalla en niños menores de 2 años En niños de entre 2 hasta 4 años el tiempo de pantalla debería limitarse a menos de una hora al día En niños de entre 5 hasta 17 años el tiempo de uso de pantallas con fines recreativos a un máximo de dos horas al día
CPS	2017	Menores de 5 años	Evitar el tiempo de pantalla en niños menores de 2 años Para los niños de 2 a 5 años, limite el tiempo de pantalla rutinario o regular a menos de 1 hora al día
CPS	2019	Entre 5 hasta 19 años	No hay recomendaciones sobre el tiempo exacto que deben dedicar a las pantallas

Tabla 1.1: Recomendaciones sobre el tiempo de pantalla según las guías

Recomendaciones	OMS	AAP	CPS	MSSSI
Tiempo pantalla para menores de 5 años	✔	✔	✔	✔
Tiempo de pantalla para niños de 5 años o más	✖	✖	✖	✔
Dirigidas a las familias	✖	✔	✔	✖
Dirigidas a los pediatras	✖	✔	✖	✖
Dirigidas a los gobiernos, industrias e investigadores	✖	✔	✖	✖
Tiempo de pantalla antes de irse a la cama	✖	✔	✔	✖
Tiempo de pantalla durante las comidas	✖	✔	✔	✖
Plan familiar de consumo de contenido multimedia	✖	✔	✔	✖

Tabla 1.2: Comparación de las guías de recomendaciones sobre el tiempo y uso de pantalla en la población pediátrica

1.3. Efectos del tiempo de pantalla

Debido a la evolución constante del patrón de uso y el tiempo de pantalla, la cantidad de estudios e investigaciones abordando los posibles riesgos y/o beneficios del uso y el tiempo de pantalla en la población infantil ha crecido exponencialmente (Figura 1.1) [2]. Sin embargo como se observa en las tablas 1.1 y 1.2, las recomendaciones sobre el tiempo de pantalla para la población pediátrica entre las instituciones no están claras, además, existen controversias con las autoridades educativas quienes, a diferencia de las autoridades sanitarias que con sus recomendaciones desalientan el uso de pantallas sobre todo en los más pequeños, animan su uso con el objetivo de que niños y adolescentes estén preparados para desarrollar y afrontar su carrera educativa y profesional [14, 15]. Teniendo todo esto en cuenta, los efectos tanto negativos como positivos del tiempo de pantalla en la salud de los niños y adolescentes aún son desconocidos.

Centrándonos en los riegos, una gran variedad de estudios e investigaciones científicas demuestran que tiempos excesivos de pantallas están relacionados con una gran variedad de problemas fisiológicos y psicológicos [4, 16–21]. A continuación, se detallan, según la literatura científica hasta la fecha algunos de estos efectos negativos en la salud de la población infantil que se abordarán en la presente tesis doctoral.

1.3.1. Sueño

Según la evidencia científica existe una relación directa entre el tiempo de sueño y el tiempo de pantalla tanto para la población infantil más joven [22] como para la población de edad escolar y adolescentes [19]. Además, mantener una buena calidad de sueño, y respetar los tiempos de sueño según la edad recomendados por las instituciones, están relacionados con un menor riesgo de obesidad, mejor regulación emocional, mejor calidad de bien estar y mejor rendimiento académico [22, 23]. En España, la duración de sueño en la población de entre 0 y 14 años ha disminuido alrededor de 20 minutos entre 1987 y 2011 [24], así mismo, entre 2001 y 2017 [25]. La principal hipótesis del mecanismo entre el tiempo de pantalla y la duración de sueño es que el tiempo de pantalla desplaza el tiempo de irse a la cama, provocando iniciar el sueño más tarde y tener menos tiempo de sueño disponible ya que el momento de despertarse no se desplaza [26, 27]. Además, el uso de pantallas justo antes de irnos a dormir provoca que se reactive la actividad cerebral causando que después nos cueste más iniciar el sueño [26, 27]. En este sentido el tiempo de pantalla también puede sustituir otras rutinas más relajantes, como pueden ser el baño o el cuento, para tener una buena higiene del sueño [19].

1.3.2. Obesidad y hábitos alimentarios poco saludables

Respecto a la obesidad la evidencia científica previa muestra asociación positiva entre el tiempo de pantalla y el riesgo de tener exceso de peso en la población pediátrica [4]. La obesidad infantil sigue siendo uno de los mayores retos en la actualidad para la salud pública, habiendo alrededor de 38 millones de niños menores de 5 años en 2019 y alrededor de 340 millones de niños y adolescentes entre 5 y 18 años en 2016 con sobrepeso u obesidad en todo el mundo [28]. Esta preocupación también es presente en Europa [29], especialmente en los países mediterráneos como España, situándose por encima del 30 % la prevalencia de exceso de peso (sobrepeso y obesidad) en 2017 [30]. El sobrepeso y obesidad infantil se deben a un conjunto de factores genéticos, conductuales y ambientales, creando un desequilibro de la energía entre las calorías consumidas y las gastadas [28]. Fijándonos en los factores conductuales, la literatura previa nos muestra que patrones menos saludables, incluyendo períodos más largos de tiempo de pantallas y hábitos dietéticos menos saludables, están asociados con un mayor riesgo de sufrir adiposidad [21]. La principal hipótesis del mecanismo entre el tiempo de pantalla y la obesidad es que el tiempo de pantalla desplaza o sustituye el tiempo dedicado al ejercicio físico, el cual es un factor protector del exceso de peso [4]. Además, el tiempo de pantalla aumenta la exposición a espacios publicitarios dedicados a alimentos poco saludables desencadenando su consumo [4], así como, el tiempo de pantalla podría provocar una situación de estrés mitigada por el consumo de alimentos poco saludables [31].

Aunque, el principal efecto en la salud infantil y adolescente del consumo de alimentos poco saludables sea el exceso de peso, sus consecuencias van más allá, relacionándose con el síndrome metabólico [32], hiperactividad [33] y problemas psiquiátricos o violencia [34].

1.3.3. Salud mental

En referencia a la salud mental, la literatura científica nos muestra que períodos más largos de exposición a pantallas están asociados con más hiperactividad/déficit de atención, así como con problemas emocionales y de compañerismo [18]. En el caso de los adolescentes, existe suficiente evidencia de que hay una relación positiva entre el tiempo de pantalla y tener síntomas depresivos [35,36]. La infancia y la adolescencia son periodos cruciales para la salud mental, ya que durante ellos los niños y adolescentes adquieren habilidades cognitivas y socio-emocionales que determinan su futura salud mental [37,38]. Entre el 10–20 % de los niños y adolescentes en todo el mundo experimentan trastornos de salud mental [37]. En Europa la ansiedad y la depresión se sitúan entre las 5 causas principales de la carga general de morbilidad entre los niños y adolescentes [39]. En España en 2017, el 1.8 % de niños de entre 0 y 14 años tenía problemas de conducta, incluyendo hiperactividad, y el 0.6 % tuvo problemas mentales, incluyendo depresión y ansiedad [40]. A diferencia de los anteriores problemas fisiológicos, los mecanismos que existen entre el tiempo de pantalla y la salud mental infantil no son tan directos, ya que el tiempo de pantalla podría ser un buen predictor de una salud mental pobre, pero al mismo tiempo, los niños y adolescentes que tienen problemas psicológicos podrían preferir escudarse o pasar más tiempo frente a una pantalla [18].

1.4. Uso de pantallas en tiempos de COVID-19

Desde que el SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2), popularmente conocido como COVID-19, llegó a nuestras vidas en diciembre de 2019 los gobiernos aplicaron medidas que afectaron directamente a los hábitos de la población, especialmente la de los niños. España, fue uno de los países más restrictivos, dejando más de 8 millones de niños y adolescentes menores de 18 años totalmente confinados alrededor de 45 días, debido a que la primera mediada fue cerrar guarderías, escuelas e institutos, y prohibir a los más jóvenes salir a la calle [41]. Además, desde marzo hasta septiembre del 2020 la educación se realizó a distancia. El estar totalmente confinados ha provocado un cambio en algunas rutinas [42, 43], así como un aumento en el tiempo frente a la pantalla, debido a que las clases pasaron a ser online, y que la video llamada fue la vía predominante de comunicación entre los más jóvenes [44]. Además, debido a que las características urbanísticas de hoy en días, viviendas muy pequeñas, masificadas y sin acceso a espacios exteriores, como balcones, terrazas, patios o jardines, es mucho más fácil entretenerse con la ayuda de las pantallas que con métodos tradicionales. Finalmente, el hecho de que la mayoría de padres y madres tuvieron que trabajar desde casa, hizo que las pantallas fueran una estrategia para mantener a los niños y adolescentes tranquilos y entretenidos.

1.5. Antecedentes del tiempo de pantalla en la población pediátrica española

El primer trabajo indexado en PubMed abordando la problemática del tiempo de pantalla fue el artículo publicado por Caviedes-Altable et.al., [45] en el año 2000, utilizando una muestra de niños y adolescentes de entre 3 y 14 años que participaron en las revisiones de salud de un centro de Cantabria, en él se presentaban, entre otras cosas, el promedio de los minutos diarios de visionado de televisión y la prevalencia de niños con disposición de televisión en el dormitorio [45]. Un año más tarde se publicó un artículo en la misma línea [46]. En 2012, un estudio con una muestra de adolescentes publicó los patrones del comportamiento sedentario basado en el tiempo de pantalla, incluyendo la televisión, los juegos de ordenador, videoconsola y el uso de internet [47]. En este sentido, estos datos se actualizaron en 2017 con la publicación de un trabajo a partir de una muestra de niños y adolescentes de entre 9 y 17 años incluidos en el estudio Antropometría, Ingesta y Balance Energético en España (ANIBES), además, el tiempo de pantalla a parte del tiempo de televisión también incluía el uso de ordenador y la navegación por internet [48]. Actualmente los datos más recientes sobre el tiempo de pantalla en la población pediátrica española provienen de un estudio cuyo objetivo es determinar si la población infantil cumple las recomendaciones sanitarias de uso adecuado de pantallas recreativas (televisión y videojuegos) y evaluar las variables asociadas a un uso inadecuado [49]. En este sentido, el trabajo anterior no es el único que estudia posibles factores predictores de un uso excesivo de tiempo de pantalla, existiendo 3 artículos más que estudian los posibles factores ambientales, familiares, individuales y socioeconómicos que podrían afectar el uso de pantallas infantil [50–52].

En referencia a la asociación del tiempo de pantalla con diferentes variables de salud en la población pediátrica española, las variables de salud más estudiadas hasta el momento son el estado de peso [46, 53–57] y la actividad física [57–62] ambos tratados en 6 trabajos. En segundo lugar, tratado en cuatro estudios encontramos la dieta o frecuencia de alimentos [55,63–65]. El siguiente factor más estudiado es el sueño, incluido en dos estudios [66,67]. Finalmente, con menos representación, sólo un artículo, fueron estudiados la presencia de enfermedad crónica [46], los trastornos alimentarios [68], la salud mental [69], la imagen corporal [60], enfermedad cardiovascular [70] y salud global [71]. Dada la excepcionalidad del momento también encontramos estudios donde abordan el uso de pantallas en tiempos de pandemia, comparando el tiempo de uso antes y durante el confinamiento total debido al COVID-19 [42, 43].

Otro aspecto destacable es que la gran mayoría de los estudios que tratan el tiempo de pantalla y su asociación con la salud en la población infantil española están centrados en la población adolescente (mayor de 12 años) [42,47,48,54,56–61,67,68,70]. Además, la representación de artículos añadiendo al tiempo de pantalla el tiempo de uso de teléfono móvil, teléfono inteligente o tableta es realmente escasa, sólo incluidos en dos trabajos, destacar que los trabajos mencionados previamente están centrados básicamente en la población pre-adolescente y adolescente [42, 67].

1.6. Marco teórico conceptual del tiempo de pantalla en la población pediátrica

En la figura 1.2 se propone un marco teórico conceptual de la exposición a las pantallas en la población infantil y adolescente y los posibles mecanismos de como el tiempo de pantalla afecta a la salud de los más pequeños desarrollado por el Grupo de Evaluación de Determinantes de la Salud y Políticas Sanitarias de la Universitat Internacional de Catalunya (manuscrito científico en elaboración por el grupo).

En el marco teórico conceptual (figura 1.2) se muestra que factores biológicos (sexo, edad, altura, peso, etnia o limitaciones debidas por problemas de salud) podrían estar relacionados con el tiempo de pantalla, la topografía de uso de pantallas (contenidos, tipo de dispositivo, momento del día, tipo de día o consecuencia del comportamiento), estilos de vida y salud física, psicológica y social. El entorno familiar y socioeconómico (nivel educativo de los padres, clase social, tiempo de pantalla y estilos de vida de los padres o estructura familiar) podría afectar el tiempo de pantalla, la topografía de uso, los estilos de vida y la salud física, psicológica y social de los niños. Los estilos de vida, podrían estar relacionados con los factores biológicos, el tiempo de pantalla y la salud física, psicológica y social. La topografía de uso de pantallas estaría relacionada con el tiempo de pantalla y la salud física, psicológica y social. El tiempo de pantalla podría afectar los estilos de vida y la salud física, psicológica y social. Por último, la salud física, psicológica y social están relacionadas entre ellas, ya que para tener una buena salud es necesario tener una buena salud física, psicológica y social, tal y como se acordó en la constitución de la OMS en 1946 [72].

En este sentido, el primer mecanismo que se nos plantea es que el tiempo de pantalla sustituye o desplaza algunas actividades o rutinas que pueden ser beneficiosas para la salud, como podría ser la actividad física [61], o actividades adecuadas para tener una buena higiene del sueño [19]. Otro mecanismo que nos sugiere el marco teórico conceptual (figura 1.2) es que niños de familias con nivel socioeconómico más bajo pasan períodos más largos frente las pantallas, debido a que los padres tienen trabajos menos calificados, teniendo más dificultades por atender todas las necesidades de los niños debido a que los horarios son menos flexibles, además de tener salarios más bajos y menos recursos económicos para invertir en otras actividades extracurriculares. Así mismo, niños más mayores presentan períodos más largos frente a las pantallas, debido a que son más independientes. Por último, el marco teórico conceptual nos muestra que la topografía del uso de pantallas también puede afectar el tiempo de pantalla (tipo de aplicaciones que se suelen usar, existencia de normas de uso, etc.). Además, la figura de los padres parece ser fundamental para explicar el tiempo de pantalla de los niños, ya que el uso de pantallas de los padres puede ser un predictor del uso de pantallas de los niños [73].

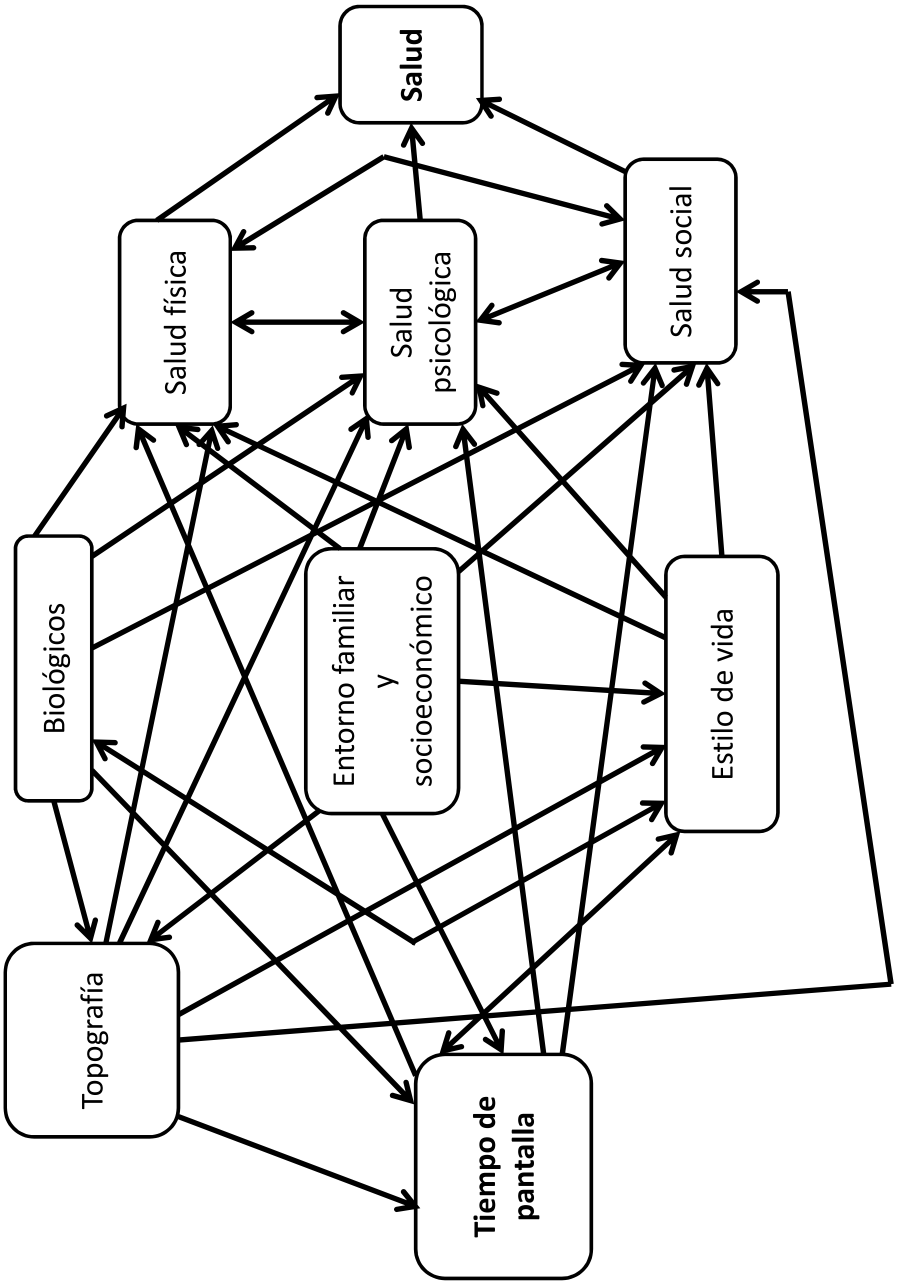

Figura 1.2: Marco teórico conceptual del tiempo de pantalla y su efecto en la salud de la población pediátrica

Capítulo 2

Hipótesis y objetivos de la tesis doctoral

2.1. Hipótesis

1. Períodos más largos de tiempo de pantalla están asociados con períodos más cortos de sueño.
2. Períodos más largos de tiempo de pantalla están asociados con una mayor probabilidad de tener exceso de peso.
3. Períodos más largos de tiempo de pantalla están asociados con peores hábitos alimentarios.
4. Períodos más largos de tiempo de pantalla están asociados con una mayor probabilidad de tener problemas psicológicos.
5. Los niños españoles menores de 5 años durante la primera ola de la pandemia del COVID-19 superaron las horas recomendadas de exposición a los teléfonos inteligentes y/o tabletas.

2.2. Objetivos

1. Describir la prevalencia de uso de pantallas de los niños españoles de entre 1 y 14 años.
2. Evaluar la asociación del uso excesivo de pantallas con la duración de sueño según la edad de los niños españoles de entre 1 y 14 años.
3. Determinar la asociación entre el tiempo de pantalla y el estado de exceso de peso y obesidad de los niños españoles de entre 2 y 14 años.
4. Evaluar la asociación del uso excesivo de pantallas con la frecuencia de consumo de dulces, refrescos, comida rápida y aperitivos en niños españoles de entre 1 y 14 años.
5. Valorar la asociación del uso excesivo de pantallas con los problemas emocionales y de comportamiento de los niños españoles de entre 4 y 14 años.
6. Caracterizar el uso de teléfonos inteligentes y tabletas durante el confinamiento total de la primera ola de la pandemia del COVID-19 en niños menores de 48 meses residentes en Barcelona.

Capítulo 3

Metódos

Para la realización de esta tesis doctoral se han utilizado dos fuentes de información distintas, la Encuesta Nacional de Salud de España (ENSE) para el año 2017 y un estudio *ad hoc* para evaluar el sueño de la población infantil en España durante el confinamiento de la primera ola de la pandemia del COVID-19 (segunda fase del estudio EpiSon: EpiSon–II). La metodología de ambas fuentes de información esta disponible en los artículos de la tesis. Sin embargo, a continuación, se detallan las metodologías brevemente:

3.1. Encuesta Nacional de Salud de España

La ENSE es un cuestionario de periodicidad quinquenal realizado conjuntamente entre el Ministerio de Salud, Consumo y Bienestar Social (MSCBS) de España y el Instituto Nacional de Estadística (INE) con el objetivo de monitorizar la salud de la población residente en España [74].

La ENSE está formada por tres cuestionarios: adultos (15 años o más) [75], menores (0-14 años) [76] y hogar [77]. Para el presente trabajo se han utilizado los datos más recientes correspondiendo al año 2017, estos incluyen 23.800 hogares seleccionados a partir de un muestreo trietápico estratificado, siendo las unidades de la primera etapa las secciones censales, las viviendas las unidades de la segunda etapa y los individuos las unidades de la tercera etapa [74]. La tasa de respuesta fue del 72.2 % [78]. Para este trabajo se ha utilizado la información obtenida por el cuestionario de menores, aunque también se ha tenido en cuenta información de los otros dos cuestionarios. Toda la información referente a los niños fue reportada por algunos de los padres o tutores legales y en el caso de la imposibilidad de alguno de los anteriores, esta información fue reportada por otros familiares.

El tiempo de pantalla fue obtenido a partir de las preguntas *"Aproximadamente ¿Cuánto tiempo suele pasar (Nombre del niño seleccionado), durante su tiempo libre de un día de entresemana (lunes-viernes) frente a una pantalla, incluyendo el ordenador, la tablet, la televisión, los vídeos, los videojuegos o la pantalla del teléfono móvil?"* y la misma pregunta pero en un día de fin de semana (sábado y domingo), que son las preguntas 62 y 63, respectivamente, del bloque descanso y actividad física (bloque K) del cuestionario de menores, ambas con tres posibles respuestas (nada o casi nada, menos de una hora y una hora o más) [76]. Entonces, diferenciando entre un día entresemana y un día de fin de semana, aquellos que contestaron una hora o más también reportaron el número de horas diarias en promedio, siendo las posibles respuestas de 1 hora hasta 12 horas. Se calculó el número medio de horas diarias frente a una pantalla para fines recreativos mediante una media ponderada [1], solo para aquellos participantes que reportaron una hora o más entre lunes y viernes, y sábado y domingo.

3.2. EpiSon–II: Segunda Fase del estudio EpiSon

El estudio EpiSon–II es la segunda fase del estudio EpiSon, cuyo objetivo es evaluar la calidad de sueño de niños menores de 3 años durante el confinamiento total de la pandemia del SARS-CoV-2. La muestra del estudio EpiSon-II se trata de una muestra no probabilística cuya información fue obtenida a partir de cuestionarios en línea (`www.epison.es`) contestados por los padres. Los pediatras del Hospital Universitario General de Cataluña (HUGC) proporcionaron la información del estudio a los padres de sus pacientes y al mismo tiempo los invitaron a participar. Además, los animaron a difundir el estudio entre otros padres, así como en foros de padres. Se recogió la muestra entre abril y junio de 2020.

El tiempo de pantalla fue obtenido a partir de la pregunta *"Durante el confinamiento, ¿cuántos minutos de media al día ha utilizado (o mostrado a) su hijo/a un Smartphone o tablet?"*. Además, se les hizo dos preguntas relacionadas con la exposición durante las comidas *"Durante el confinamiento, ¿su hijo/a ha utilizado habitualmente el Smartphone o la tablet durante las comidas (desayuno, comida y cena)?"* y antes de acostarse *"Durante el confinamiento, ¿su hijo/a ha utilizado habitualmente el Smartphone o la tablet antes de irse a dormir?"*

[1] $\frac{(\text{horas lunes} - \text{viernes})\cdot 5 + (\text{horas sábado} - \text{domingo})\cdot 2}{7}$

Capítulo 4

Resultados

4.1. Objetivos y resultados de los artículos de la tesis doctoral

La presente tesis doctoral lo forman un compendio de 3 artículos científicos publicados en revistas indexadas, 2 manuscritos que se encuentran actualmente en revisión en revistas indexadas y de una carta al editor publicada en una revista indexada. Se adjunta en la sección de Anexos la correspondencia con editores y revisores hasta la aceptación de los artículos publicados y los derechos y permisos de incluir los artículos que estan publicados mediante suscripción en la presente tesis (ver Anexos A, B, C y D). Además, la doctoranda ha participado como primera autora en 3 artículos científicos publicados en revistas indexadas (ver Anexos E.1, E.2 y E.3) que no son parte de la presente tesis doctoral y forman parte de su formación como estudiante de doctorado. Además, también se incluye un artículo de divulgación científica de los resultados de la presente tesis publicado en la plataforma de divulgación The Conversation[1] (ver Anexo G), la presentación presentada en el concurso "Explica tu tesis en 4 minutos" organizado por la Fundació Catalana per la Recerca i la Innovació (FCRi) (ver Anexo H) y el impacto mediático de los artículos publicados en la presente tesis doctoral (ver Anexos I e J).

A continuación, se expone los objetivos y principales resultados de los artículos y manuscritos de la tesis doctoral, así como la carta al editor:

1. Àurea Cartanyà-Hueso, Cristina Lidón-Moyano, Juan Carlos Martín-Sánchez, Adrián González-Marrón, Nuria Matilla-Santander, Queralt Miró, Jose M Martínez-Sánchez. Association of screen time and sleep duration among Spanish 1-14 years old children. Paediatr Perinat Epidemiol. 2021; 35: 120—129. `https://doi.org/10.1111/ppe.12695`

   Paediatric and Perinatal Epidemiology es una revista indexada en el Journal Citation Report de ISI–Web of science con un factor de impacto 2.917 (posición 18 de 128 en la categoria de Pediatrics) en el 2019.

   - Objetivo: Describir el tiempo diario de pantalla recreativo y evaluar la asociación entre el tiempo de pantalla dedicado a fines recreativos y la duración de sueño en niños españoles de entre 1 y 14 años.
   - Resultados: El 44.3 % de los niños pasaron al menos 120 minutos diarios de tiempo de pantalla recreativo. El 24.5 % y el 28.2 % de los niños que pasaban entre 120 minutos y 179 minutes, y al menos 180 minutos frente a una pantalla durante su tiempo libre tenían una duración de sueño insuficiente según su edad.

[1] `https://theconversation.com/el-lado-oscuro-de-las-pantallas-147383`

2. Àurea Cartanyà-Hueso, Cristina Lidón-Moyano, Adrián González-Marrón, Juan Carlos Martín-Sánchez, Jose M. Martínez-Sánchez. Screen time use and sleep in children: are there differences among social classes?. Sleep Medicine. 2020; 68:153. `https://doi.org/10.1016/j.sleep.2019.12.006.`

   Sleep Medicine es una revista indexada en el Journal Citation Report de ISI–Web of science con un factor de impacto 3.038 (posición 80 de 204 en la categoria de Clinical Neurology) en el 2019.

   - Objetivo: Describir el tiempo de pantalla y el porcentaje de duración de sueño insuficiente según la posición socioeconómica del hogar.
   - Resultados: Posiciones socioeconómicas más bajas del hogar presentan porcentajes más elevados de superar la hora diaria de tiempo de pantalla durante su tiempo libre y de dormir insuficiente según la edad del niño.

3. Àurea Cartanyà-Hueso, Cristina Lidón-Moyano, Juan Carlos Martín-Sánchez, Adrián González-Marrón, Hipólito Pérez-Martín, Jose M Martínez-Sánchez. Association between excess weight and obesity assessed through three different sets of criteria and leisure screen time among spanish 2-14 years. [Manuscrito en revisión]

   Este manuscrito está en revisión en una revista indexada en el Journal Citation Report de ISI–Web of science.

   - Objetivo: Determinar la relación entre el tiempo de pantalla de ocio diario y el exceso de peso (sobrepeso más obesidad) y obesidad utilizando diferentes criterios en niños españoles de entre 2 y 14 años.
   - Resultados: Utilizar las pantallas para el ocio al menos 180 minutos diarios está asociado con una mayor prevalencia de tener exceso de peso y obesidad, y un mayor número esperado de criterios de exceso de peso cumplidos.

4. Àurea Cartanyà-Hueso, Adrián González-Marrón, Cristina Lidón-Moyano, Esteve Garcia-Palomo, Juan Carlos Martín-Sánchez, Jose M Martínez-Sánchez. Association between leisure screen time and junk food intake in a nationwide representative sample of spanish children (1–14 years): A cross–sectional study. Healthcare. 2021; 9(2):228. `https://doi.org/10.3390/healthcare9020228`

   Healthcare es una revista indexada en el Journal Citation Report de ISI–Web of science con un factor de impacto 1.916 (posición 62 de 102 en la categoria de Health Care Sciences & Services) en el 2019.

   - Objetivo: Determinar la asociación entre el tiempo de pantalla para fines recreativos y la frecuencia de consumo de dulces, refrescos, comida rápida y aperitivos en una muestra representativa de españoles de entre 1 y 14 años.

- Resultados: Los niños que pasaron al menos 1 hora al día frente a una pantalla durante su tiempo libre tenían un porcentaje significativamente mayor de alta frecuencia de consumo de dulces y aperitivos en comparación con los niños que tenían un tiempo de pantalla para fines recreativos diario inferior a la hora. En el caso de los refrescos y la comida rápida, el porcentaje de alta frecuencia de consumo fue significativamente superior a partir de las dos y tres horas, respectivamente.

5. Àurea Cartanyà-Hueso, Cristina Lidón-Moyano, Adrián González-Marrón, Juan Carlos Martín-Sánchez, Franco Amigo, Jose M Martínez-Sánchez. Association between screen time and emotional and behavioural problems in Spanish children. [Manuscrito en revisión]

   Este manuscrito está en revisión en una revista indexada en el Journal Citation Report de ISI–Web of science.

   - Objetivo: Determinar la asociación entre el tiempo de pantalla para fines recreativos y los problemas emocionales y de comportamiento en niños y adolescentes españoles de entre 4 y 14 años.
   - Resultados: Los niños que pasaron al menos tres horas diarias delante de una pantalla durante su tiempo libre tenían un mayor porcentaje de tener una alta probabilidad de estar a riesgo de tener problemas emocionales y de comportamiento.

6. Àurea Cartanyà-Hueso, Cristina Lidón-Moyano, Pia Cassanello, Ana Díez-Izquierdo, Juan Carlos Martín-Sánchez, Albert Balaguer, Jose M Martínez-Sánchez. Smartphone and tablet usage during COVID-19 pandemic confinement in children under 48 months in Barcelona (Spain). Healthcare. 2021; 9(1):96. `https://doi.org/10.3390/healthcare9010096`

   Healthcare es una revista indexada en el Journal Citation Report de ISI–Web of science con un factor de impacto 1.916 (posición 62 de 102 en la categoria de Health Care Sciences & Services) en el 2019.

   - Objetivo: Describir el uso de teléfonos inteligentes y tabletas durante el primer confinamiento total debido a la pandemia del COVID-19 en niños menores de 48 meses residentes en Barcelona.
   - Resultados: Durante el confinamiento total debido a la pandemia del COVID-19, el 67.5 % de los niños menores de 48 meses fueron expuestos diariamente a los teléfonos inteligentes y tabletas. Además, los niños que estaban expuestos durante las comida y justo antes de irse a la cama presentaban períodos diarios más largos de exposición o uso a teléfonos inteligentes y tabletas.

Además, en los anexos E.1, E.2 y E.3 se adjuntan los siguientes trabajos que forman parte de la formación previa al doctorado de la estudiante (primera autora en todos ellos) pero no de la tesis doctoral. También se adjunta el impacto mediático de los artículos anteriores (ver Anexo K).

1. Àurea Cartanyà-Hueso, Cristina Lidón-Moyano, Marcela Fu, Raúl Perez-Ortuño, Montse Ballbè, Nuria Matilla-Santander, Juan Carlos Martín-Sánchez, José A. Pascual, Esteve Ferenández, Jose M. Martínez-Sánchez. Comparison of TSNAs concentration in saliva according to type of tobacco smoked. Environmental Research. 2019. 172:73–80. `https://doi.org/10.1016/j.envres.2018.12.006`

   Environmental Research es una revista indexada en el Journal Citation Report de ISI–Web of science con un factor de impacto 5.715 (posición 15 de 193 en la categoria de Public, Environmental & Occupational Health) en el 2019.

2. Àurea Cartanyà-Hueso, Cristina Lidón-Moyano, Marcela Fu, Montse Ballbè, Juan Carlos Martín-Sánchez, Adrián González-Marrón, Nuria Matilla-Santander, Jose M. Martínez-Sánchez. Apoyo a la regulación de fumar en el interior de vehículos privados y espacios públicos al aire libre. Rev Esp Salud Pública. 2019. 93.

   Revista Española de Salud Pública es una revista indexada en el Journal Citation Report de ISI–Web of science con un factor de impacto 0.746 (posición 159 de 171 en la categoria de Public, Environmental & Occupational Health) en el 2019.

3. Àurea Cartanyà-Hueso, Juan Carlos Martín-Sánchez, Cristina Lidón-Moyano, Adrián González-Marrón, Jose M. Martínez-Sánchez. Differences in sleep duration in a territory with the same time zone according to the geographic longitude: the spanish case. 2021. 82:151–154 `https://www.sciencedirect.com/science/article/pii/S1389945721002094`

   Sleep Medicine es una revista indexada en el Journal Citation Report de ISI–Web of science con un factor de impacto 3.038 (posición 80 de 204 en la categoria de Clinical Neurology) en el 2019.

4.2. Artículo I

Association of screen time and sleep duration among Spanish 1-14 years old children

Received: 15 January 2020 | Revised: 8 May 2020 | Accepted: 12 May 2020

DOI: 10.1111/ppe.12695

ORIGINAL ARTICLE

Paediatric and Perinatal Epidemiology WILEY

Association of screen time and sleep duration among Spanish 1-14 years old children

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Abstract

Background: Due to the change in screen time usage in the last decade, there is needed to add more evidence about the relationship of screen time and sleep duration.

Objective: To assess the association between screen time and sleep duration among Spanish children between 1 and 14 years old.

Methods: We used data from the 2017 Spanish National Health survey, conducted on a representative sample of the Spanish population. We categorised daily leisure screen time as 0-59, 60-119, 120-179, and ≥180 minutes. We classified sleep duration, depending on the age, as proper sleep duration and short sleep duration. We calculated unadjusted, and adjusted prevalence ratio (PR) and 95% confidence interval (CI) of short sleep duration according to daily leisure screen time after adjusting for potential confounders. PR's were derived from fitting generalised linear models with Poisson distribution and robust variance.

Results: Of the 5517 Spanish children aged 1-14 years, 44.3% spent 120 minutes or more of daily leisure screen time and 23.6% had short sleep duration. 24.5% and 28.2% of children spending between 120 and 179 minutes and exceeding 180 minutes of daily leisure screen time suffered short sleep duration, respectively. In the adjusted model, higher patterns of daily leisure screen time were associated with short sleep duration: adjusted $PR_{120\text{-}179}$ = 1.34 (95% CI 1.18, 1.54) and adjusted $PR_{\geq 180}$ = 1.48 (95% CI 1.27, 1.73).

Conclusions: Around one out of four Spanish children between 1 and 14 years old, exceeding 120 minutes of daily leisure screen time, had short sleep duration. More scientific research is needed for institutions to work on providing novel healthcare programmes that consider these new determinants of child health.

KEYWORDS
children, electronic devices, screen time, sleep duration

1 | BACKGROUND

Over the last decades, the use of screens has considerably changed. At the end of the 20th century and beginning of the 21st century, leisure screen time consisted mainly in the exposure to TV and videogames. However, when smartphones and tablets appeared, in 2007 and 2010, respectively, screen time moved to these new devices, decreasing the time of people watching TV and increasing the time using smartphones and tablets.[1] Other important change related to the use of screen devices is the age of the first contact with digital media, which shifted from 4 years to 4 months, among children born since 2010s.[1] In this sense, the World Health Organization (WHO) has recently recommended that children below 2 years of age should not be exposed to screens and those who are between 2 and 5 years old are not recommended to spend more than 1 hour daily in front of a screen.[2] In 2016, the American Academy of Pediatrics (AAP) recommended avoiding the use of screen media in children under 18 months, controlling what children watch and reducing the exposure time to <1 hour daily in children between 2 and 5 years old.[3]

The recommendations of the WHO and AAP are based on scientific evidence showing that longer screen time exposure is associated with negative health effects, such as unhealthy lifestyles, obesity, and depressive symptoms.[4,5] Shorter sleep duration is directly related to increased risk of obesity, poorer emotional regulation, quality of life/well-being, and academic achievement.[6,7] Further, sleep duration has considerably decreased in the paediatric population.[6] In Spain, sleep duration has decreased by 20 minutes in children between 2 and 14 years old.[8] Focusing on the different groups of age, sleep duration among children between 2 and 5 years old decreased by 24 minutes, from 10 hours and 40 minutes in 1987 to 10 hours and 16 minutes in 2011.[8] In reference to those children between 6 and 9 years, total sleep duration decreased by 20 minutes from 1987 to 2011, from 9 hours and 51 minutes in 1987 to 9 hours and 31 minutes in 2011.[8] Finally, sleep duration among children between 10 and 14 years old decreased by 27 minutes, from 9 hours and 19 minutes in 1987 to 8 hours and 52 minutes in 2011.[8] Screen time may replace activities and routines that are relaxing and that promote more adequate sleep hygiene,[9] defined as a variety of different practices and habits that are necessary to have better sleep quality and full daytime alertness.[10] Additionally, evidence suggests that other environmental aspects such as the region of residence[11-13] or culture[14] are associated with sleep patterns. A previous study[15] showed that children between 2 and 9 years from Mediterranean countries, including Spain, and Eastern countries, have shorter nocturnal sleep duration compared with Northern countries.[15] Focusing on Spain, some non-scientific articles discussed that this difference might be due to Spanish schools ending the day later than schools from Northern countries, the Spanish having longer working hours, and having dinner later, consequently going to bed later, despite the waking time being almost the same in all the European countries.[16,17]

Previous systematic reviews, which included both cross-sectional[18] and longitudinal[9] studies, showed a negative association between screen time and sleep duration in children from 4 to 15 years old.[9,18] Both systematic reviews[9,18] included studies conducted in Spain. However, to the best of our knowledge, there is lack of evidence about the relationship between screen time and sleep duration using a representative sample at the national level in Spain. Therefore, we hypothesise that there is an adverse association between screen time and sleep duration. In this sense, the objective of this study is to assess the relationship between leisure screen time and sleep duration using a representative sample of Spanish children aged from 1 to 14 years old.

Synopsis

Study question

Is there an inverse association between screen time and sleep duration among Spanish children between 1 and 14 years old?

What's already known

Increasing scientific evidence shows that higher screen time patterns are associated with negative health effects, including sleep duration.

What this study adds

This study provides updated information about screen time patterns and sleep duration in the Spanish context and corroborates the possible adverse effect between screen time and sleep duration in children.

2 | METHODS

We used data from the 2017 Spanish National Health Survey, conducted on a representative sample of the Spanish population. All the participants were included in the sample through stratified sampling, according to the size of the municipality, conducted in three steps, being the first census tracts, the second family dwellings, and the third individuals. The data were collected through a face-to-face questionnaire from October 2016 to October 2017.[19] The initial sample included 6106 children younger than 15 years old. All the information associated with the children was reported by an informant. The exclusion criteria for the purposes of our study were as follows: (a) to have a limitation to do any children activity due to health issues. Due to the nature of the questionnaire we cannot exclude any specific issue, only those children who declared having a limitation due to health issues in the last 6 months, (n = 332), (b) to be < 1-year-old, because the questionnaire methodology exempted children under 1-year-old from answering leisure screen time questions (n = 256), and (c) to have a Biologically Implausible Value (BIV) according to the sleep duration (n = 1). Hence, the final sample consisted of 5517 healthy children between 1 and 14 years old.

2.1 | Study variables

2.1.1 | Leisure screen time

Data on the duration of leisure screen time exposure were retrieved through questions: "During the leisure time of the child, how much time does the child spend in front of the screen, including laptop, tablet, TV, videos, videogames or smartphones?", differentiating between weekday (from Monday to Friday) and weekend day (Saturday and Sunday), with 3 possible responses (Never or almost never, <1 and 1 hour or more). Then, for those who responded that they spent 1 hour or more in front of the screen in a weekday and/or in a weekend day, they declared the average number of hours that they spent in front of it in a weekday and/or in a weekend day. We recalculated the average number of hours in front of a screen daily through a weighted mean (we have summed the reported hours from weekdays multiplied by 5 and the reported hours from weekend days multiplied by 2, and then divided it by 7) only for those who spending 1 hour or more in a weekday and in a weekend day. Using both questions, we created a daily leisure screen time variable with four categories as 0-59, 60-119, 120-179, and ≥180 minutes.

2.1.2 | Sleep duration

The questionnaire collected the sleep duration variable through the question "Could you say, approximately, how much time the child usually sleeps daily? Including naps." We used the recommendation of the National Sleep Foundation (NSF) about the number of hours' sleep needed according to the age. These recommendations arise from an 18-member multidisciplinary expert panel,[20,21] being from 11 to 14 hours for children between 1 and 2 years old, from 10 to 13 hours for children between 3 and 5 years, from 9 to 11 hours for children between 6 and 13 years, and from 8 to 10 hours for children between 14 and 17 years.[20,21] Then, we constructed the sleep duration variable differentiating those who sleep for a duration of time equal or greater to the lower boundary than the NSF recommended according to the age, classified as (a) proper sleep duration, and those who sleep less than recommended, classified as (b) short sleep duration.

2.1.3 | Potential confounders

Based on literature, we selected the following variables as potential confounders. Sociodemographic features of the children: Sex, because evidence at national level[22] show differences in screen time behaviour according to sex. Age, categorised according to the Spanish school system, as we assume that children on the same school stage have similar school hours and routines (from 1 to 2 years old, from 3 to 5 years old, from 6 to 11 years old and from 12 to 14 years old). Moreover, features of the children's family; relationship between the person answering the questionnaire and the child (father/mother, legal guardian, brother/sister, grandparent, other family member, and other relationship); education level of the parents (low: unschooled, elementary school completed or uncompleted and special education, medium: high school and training cycles and, high: university education); family model (couple, single-parent family, couple or single-parent family with other members of the family, and others); social class: Class I (directors, managers, university professionals), Class II (intermediate occupations and freelancers), and Class III (manual workers).[23] And finally, behavioural features of the children; physical activity (no exercise, occasional physical activity, physical activity several times per month and, physical activity several times per week); and *z*-score of the Body Mass Index for age (BMI-for-age), through self-reported weight and height, calculated according to the child growth standards of the WHO.[24,25] We treated as missing data those *z*-scores of weight-for-age, height-for-age, and BMI-for-age classified as BIV.[26-28]

2.2 | Statistical analysis

We calculated the percentage of the different categories of the daily leisure screen time variable, unadjusted prevalence ratio (PR) and their 95% confidence interval (CI) according to potential confounders. We calculated the overall prevalence of short sleep duration, unadjusted, and adjusted PR, according to daily leisure screen time and potential confounders. Additionally, we stratified these analyses by (a) child's age and (b) child's age and parent's education level. Associations were adjusted for daily leisure screen time, sex and age of the child, relationship between the person answering the questionnaire and the child, education level, family model, physical activity, and BMI-for-age *z*-score, except for those PR corresponding to social class that were adjusted for daily leisure screen time, sex and age of the child, relationship between the person answering the questionnaire and the child, social class, family model, physical activity, and BMI-for-age *z*-score. We did not adjust the PR for education level and social class jointly in order to avoid collinearity, and we adjusted the majority of PR for education level instead of social class because the first one had less missing data (missing data education level: 197 vs missing data social class: 397). PR's were derived from fitting generalised linear models with Poisson distribution and robust variance.[29] The statistical program used was R-3.5.2.

2.3 | Missing data

The variables sleep duration, sex and age of the child, relationship between the person answering the questionnaire and the child, and model family did not have missing data. Daily leisure screen time had 21 (0.4%), education level had 197 (3.6%), social class had 397

TABLE 1 Percentages and prevalence ratios of daily leisure screen time, overall and according to potential confounders

	Daily leisure screen time								
	n (%)	0-59 min (n = 1610)	PR (95% CI)	60-119 min (n = 1447)	PR (95% CI)	120-179 min (n = 1574)	PR (95% CI)	≥180 min (n = 865)	PR (95% CI)
Overall	5517 (100)	29.3		26.3		28.6		15.7	
Sex of the child									
Male	2865 (51.9)	28.7	1.00 (Reference)	25.6	1.00 (Reference)	29.7	1.00 (Reference)	16	1.00 (Reference)
Female	2652 (48.1)	29.9	1.04 (0.96, 1.13)	27.1	1.06 (0.97, 1.15)	27.5	0.93 (0.85, 1.01)	15.5	0.97 (0.86, 1.10)
Age of the child (y)									
1-2	739 (13.4)	59.1	1.00 (Reference)	22.2	1.00 (Reference)	13.8	1.00 (Reference)	4.9	1.00 (Reference)
3-5	1043 (18.9)	33.2	0.56 (0.51, 0.62)	30.8	1.39 (1.18, 1.64)	26.9	1.95 (1.59, 2.40)	9.0	1.84 (1.27, 2.67)
6-11	2358 (42.7)	25.9	0.44 (0.40, 0.48)	29.5	1.33 (1.15, 1.54)	30.4	2.20 (1.82, 2.66)	14.3	2.90 (2.08, 4.04)
12-14	1377 (25.0)	16.3	0.28 (0.24, 0.31)	19.8	0.89 (0.75, 1.06)	34.9	2.52 (2.08, 3.07)	29.1	5.91 (4.25, 8.21)
Relationship between the person answering the questionnaire and the child									
Parents	5204 (94.3)	29.2	1.00 (Reference)	26.5	1.00 (Reference)	28.8	1.00 (Reference)	15.4	1.00 (Reference)
Others[a]	313 (5.7)	30.1	1.03 (0.86, 1.23)	23.3	0.88 (0.71, 1.08)	25.6	0.89 (0.73, 1.08)	21	1.36 (1.09, 1.71)
Education level of the parents									
High	1808 (32.8)	35.1	1.00 (Reference)	28.6	1.00 (Reference)	26.4	1.00 (Reference)	9.8	1.00 (Reference)
Medium	3056 (55.4)	25.9	0.74 (0.68, 0.80)	25.9	0.9.0 (0.82, 0.99)	29.9	1.13 (1.03, 1.24)	18.3	1.87 (1.59, 2.19)
Low	456 (8.3)	29.3	0.83 (0.71, 0.97)	19.4	0.68 (0.55, 0.83)	30.4	1.15 (0.98, 1.35)	20.9	2.13 (1.70, 2.68)
Social class[b]									
Class I	1145 (20.8)	34.0	1.00 (Reference)	27.4	1.00 (Reference)	27.9	1.00 (Reference)	10.7	1.00 (Reference)
Class II	1002 (18.2)	29.6	0.88 (0.78, 1.00)	28.3	1.03 (0.91, 1.17)	28.1	1.00 (0.88, 1.15)	13.9	1.27 (1.02, 1.58)
Class III	2973 (53.9)	26.8	0.81 (0.73, 0.89)	24.9	0.91 (0.82, 1.02)	29.9	1.06 (0.96, 1.18)	18.4	1.66 (1.40, 1.98)
Family model									
Couple	4303 (78.0)	29.3	1.00 (Reference)	27.0	1.00 (Reference)	28.7	1.00 (Reference)	15.0	1.00 (Reference)
Single-parent family	607 (11.0)	27.0	0.92 (0.80, 1.06)	24.3	0.90 (0.78, 1.05)	29.6	1.03 (0.90, 1.18)	19.0	1.27 (1.06, 1.52)
Couple or single-parent family with family	445 (8.1)	29.8	1.02 (0.88, 1.18)	24.4	0.90 (0.76, 1.07)	28.2	0.98 (0.84, 1.15)	17.5	1.17 (0.94, 1.45)
Others	162 (2.9)	36.0	1.23 (1.00, 1.52)	22.4	0.83 (0.62, 1.11)	23.6	0.82 (0.62, 1.09)	18.0	1.20 (0.86, 1.68)
Physical activity									
No exercise	1191 (21.6)	37.1	1.00 (Reference)	24.1	1.00 (Reference)	23	1.00 (Reference)	15.9	1.00 (Reference)

(Continues)

TABLE 1 (Continued)

	Daily leisure screen time								
		0-59 min (n = 1610)		60-119 min (n = 1447)		120-179 min (n = 1574)		≥180 min (n = 865)	
	n (%)		PR (95% CI)		PR (95% CI)		PR (95% CI)		PR (95% CI)
Occasional activity	1366 (24.8)	29.3	0.79 (0.71, 0.88)	24.9	1.04 (0.90, 1.19)	30.8	1.34 (1.18, 1.53)	15.0	0.94 (0.79, 1.13)
Several times per month	1420 (25.7)	27.1	0.73 (0.65, 0.82)	25.8	1.07 (0.94, 1.23)	30.1	1.31 (1.15, 1.49)	17.1	1.07 (0.90, 1.28)
Several times per week	1514 (27.4)	24.7	0.66 (0.59, 0.75)	30.0	1.25 (1.10, 1.42)	30.0	1.31 (1.15, 1.49)	15.3	0.96 (0.81, 1.15)
	n (%)	Mean (SD)	PR (95% CI)	Mean (SD)	PR (95% CI)	Mean (SD)	PR (95% CI)	Mean (SD)	PR (95% CI)
BMI-for-age z-score[b,c]	4606 (83.5)	0.49 (1.42)	0.99 (0.96, 1.02)	0.54 (1.42)	1.01 (0.98, 1.04)	0.51 (1.39)	1.00 (0.97, 1.03)	0.51 (1.41)	1.00 (0.96, 1.05)

Abbreviations: PR, Unadjusted prevalence ratio; SD, standard deviation.

[a]Includes legal guardians, brothers/sisters, grandparents, other family members, and other relationships.

[b]Imputation data for those variables whose proportion of missing data was higher than 5%.

[c]z-score: standardised value of the BMI-for-age through self-reported weight and height, and calculated according to the child growth standards of the WHO.

(7.2%), physical activity had 26 (0.5%), and BMI-for-age *z*-score had 911 (16.5%) missing data. Therefore, for those variables that have more than 5% of missing data, we used multiple imputation through predictive mean matching method with 50 imputations to impute missing data and included the imputed variable in the models.

2.4 | Ethics approval

All data used in this study are legally accessible to the public and appropriately protected by the law (the information was publicly anonymised data), for this reason, ethical approval was not required.

3 | RESULTS

This study included 5517 Spanish children: 51.9% were male, on average they were 7.9 years old, the parents answered 94.3% of the questionnaires, 55.4% of the parents reported having medium education level, and 53.9% of the parents belonged to low social class.

Table 1 shows the percentage and the unadjusted PR of daily leisure screen time use according to potential confounders. 44.3% of children spend 120 minutes or more in front of a screen. The prevalence of 180 minutes or more in front of a screen increased according to the age, and decreased according to education level and social class. These patterns remained when we calculated the unadjusted PR for the age, education level, and social class.

Table 2 shows the prevalence of short sleep duration, unadjusted, and adjusted PR according to daily leisure screen time and potential confounders. The prevalence of short sleep duration was 23.6%. This prevalence increased according to daily leisure screen time (from 21.3% to 28.2%). This pattern remained even after we adjusted for potential confounders (reference: 0-59 minutes) adjusted $PR_{60\text{-}119}$ = 1.20 (95% CI 1.05, 1.38), adjusted $PR_{120\text{-}179}$ = 1.34 (95% CI 1.18, 1.54), and adjusted $PR_{\geq 180}$ = 1.48 (95% CI 1.27, 1.73). Regarding to potential confounders, the prevalence of short sleep duration decreased according to education level and social class. These patterns remained after adjusting for other potential confounders in the case of education level.

Table 3 shows the prevalence of short sleep duration, unadjusted, and adjusted PR according to daily leisure screen time stratified by child's age and stratified by age and education level of the parents jointly. Rather convincing evidence suggests that the prevalence of short sleep duration increased according to daily leisure screen time in those children between 3 and 5 years, and in those children between 6 and 11 years. These patterns were kept robust after adjusting for potential confounders for those children between 3 and 5 years, and for those children between 6 and 11 years. Moreover, these patterns were maintained even after stratifying by age and education level of parents jointly, for those children between 3 and 5 years old with parents with medium education level, and for those children between 6 and 11 years old with parents with medium education level, as well as, with high education level.

TABLE 2 Prevalence of short sleep duration and its association with daily leisure screen time and potential confounders

	Short sleep duration[a]			
	n (%)	%	Unadjusted PR (95% CI)	Adjusted PR (95% CI)
Overall	5517 (100)	23.6		
Daily leisure screen time (min)				
0-59	1610 (29.2)	21.3	1.00 (Reference)	1.00 (Reference)
60-119	1447 (26.2)	22.0	1.03 (0.90, 1.18)	1.20 (1.05, 1.38)[b]
120-179	1574 (28.5)	24.5	1.15 (1.01, 1.31)	1.34 (1.18, 1.54)[b]
≥180	865 (15.7)	28.2	1.32 (1.15, 1.53)	1.48 (1.27, 1.73)[b]
Sex of the child				
Male	2865 (51.9)	23.2	1.00 (Reference)	1.00 (Reference)
Female	2652 (48.1)	24.0	1.03 (0.94, 1.14)	1.04 (0.94, 1.14)[b]
Age of the child (y)				
1-2	739 (13.4)	39.2	1.00 (Reference)	1.00 (Reference)
3-5	1043 (18.9)	25.3	0.65 (0.56, 0.74)	0.60 (0.52, 0.69)[b]
6-11	2358 (42.7)	16.0	0.41 (0.36, 0.46)	0.37 (0.32, 0.44)[b]
12-14	1377 (25.0)	26.8	0.68 (0.60, 0.77)	0.61 (0.52, 0.71)[b]
Relationship between the person answering the questionnaire and the child				
Parents	5204 (94.3)	23.2	1.00 (Reference)	1.00 (Reference)
Others[c]	313 (5.7)	29.4	1.27 (1.06, 1.51)	1.06 (0.82, 1.38)[b]
Education level of the parents				
High	1808 (32.8)	20.2	1.00 (Reference)	1.00 (Reference)
Medium	3056 (55.4)	24.5	1.22 (1.09, 1.36)	1.17 (1.05, 1.31)[b]
Low	465 (8.3)	27.9	1.38 (1.16, 1.64)	1.29 (1.08, 1.54)[b]
Social class[d]				
Class I	1145 (20.8)	20.5	1.00 (Reference)	1.00 (Reference)
Class II	1002 (18.2)	23.0	1.1 (0.95, 1.29)	1.09 (0.93, 1.27)[e]
Class III	2973 (53.9)	25.0	1.2 (1.06, 1.36)	1.13 (1.00, 1.28)[e]
Family model				
Couple	4303 (78.0)	22.4	1.00 (Reference)	1.00 (Reference)
Single-parent family	607 (11.0)	26.9	1.20 (1.04, 1.39)	1.18 (1.03, 1.36)[b]
Couple or single-parent family with family	445 (8.1)	29.4	1.32 (1.13, 1.54)	1.11 (0.93, 1.33)[b]
Others	162 (2.9)	27.2	1.21 (0.94, 1.57)	1.07 (0.78, 1.47)[b]
Physical activity				
No exercise	1191 (21.6)	29.7	1.00 (Reference)	1.00 (Reference)
Occasional activity	1366 (24.8)	26.4	0.89 (0.78, 1.00)	1.04 (0.91, 1.18)[b]
Several times per month	1420 (25.7)	21.2	0.71 (0.62, 0.81)	1.00 (0.86, 1.16)[b]
Several times per week	1514 (27.4)	18.4	0.62 (0.54, 0.71)	0.87 (0.74, 1.02)[b]
	n (%)	**Mean (SD)**	**Unadjusted PR (95% CI)**	**Adjusted PR (95% CI)**
BMI-for-age *z*-score[d,f]	4606 (83.5)	0.65 (1.48)	1.07 (1.03, 1.10)	1.07 (1.03, 1.10)[b]

Abbreviations: PR, prevalence ratio; SD, standard deviation.

[a]Short sleep duration: defined as sleep less than lower limit purposed by the National Sleep Foundation.

[b]Adjusted for daily leisure screen time, sex of the child, age of the child, relationship of the child with the questionnaire respondent, education level of the parents, family model, physical activity, and BMI-for-age *z*-score.

[c]Includes legal guardians, brothers/sisters, grandparents, other family members, and other relationships.

[d]Imputation data for those variables whose proportion of missing data was higher than 5%.

[e]Adjusted for daily leisure screen time, sex of the child, age of the child, relationship of the child with the questionnaire respondent, social class, family model, physical activity, and BMI-for-age *z*-score.

[f]*z*-score: standardised value of the BMI-for-age through self-reported weight and height, and calculated according to the child growth standards of the WHO.

TABLE 3 Association of daily leisure screen time and short sleep duration stratified by age of the child and by age of the child and parents' education level jointly

		Short sleep duration[a]											
		Child's age 1-2 y			Child's age 3-5 y			Child's age 6-11 y			Child's age 12-14 y		
	Daily leisure screen time (min)	%	Unadjusted PR (95% CI)	Adjusted PR (95% CI)	%	Unadjusted PR (95% CI)	Adjusted PR (95% CI)	%	Unadjusted PR (95% CI)	Adjusted PR (95% CI)	%	Unadjusted PR (95% CI)	Adjusted PR (95% CI)
Overall	0-59	35.4	1.00 (Reference)	1.00 (Reference)	20.9	1.00 (Reference)	1.00 (Reference)	11.0	1.00 (Reference)	1.00 (Reference)	22.9	1.00 (Reference)	1.00 (Reference)
	60-119	45.1	1.27 (1.03, 1.57)	1.27 (1.02, 1.57)[b]	24.4	1.17 (0.88, 1.55)	1.14 (0.85, 1.52)[b]	14.6	1.33 (0.99, 1.77)	1.35 (1.01, 1.81)[b]	24.4	1.06 (0.77, 1.47)	1.05 (0.76, 1.46)[b]
	120-179	43.6	1.23 (0.95, 1.59)	1.20 (0.93, 1.55)[b]	28.2	1.35 (1.02, 1.78)	1.31 (0.99, 1.74)[b]	17.1	1.55 (1.18, 2.05)	1.50 (1.13, 2.00)[b]	29.5	1.29 (0.98, 1.70)	1.24 (0.93, 1.64)[b]
	≥180	47.2	1.33 (0.92, 1.93)	1.23 (0.83, 1.82)[b]	35.1	1.68 (1.19, 2.37)	1.53 (1.08, 2.18)[b]	25.3	2.30 (1.72, 3.08)	2.06 (1.52, 2.80)[b]	27.3	1.19 (0.89, 1.60)	1.14 (0.85, 1.53)[b]
Low education level	0-59	31.4	1.00 (Reference)	1.00 (Reference)	31.3	1.00 (Reference)	1.00 (Reference)	17.2	1.00 (Reference)	1.00 (Reference)	16.7	1.00 (Reference)	1.00 (Reference)
	60-119	50.0	1.59 (0.68, 3.72)	1.12 (0.53, 2.37)[c]	40.0	1.28 (0.49, 3.33)	1.23 (0.42, 3.57)[c]	20.0	1.16 (0.51, 2.61)	1.22 (0.55, 2.70)[c]	30.0	1.80 (0.59, 5.50)	1.68 (0.55, 5.14)[c]
	120-179	66.7	2.12 (1.00, 4.48)	2.00 (0.89, 4.48)[c]	52.2	1.67 (0.73, 3.81)	1.16 (0.49, 2.76)[c]	22.6	1.31 (0.63, 2.71)	1.37 (0.65, 2.88)[c]	23.4	1.40 (0.50, 3.95)	1.55 (0.59, 4.10)[c]
	≥180	66.7	2.12 (1.00, 4.48)	2.31 (0.93, 5.74)[c]	30.8	0.98 (0.33, 2.94)	0.81 (0.33, 2.00)[c]	30.0	1.74 (0.83, 3.63)	1.61 (0.76, 3.41)[c]	25.0	1.50 (0.52, 4.32)	1.48 (0.54, 4.06)[c]
Medium education level	0-59	36.6	1.00 (Reference)	1.00 (Reference)	21.8	1.00 (Reference)	1.00 (Reference)	12.5	1.00 (Reference)	1.00 (Reference)	26.1	1.00 (Reference)	1.00 (Reference)
	60-119	41.4	1.13 (0.83, 1.54)	1.11 (0.81, 1.51)[c]	25.3	1.16 (0.79, 1.72)	1.11 (0.76, 1.64)[c]	16.4	1.31 (0.90, 1.91)	1.31 (0.90, 1.90)[c]	24.1	0.92 (0.61, 1.39)	0.90 (0.60, 1.36)[c]
	120-179	49.2	1.34 (0.98, 1.85)	1.3 (0.95, 1.78)[c]	27.9	1.28 (0.87, 1.89)	1.26 (0.86, 1.86)[c]	15.5	1.24 (0.86, 1.8)	1.24 (0.85, 1.80)[c]	30.5	1.17 (0.83, 1.66)	1.14 (0.81, 1.62)[c]
	≥180	41.2	1.13 (0.62, 2.05)	1.04 (0.56, 1.93)[c]	46.2	2.12 (1.41, 3.19)	2.06 (1.35, 3.15)[c]	25.3	2.03 (1.40, 2.95)	1.95 (1.34, 2.85)[c]	30.0	1.15 (0.81, 1.64)	1.12 (0.79, 1.60)[c]
High education level	0-59	34.6	1.00 (Reference)	1.00 (Reference)	17.7	1.00 (Reference)	1.00 (Reference)	7.3	1.00 (Reference)	1.00 (Reference)	19.4	1.00 (Reference)	1.00 (Reference)
	60-119	48.4	1.40 (1.01, 1.94)	1.50 (1.09, 2.08)[c]	20.2	1.14 (0.7, 1.86)	1.16 (0.71, 1.90)[c]	10.9	1.49 (0.83, 2.67)	1.52 (0.86, 2.70)[c]	24.4	1.26 (0.69, 2.29)	1.26 (0.69, 2.29)[c]
	120-179	27.3	0.79 (0.44, 1.42)	0.84 (0.47, 1.51)[c]	23.9	1.35 (0.83, 2.19)	1.41 (0.85, 2.32)[c]	17.5	2.40 (1.39, 4.13)	2.39 (1.39, 4.11)[c]	27.9	1.44 (0.83, 2.48)	1.36 (0.80, 2.32)[c]
	≥180	41.7	1.20 (0.60, 2.42)	1.15 (0.58, 2.25)[c]	11.5	0.65 (0.21, 2.00)	0.58 (0.21, 1.64)[c]	20.0	2.74 (1.36, 5.52)	2.72 (1.34, 5.53)[c]	19.1	0.98 (0.51, 1.87)	0.95 (0.50, 1.79)[c]

Abbreviation: PR, prevalence ratio.

[a]Short sleep duration: defined as sleep less than lower limit purposed by the National Sleep Foundation.

[b]Adjusted prevalence ratio for daily leisure screen time, sex of the child, relationship of the child with the questionnaire respondent, education level of the parents, family model, physical activity, and BMI-for-age *z*-score.

[c]Adjusted prevalence ratio for daily leisure screen time, sex of the child, relationship of the child with the questionnaire respondent, family model, physical activity, and BMI-for-age *z*-score.

4 | COMMENT

4.1 | Principal findings

Around four out of ten Spanish children between 1 and 14 years old spent 120 minutes or more of time in front of a screen, and more than one out of five did not meet NSF recommendations referring to lower boundaries. Further, one out of four Spanish children, spending 120 minutes or more in front of a screen daily during their leisure time, suffered short sleep duration. This association was stronger among older children.

4.2 | Strengths of the study

Our study has several strengths, one of which is its large sample size, therefore, adding more power to the study. It includes a wide range of ages allowing comparison. Moreover, this survey is representative at the national level. Therefore, every area of Spain is represented, including those more rural and more urban, and we may assume that differences exist according to the patterns of screen time and sleep between these areas. Finally, this study reports some factors of the screen time according to the Spanish context.

4.3 | Limitations of the data

Children did not self-report the data, which might be a limitation when children are old enough or mature to self-report, potentially resulting in underestimated values. Additionally, the parents reported data in most cases, but some questionnaires were responded by legal guardians or brothers/sisters, grandparents or other family members, and they might have provided biased information due to recall bias and observer bias in the study.[30,31] Nevertheless, when adjusting for potential confounders, we did not find differences between who answered the questionnaire, and when the analyses were stratified by informant, for the parent category the overview did not change and for the "others" category we lost the difference due to its small sample size (n = 313) (data not shown). Next, we cannot disregard the common method bias (self-reported exposure and outcomes measured at one point of time).

Additionally, the overall "sleep duration" and "screen time" among those who spend more than 1 hour in front of a screen were reported as a discrete numeric variable in hours and not in minutes. Thus, these measurements are imprecise and we cannot rule out miss-classification bias. Second, our study does not represent children under 1-year-old due to missing information regarding the leisure screen time question. Third, the study utilised a questionnaire, which is susceptible to social desirability and recall bias. Fourth, given that this is a secondary analysis of data, we did not have information regarding relevant questions, such as if the children used media devices just before going to sleep. Therefore, we cannot assess if the association exists due to the total leisure screen time or because the children were exposed to screens just before going to the bed.[32,33] In addition, other relevant information that we could not take into account is the type of device they used most, or the content that they used to watch. Future research should take into account this information. Finally, due to the cross-sectional design of this study, we cannot assess causality and determine the temporal sequence of the association between short sleep duration and leisure screen time.

4.4 | Interpretation

Our findings suggest that there might have been an association between daily leisure screen time and short sleep duration. Our results are in line with those obtained in a Spanish study[34] which examined the association between hours of TV viewing and sleep duration using a sample of 468 children between 6 and 9 years old from Menorca.[34] That study concluded that children spending longer periods watching TV had a shorter sleep duration.[34] In this sense, a study[15] conducted in 2011, which compared the nocturnal sleep duration in children between 2 and 9 years old from 8 European countries including Spain, showed that children from Northern countries slept longer than those from Southern and Eastern countries even after adjusting for screen time and other potential confounders, such as season and daylight hours.[15] In addition, when stratifying by both age and parents' education level, we found similar patterns in the association between daily leisure screen time and short sleep duration. Therefore, our results suggest that within those families with the same education level, children with higher patterns of leisure screen time were more likely to have short sleep duration.

Regarding leisure screen time, our results showed that teenagers (12-14 years) were the most likely to exceed 120 minutes of daily leisure screen time. The prevalence obtained in our study, however, is lower than the one obtained in a previous study[35] using a sample of teenagers (aged 11, 13, and 15 years) from 22 European countries (including Spain). This could be partially explained because the screen time is self-reported by the teenagers[35] and it could underestimate our results of screen time because teenagers are not as dependent from their parents as younger children, and parents are less aware of how they spend their free time.

Furthermore, children of parents with lower education level and/or social class were more likely to exceed 120 minutes of daily leisure screen time. These results agreed with the ones obtained in a study conducted in Spain,[36] with two samples of children between 6 and 9 years old and between 7 and 8 years old for the years 2011 and 2013, respectively.[36] Moreover, evidence indicates that parental lifestyle plays an important role in the screen exposure of their children.[37] In this sense, parents with low socio-educational background may not need and/or may not able to spend economic resources in other entertainment activities.[38] Our results suggest that those children belonging to low socio-educational families were more likely to suffer short sleep duration. Our results are in line with the results of other Spanish study.[8] Our hypothesis is that in Spain, parents with higher socio-education background had more resources to invest in their children and had better work-life balance. Future research should explore more deeply the reasons why these differences exist.

Regarding short sleep duration, our results showed an overall prevalence of 23.6%, inconsistent with a Spanish study,[8] which showed a positive trend in the prevalence of short sleep duration being 29.8% in 1987 rising up to 44.7% in 2011.[8] This difference could be explained because we used different criteria for short sleep duration, being our criteria more specific according to the age and more updated.[8] Nevertheless, regarding the age of the child, our results are consistent with the other Spanish study.[8]

Currently, recommended use and exposure to screen between Health and Educational authorities are controversial.[39] Health authorities discourage young children's use of digital technology and raise concerns about the potential negative effects on children's health. However, education authorities encourage the use of digital technology by children to prepare them to thrive in a digital world. In this sense, more research is needed so institutions may consider to include these new health determinants in future health programmes for children.

5 | CONCLUSIONS

Around one out of four Spanish children between 1 and 14 years old, exceeding 120 minutes of daily leisure screen time, had short sleep duration. More scientific research is needed for institutions to work on provide novel healthcare programmes that consider new risks for the health and wellbeing of children.

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REFERENCES

1. Wolf C, Wolf S, Weiss M, Nino G. Children's environmental health in the digital era: understanding early screen exposure as a preventable risk factor for obesity and sleep disorders. *Children*. 2018;5:31.
2. World Health Organization (WHO). Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age. *World Health Organisation*; 2019.
3. Guram S, Heinz P. Media use in children: American Academy of Pediatrics recommendations 2016. *Archives of Disease in Childhood-Education and Practice* 2018;103:99-101.
4. Stiglic N, Viner RM. Effects of screentime on the health and well-being of children and adolescents: a systematic review of reviews. *BMJ Open*. 2019;9:e023191.
5. Yan H, Zhang R, Oniffrey T, et al. Associations among screen time and unhealthy behaviors, academic performance, and well-being in Chinese adolescents. *Int J Environ Res Public Health*. 2017;14(6):1-15.
6. Chaput J-P, Gray CE, Poitras VJ, et al. Systematic review of the relationships between sleep duration and health indicators in school-aged children and youth. *Appl Physiol Nutr Metab*. 2016;41:266-282.
7. Chaput J-P, Gray CE, Poitras VJ, et al. Systematic review of the relationships between sleep duration and health indicators in the early years (0–4 years). *BMC Public Health*. 2017;17:855.
8. de Ruiter I, Olmedo-Requena R, Sánchez-Cruz J-J, Jiménez-Moleón J-J. Changes in sleep duration in Spanish children aged 2–14 years from 1987 to 2011. *Sleep Med*. 2016;21:145-150.
9. Belmon LS, van Stralen MM, Busch V, Harmsen IA, Chinapaw MJM. What are the determinants of children's sleep behavior? A systematic review of longitudinal studies. *Sleep Med Rev*. 2019;43:60-70.
10. National Sleep Foundation. What is sleep hygiene? https://www.sleepfoundation.org/articles/sleep-hygiene. Accessed May 27, 2020.
11. Kuula L, Gradisar M, Martinmäki K, et al. Using big data to explore worldwide trends in objective sleep in the transition to adulthood. *Sleep Med*. 2019;62:69-76.
12. Gradisar M, Gardner G, Dohnt H. Recent worldwide sleep patterns and problems during adolescence: a review and meta-analysis of age, region, and sleep. *Sleep Med*. 2011;12:110-118.
13. Olds T, Blunden S, Petkov J, Forchino F. The relationships between sex, age, geography and time in bed in adolescents: a meta-analysis of data from 23 countries. *Sleep Med Rev*. 2010;14:371-378.
14. Jenni OG, O'Connor BB. Children's sleep: an interplay between culture and biology. *Pediatrics*. 2005;115:204-216.
15. Hense S, Barba G, Pohlabeln H, et al. Factors that influence weekday sleep duration in European children. *Sleep*. 2011;34:633-639.
16. El país. ¿Duermes como el español medio? https://verne.elpais.com/verne/2016/06/06/articulo/1465209209_937892.html. Accessed May 27, 2020.
17. The Guardian. Spaniards' lack of sleep isn't a cultural thing – they're in the wrong time zone. https://www.theguardian.com/commentisfree/2017/feb/22/spaniards-sleep-time-zone-spain. Accessed May 27, 2020
18. Hale L, Guan S. Screen time and sleep among school-aged children and adolescents: a systematic literature review. *Sleep Med Rev*. 2015;21:50-58.
19. (INE) NSI. National Health Survey 2017. https://www.ine.es/en/metodologia/t15/t153041917_en.pdf. Accessed May 27, 2020
20. Hirshkowitz M, Whiton K, Albert SM, et al. National Sleep Foundation's sleep time duration recommendations: methodology and results summary. *Sleep Health*. 2015;1:40-43.
21. Hirshkowitz M, Whiton K, Albert SM, et al. National Sleep Foundation's updated sleep duration recommendations: final report. *Sleep Health*. 2015;1:233-243.
22. Continente X, Pérez A, Espelt A, Ariza C, López MJ. Multiple lifestyle risk behaviours and excess weight among adolescents in Barcelona, Spain. *Gac Sanit*. 2017;31:332-335.
23. Domingo-Salvany A, Bacigalupe A, Carrasco JM, Espelt A, Ferrando J, Borrell C. Propuestas de clase social neoweberiana y neomarxista a partir de la Clasificación Nacional de Ocupaciones 2011. *Gac Sanit*. 2013;27:263-272.
24. De Onis M, Onyango AW, Borghi E, Siyam A, Nishida C, Siekmann J. Development of a WHO growth reference for school-aged children and adolescents. *Bull World Health Organ*. 2007;85(09):660-667.
25. WHO Multicentre Growth Reference Study Group. *WHO child growth standards: length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age: methods and development*. Geneva; 2006.

26. Freedman DS, Lawman HG, Skinner AC, McGuire LC, Allison DB, Ogden CL. Validity of the WHO cutoffs for biologically implausible values of weight, height, and BMI in children and adolescents in NHANES from 1999 through 2012. *Am J Clin Nutr*. 2015;102:1000-1006.
27. Freedman DS, Lawman HG, Pan L, et al. The prevalence and validity of high, biologically implausible values of weight, height, and BMI among 8.8 million children. *Obesity*. 2016;24:1132-1139.
28. Centers for Disease Control and Prevention (CDC). A SAS Program for the 2000 CDC Growth Charts (ages 0 to <20 years). https://www.cdc.gov/nccdphp/dnpao/growthcharts/resources/sas.htm. Accessed May 2020.
29. Espelt A, Marí-dell'Olmo M, Panello E, Bosque-Prous M. Applied prevalence ratio estimation with different regression models: an example from a cross-national study on substance use research. *Adicciones*. 2016;29:37-54.
30. Tripepi G, Jager KJ, Dekker FW, Zoccali C. Selection bias and information bias in clinical research. *Nephron Clin Pract*. 2010;115:c94-c99.
31. Mahtani K, Spencer EA, Brassey J, Heneghan C. Catalogue of bias: observer bias. *BMJ Evid Based Med*. 2018;23(1):23-24.
32. Hysing M, Pallesen S, Stormark KM, Jakobsen R, Lundervold AJ, Sivertsen B. Sleep and use of electronic devices in adolescence: results from a large population-based study. *BMJ Open*. 2015;5:1-7.
33. Lemola S, Perkinson-Gloor N, Brand S, Dewald-Kaufmann JF, Grob A. Adolescents' electronic media use at night, sleep disturbance, and depressive symptoms in the smartphone age. *J Youth Adolesc*. 2015;44:405-418.
34. Marinelli M, Sunyer J, Alvarez-Pedrerol M, et al. Hours of television viewing and sleep duration in children a multicenter birth cohort study. *JAMA Pediatr*. 2014;168:458-464.
35. Ghekiere A, Van Cauwenberg J, Vandendriessche A, et al. Trends in sleeping difficulties among European adolescents: are these associated with physical inactivity and excessive screen time? *Int J Publ Health*. 2019;64(4):487-498.
36. Pérez-Farinós N, Villar-Villalba C, López Sobaler AM, et al. The relationship between hours of sleep, screen time and frequency of food and drink consumption in Spain in the 2011 and 2013 ALADINO: a cross-sectional study. *BMC Public Health*. 2017;17:1-12.
37. Xu H, Wen LM, Rissel C. Associations of parental influences with physical activity and screen time among young children: a systematic review. *J Obes*. 2015;2015:1-23.
38. Domingues-Montanari S. Clinical and psychological effects of excessive screen time on children. *J Paediatr Child Health*. 2017;53:333-338.
39. Straker L, Zabatiero J, Danby S, Thorpe K, Edwards S. Conflicting guidelines on young children's screen time and use of digital technology create policy and practice dilemmas. *J Pediatr*. 2018;202:300-303.

How to cite this article: Cartanyà-Hueso À, Lidón-Moyano C, Martín-Sánchez JC, et al. Association of screen time and sleep duration among Spanish 1-14 years old children. *Paediatr Perinat Epidemiol*. 2020;00:1–10. https://doi.org/10.1111/ppe.12695

4.3. Carta al editor

Screen time use and sleep in children are there differences among social classes?

Sleep Medicine 68 (2020) 153

Contents lists available at ScienceDirect

Sleep Medicine

journal homepage: www.elsevier.com/locate/sleep

Letter to the Editor

Screen time use and sleep in children: are there differences among social classes?

Dear Editor,

There is evidence that longer periods of screen time are related to shorter periods of sleep among children [1]. A previous study concluded that parental lifestyle plays a great role in children's screen time [2]. Moreover, Paudel et al., concluded that children (between 4 and 8 years of age) whose parents have higher use of screen devices are more likely to have higher screen media use as well [3]. The objective of this letter is to describe the screen time use and the percentage of short sleep duration [4] among children according to household socioeconomic position [5].

A secondary analysis of the last National Health Survey in Spain, conducted in 2017 (n = 5,850) [6] showed that more than 70% of Spanish children (between 1 and 14 years old) during their free time from Monday to Friday exceeded 1 h of screen time daily [6]. The households with lower social class had a higher percentage of children exceeding 1 h screen time daily (from 68.6% in the highest class to 78.2% in the lowest class) [6]. Additionally, those children belonging to household in lower social class had higher prevalence of having short sleep duration (ranging from 19.6% in the highest class to 28.2% in the lowest class).

Based on these results, we hypothesize that in Spain, those households belonging to higher social class might have more resources to invest in extracurricular activities and have better work-life balance in order to follow a good sleep hygiene.

For this reason, future studies assessing the relation between screen time and sleep duration in children should take into account the underlying cause of social class of the household and provide stratified analysis according to social class of the household. Moreover, institutions should promote extracurricular activities, provide accessible extracurricular activities for all the households and facilitate a better work-life balance.

Conflict of interest

The ICMJE Uniform Disclosure Form for Potential Conflicts of Interest associated with this article can be viewed by clicking on the following link: https://doi.org/10.1016/j.sleep.2019.12.006.

References

[1] Belmon LS, van Stralen MM, Busch V, et al. What are the determinants of children's sleep behavior? A systematic review of longitudinal studies. Sleep Med Rev 2019;43:60–70.
[2] Xu H, Wen LM, Rissel C. Associations of parental influences with physical activity and screen time among young children: a systematic review. J Obes 2015;2015.
[3] Paudel S, Jancey J, Subedi N, et al. Correlates of mobile screen media use among children aged 0–8: a systematic review. BMJ Open 2017;7:e014585.
[4] Hirshkowitz M, Whiton K, Albert SM, et al. National Sleep Foundation's updated sleep duration recommendations: final report. Sleep Heal 2015;1:233–43. https://doi.org/10.1016/J.SLEH.2015.10.004.
[5] Domingo-Salvany A, Bacigalupe A, Carrasco JM, et al. Propuestas de clase social neoweberiana y neomarxista a partir de la Clasificación Nacional de Ocupaciones 2011. Gac Sanit 2013;27:263–72. https://doi.org/10.1016/j.gaceta.2012.12.009.
[6] Ministerio de Sanidad. C. y B. S. Encuesta Nacional de Salud ENSE, España 2017. Serie informes monográficos #2 -ACTIVIDAD FÍSICA, DESCANSO Y OCIO. Madrid: Ministerio de Sanidad, Consumo y Bienestar Social; 2019.

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25 November 2019
Available online 23 December 2019

https://doi.org/10.1016/j.sleep.2019.12.006

4.4. Artículo II

Association between leisure screen time and excess weight and obesity according to three sets of criteria among spanish children

ASSOCIATION BETWEEN LEISURE SCREEN TIME AND EXCESS WEIGHT AND OBESITY ACCORDING TO THREE SETS OF CRITERIA AMONG SPANISH CHILDREN

ASOCIACIÓN ENTRE EL TIEMPO DE PANTALLA RECREATIVO Y EL EXCESO DE PESO Y LA OBESIDAD MEDIDOS CON TRES CRITERIOS DIFERENTES ENTRE NIÑOS ESPAÑOLES

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Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. ÀCH, CLM, JCMS, AGM, HPM and JMMS are supported by the Departament de Universitats i Recerca de la Generalitat de Catalunya (2017SGR608).

Acknowledgments: N/A

ABSTRACT

Background and aim: Studies evaluating the relationship between excess weight and screen time are methodologically heterogeneous, and studies including exposure to smartphones and tablets are scarce. This study aims to assess the relationship between daily leisure screen time and excess weight (overweight plus obesity) and obesity prevalence using different sets of criteria in Spanish children aged 2-14 years.

Methods: Cross sectional study using data from the 2017 Spanish National Health Survey (n=4,528). We assessed overweight and obesity through the World Health Organization (WHO), International Obesity Task Force (IOTF), and Orbegozo 2011 criteria. Daily leisure screen time in minutes was categorized as: 0-59, 60-119, 120-179, and ≥ 180. We calculated crude and adjusted prevalence ratios (PR) with 95% confidence intervals (95% CI) of excess weight and obesity according to daily leisure screen time in minutes. Moreover, we calculated crude and adjusted percentage change (%Δ) of expected number of met excess weight/obesity criteria with 95% CI according to daily leisure screen time in minutes. We adjusted associations for potential confounders.

Results: Spending at least 180 minutes of daily leisure scree time is related to higher adjusted prevalence of excess weight (e.g. WHO $aPR_{\geq180}$: 1.18, 95% CI 1.02,1.38) and obesity (e.g. IOTF $aPR_{\geq180}$: 1.44, 95% CI 1.10,1.89) and higher adjusted expected number of criteria met of excess weight $a\%\Delta_{\geq180}$: 1.17, 95% CI 1.06,1.30.

Conclusions: Association between leisure screen time and excess weight/obesity exists independently the criterion. Cohort studies should confirm these findings, since we are in front of in a possible child health determinant.

Keywords: adolescent; child, preschool; child; pediatric obesity; screen time

RESUMEN

Introducción y objetivo: Los estudios que evalúan la relación en niños entre la obesidad y el tiempo de pantalla son heterogéneos y con diferentes criterios de obesidad. Además, existen pocos estudios que incluyan la exposición a los teléfonos inteligentes y las tabletas. Este estudio tiene como objetivo determinar la relación entre el tiempo de pantalla de ocio diario y el exceso de peso (sobrepeso más obesidad) y obesidad utilizando diferentes criterios en niños españoles de entre 2 y 14 años.

Métodos: Estudio transversal con los datos de la Encuesta Nacional de Salud de España de menores del año 2017 (n=4.528). Se determinó el sobrepeso y la obesidad a partir de los criterios de la Organización Mundial de la Salud (OMS), International Obesity Task Force (IOTF) y Orbegozo 2011. Se categorizó el tiempo diario de pantalla para fines recreativos en minutos como: 0-59, 60-119, 120-179 y ≥ 180. Calculamos la razón de prevalencias cruda y ajustada (RPa) y los intervalos de confianza al 95% (IC 95%) de exceso de peso y obesidad según el tiempo de pantalla de ocio diario en minutos. Además, hemos calculado el porcentaje de cambio crudo y ajustado (%Δ) y los IC 95% del número esperado de criterios de exceso de peso y obesidad cumplidos según el tiempo de pantalla recreativo en minutos. Hemos ajustado las asociaciones por las variables de confusión.

Resultados: Utilizar las pantallas para el ocio al menos 180 minutos diarios está asociado con una mayor prevalencia de tener exceso de peso (i.e. OMS $RPa_{\geq 180}$: 1,18, 95% CI 1,02;1,38) y obesidad (i.e. IOTF $RPa_{\geq 180}$: 1,44, 95% CI 1,10;1,89) y un mayor número esperado de criterios de exceso de peso cumplidos $a\%\Delta_{\geq 180}$: 1,17, 95% CI 1,06;1,30.

Conclusiones: Esta asociación es consistente independientemente del criterio para evaluar el exceso de peso y obesidad utilizado. Estudios longitudinales deberían confirmar ya que podríamos estar frente a un nuevo determinante de la salud infantil.

Palabras clave: adolescente; niño; niño prescolar; obesidad infantil; tiempo de pantalla

INTRODUCTION

Excess weight is defined by the World Health Organization (WHO) as "abnormal or excessive fat accumulation that presents a risk to health" [1]. Childhood excess weight, including obesity and overweight, has reached epidemic levels worldwide [2]. In 2016, nearly one out of five children and adolescents worldwide had excess weight [3]. In Europe, in 2016, around 41 million children and adolescents between 5 and 19 years had excess weight, with most concern in Mediterranean countries [4]. In this sense, in Spain, in 2017, around 30% of children and adolescents from 3 to 18 years had excess weight [5]. Children and adolescents with excess weight are more likely to experience deleterious effects during childhood and adolescence, such as hypertension, metabolic disorders, or lower self-esteem, and also later in their adulthood, such as the higher risk of obesity and cardiovascular disease or poorer employment prospects [4].

Excess weight in children is preventable. Although childhood excess weight can be associated with genetic factors, environmental (e.g. where children live or their family health status), cultural (e.g. economic and education level of the children's family), and lifestyle factors (e.g. physical activity, dietary and sleep patterns, or screen time) also play a fundamental role on excess weight [2]. In this regard, a systematic review of studies evaluating the relationship between adiposity and lifestyle patterns showed that unhealthy lifestyle patterns, including low physical activity, high screen time, and unhealthy diet were related to a higher risk of adiposity [6]. Further, a recent systematic review of prevalence studies assessing the relationship between screen time and overweight/obesity in children aged under 18 years, concluded that higher screen time could be a risk factor for being obese/overweight during childhood and adolescence [7]. Screen time has become a recurring activity in the routines of children and adolescents. Previous literature show that vast majority of children do not meet screen time guidelines [8–10], being to avoid screens for those children younger than 2 years and to limit 1 hour daily of screen time for those children between 2 and 5 years, according to Ministry of

Health, Social Services and Equality (Ministerio de Sanidad, Servicios Sociales e Igualdad: MSSSI) in 2015 [11], American Academy of Pediatrics in 2016 [12], Canadian Society of Pediatrics in 2017 [13], and WHO in 2019 [14], and to limit 2 hours daily of screen time for leisure for those children y adolescents between 5 and 17 years according to MSSSI. In this sense, 44.7 of Spanish children aged 1-14 years old in 2017 spent at least 2 hours daily of screen time for leisure [15]. Additionally, a previous systematic review highlighted that these findings were not applicable for smartphone or tablet usage due to the lack of studies assessing the exposure to these devices [7]. However, 69.1% of Spanish children between 10 and 15 years had their own mobile phone in 2017 [16].

Currently, Body Mass Index for age (BMI-for-age) is the most used criteria in epidemiological studies to assess excess weight in children and adolescents, since the BMI is practical, universally applicable, inexpensive, and non-invasive. The BMI is the result of a person's weight in kilograms divided by the square of height in meters [17]. In this sense, the most used BMI-for-age criteria for worldwide and European population are the WHO growth standards and the International Obesity Task Force (IOTF) reference values [18,19]. In 2017, the WHO established percentiles through data collected in the WHO Multicentre Growth Reference Study [18]. Further, the WHO provided tools to calculate BMI-for-age z-scores, which are standardized values from a reference population, through the lambda-mu-sigma (LMS) method [20]. On the other hand, the IOTF defined in 2000 international cut off points for BMI for overweight and obesity by sex between 2 and 18 years, defined to pass through BMI of 25 and 30Kg/m2 at the age of 18 years obtained by averaging data from 6 countries [19]. At the Spanish level, the Orbegozo criterion is the most used by clinicians. The Orbegozo foundation established BMI-for-age percentiles from longitudinal and cross-sectional studies using a sample of children from Bilbao (Spain), being the last update in 2011 [21]. In this regard, two studies conducted in Italy [22] and in Spain [23], which aimed to compare three different criteria to assess excess weight in children, showed differences in excess weight prevalences among used criteria. Further, due to the great variety of available criteria to assess excess weight in children and adolescents, the studies evaluating the association between screen time and obesity/overweight are statistically heterogeneous [7].

Due to the lack of studies including smartphone or tablet usage in the screen time and the statistical heterogeneity of published works owing to the great variety of criteria assessing obesity/overweight, this study aims to assess the relationship between daily leisure screen time and excess weight and obesity assessed by three different criteria in Spanish children from 2 to 14 years.

METHODS

This is a cross-sectional study using the 2017 Spanish National Health Survey (2017SNHS) data, which is the main source of information on the perceived health status of the population residing in Spain. More detailed information about the methodology of the 2017SNHS could be found elsewhere [24]. For the purpose of this study, we only took into account sociodemographic, environmental, cultural and lifestyle data of participants under 15 years (n=6,106). Parents, or legal guardians or other relatives (e.g. grandparents or brother/sisters), in the case of impossibility of parents or legal guardians, reported the data [24]. The exclusion criteria were (1) being younger than 2 years, since the IOTF criterion is not applicable for them (n=625), (2) having a limitation during the last half year to do any activity that children often do due to health issues (n=320), (3) not having reported the BMI and screen time data (n=633). The final sample included 4,528 Spanish children from 2 to 14 years.

Research ethics

The investigation was carried out considering the rules of the Declaration of Helsinki of 2013. We used secondary data publicly available in the following repository (https://www.mscbs.gob.es/estadEstudios/estadisticas/encuestaNacional/encuesta2017.htm).

Written informed consent was not necessary since anonymous data were used and an ethics committee approval not required. However, this manuscript results from a PhD thesis having the approval by the ethics committee of the Universitat Internacional de Catalunya with code CBAS-2020-06.

Excess weight and obesity

We computed the BMI through the weight in kilograms and height in metres reported by the person who answered the questionnaire, dividing the weight in kilograms by the square of the height in meters [17]. We used three different criteria, based on BMI-for-age, for assessing overweight and obesity: (1) WHO [18], (2) IOTF [19], and (3) Orbegozo 2011 [21] (Table 1). Regarding WHO criterion we calculated BMI-for-age z-scores from reference values provided by the WHO and through LMS method [20]. Further, we treated as missing data those height-for-age, weight-for-age, and BMI-for-age values considered as Biologically Implausible values (BIV) [25–27]. Further, we calculated the number of criteria of excess weight/obesity for children met by the children in our sample. Regarding excess weight, the range was from 0 to 6 adding one point for each overweight plus obesity criterion met (e.g. 0 were children who were neither overweight nor obese according to any criterion and 6 were children who were obese according to the three criteria). We repeated the same procedure for obesity, number of obesity criteria met was from 0 to 3, 0 being those children who were not obese according to any criteria and 3 being those children who were obese for the three criteria.

Daily leisure screen time

We obtained the daily leisure screen time through the question “Approximately during the leisure time of the child, how much time does he/she usually spend in front of a screen, including computer, tablet, TV, videos, videogames or cell phone?”. Respondents had three possible answers (Never or rarely, less than 1 hour, and 1 hour or more). Further, only those participants who answered 1 hour or more also reported the number of hours, ranging from 1 hour to 12 hours. Respondents answered the same question differentiating between from Monday to Friday and Saturday and Sunday. We calculated the average daily leisure screen time in minutes through a weighted mean, only for those participants who answered 1 hour or more in both questions. Then, we categorized daily leisure screen time in minutes as: (1) 0-59, 60-119, 120-179, and ≥ 180.

Potential confounding variables and covariates

We selected potential confounding variables and covariates according to the existing literature [2,6]: sex (male and female) and age in years of children; educational level of the parents (low: unschooled, elementary school completed or uncompleted and special education; medium: high school and training cycles; and high: university education); the relationship between who answered the questionnaire and the children (parents and others); family structure (couple, single-parent, couple or single parent cohabiting with other family members, and other); sleep duration (proper sleep duration: those children who slept equal or more than National Sleep Foundation recommends according to child's age [28,29] and short sleep duration: those children who did not); and leisure physical activity (no exercise, physical activity or sports occasionally (e.g. walking, riding a bike, or low impact physical activity), physical activity several times a month (e.g. gymnastics, jogging, swimming or team sports), and sports or physical training several times a week).

Statistical analysis

We calculated absolute and relative frequencies of excess weight and obesity assessed by the WHO, IOTF, and Orbegozo 2011 criteria according to daily leisure screen time in minutes. Further, we calculated the crude and adjusted prevalence ratios (PR and aPR) with 95% confidence intervals (95% CI) of excess weight and obesity assessed by the WHO, IOTF, and Orbegozo 2011 criteria according to daily leisure screen time in minutes. Finally, we calculated crude and adjusted percentage change (%Δ) with 95% CI of the expected number of met criteria of excess weight and obesity according to daily leisure screen time in minutes and daily leisure screen time in hours after one of exposure of it. We calculated PR, aPR, and 95% CI through generalized linear models (GLM) with Poisson family and robust variance [30], and crude, adjusted and 95% CI of %Δ of the expected number of met criteria through zero-inflated Poisson regression [31]. We adjusted the associations for the potential confounding variables. We used R.3.5.2 to do the statistical analysis.

RESULTS

This study included 4,528 children. 51.8% were male and the median of age was 9 years (Interquartile Range: 5, 12). 77.0% slept properly concerning duration, 30.1% did sports or physical training several times per week. In addition, 57.6% of children's parents had medium educational level, 78.5% of children lived together with both parents, and 95.3% of the questionnaires were answered by one of the parents. Finally, regarding daily leisure screen time, 26.1% spent between 0 and 59 minutes, 27.3% spent between 60 and 119 minutes, 29.8% spent between 120 and 179 minutes, and 16.8% spent at least 180 minutes.

Table 2 shows that those children spending at least 180 minutes of daily leisure screen time were more likely to have excess weight and obesity than those children spending up to 59 minutes of screen time for leisure, for all the three criteria used (Table 2).

Table 3 shows that children spending 180 minutes or more in front of a screen during their leisure time had a higher expected number of criteria of excess weight and obesity met than those children spending between 0 and 59 minutes of daily leisure screen time (Table 3).

DISCUSSION

Spending at least 180 minutes daily of screen time for leisure is related to higher adjusted prevalence of excess weight and obesity and higher adjusted expected number of criteria met of excess weight.

Our results are consistent with those findings obtained in a work published in 2019 using data of the fourth round (2015/2017) of the WHO Childhood Obesity Surveillance Initiative (COSI 2015-2017), which included children aged from 6 to 9 years from 35 European countries [32]. Its objective was to investigate the clustering of energy balance-related behaviours (Physical activity, screen time, fruit and vegetables intake, and soft drinks intake) and whether the identified clusters were associated with weight status. Authors concluded that Mediterranean children, including Spaniards, who were sedentary and physically inactive and spent longer periods of screen time, were more likely to be overweight/obese according to the WHO and the IOTF criteria than other clusters [32]. After reviewing evidence-based on the Spanish paediatric population we found that our findings agreed with those obtained in a study conducted in 2017 using a sample of adolescents (13-18 years) from Barcelona (Spain) in 2011-2012 that aimed, among other objectives, to analyse the potential relationship between multiple lifestyle risk behaviours, including excessive screen time, and excess weight assessed through the WHO criterion[33]. However, our findings are in contrast with those obtained for another study published in 2016, whose objective was to identify weight status prevalence, assessed through the WHO criterion, and its determinants, including screen time, among schoolchildren (8-9 years) from Barcelona in 2011, since this study did not show an association between being overweight and obese, and spending 2 hours or more of daily screen time [34]. This discrepancy might be due to us using a wider range of ages and them collecting data in 2011, when they surely did not include smartphone and tablet usage.

Additionally, our study shows that children spending at least 180 minutes of daily leisure screen time had a higher expected number of met criteria of excess weight. We assume that the certainty of having excess weight increase when there is consensus among criteria. In this sense, although it is not the main aim of this study, we found that the most prevalent criterion was the WHO criterion, with percentages of excess weight and obesity of 32.3% and 12.6%, respectively. On the other hand, the Orbegozo 2011 criterion was the least prevalent, with

24.4% and 7.5% for excess weight and obesity, respectively. The prevalence of the IOTF criterion for excess weight and obesity was slightly higher than that of Orbegozo 2011 (27.7% and 10.1%) for excess weight and obesity. These results are in line with previous evidence [23,35]. In this sense, the WHO criterion is the easiest to comply. Future studies should validate these criteria through objective measures in order to choose the most suitable criterion.

Strengths and limitations

To the best of our knowledge this is the first study that assesses the relationship between daily leisure screen time, including smartphone and tablet usage, and weight status assessed by different sets of criteria in the Spanish paediatric population. Nonetheless, this study also has limitations that should be taken into account. First, weight and height were self-reported instead of measured objectively, daily leisure screen time was collected pooled and inaccurately (e.g. not distinguish children did not use screens, not quantify screen time for those reported less than one hour daily) , and all data were collected through a questionnaire, which might provide some sources of bias. In addition, due to the cross-sectional design of this study, we cannot establish causality, and we cannot discard inverse causality.

Public health implications

The global targets 2025 of the WHO include stopping the increase in childhood excess weight [36]. Childhood obesity raised around 10 fold in the last 40 years [4]. Therefore, it is important to know the determinants of childhood excess weight. In this sense, our findings provide more evidence of the possible adverse effects of screen time on children's health. Nonetheless, these results should be confirmed through cohort studies.

CONCLUSIONS

Association between leisure screen time and excess weight/obesity exists independently the criterion. Cohort studies should confirm these findings, since we are in front of in a possible child health determinant.

What is known?

Longer periods of screen time are associated with a higher prevalence of childhood excess weight and obesity. Nonetheless, there is a lack of studies including leisure screen time associated to smartphones and tablets. Besides, due to the variety of existing criteria to assess childhood obesity, studies are statistically heterogeneous.

What is new?

Spending at least 180 minutes daily in front of screens for leisure is associated with a higher prevalence of excess weight and obesity in the three different sets of criteria. Further, children using screens 180 minutes or more daily for leisure had a higher expected number of met excess weight criteria.

REFERENCES

1. World Health Organization (WHO). Obesity and overwight. World Health Organisation. https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight. Published 2020. Accessed November 3, 2020.

2. Dehghan M, Akhtar-Danesh N, Merchant AT. Childhood obesity, prevalence and prevention. *Nutr J*. 2005;4(1):24. doi:10.1186/1475-2891-4-24

3. World Health Organization (WHO). WHO | Commission on Ending Childhood Obesity. *WHO*. 2019. http://www.who.int/end-childhood-obesity/en/. Accessed February 5, 2021.

4. World Health Organization (WHO). *Taking Action on Childhood Obesity*. World Health Organization; 2018. https://apps.who.int/iris/bitstream/handle/10665/274792/WHO-NMH-PND-ECHO-18.1-eng.pdf?ua=1.

5. Aranceta-Bartrina J, Gianzo-Citores M, Pérez-Rodrigo C. Prevalencia de sobrepeso, obesidad y obesidad abdominal en población española entre 3 y 24 años. Estudio ENPE. *Rev Española Cardiol*. 2020;73(4):290-299. doi:https://doi.org/10.1016/j.recesp.2019.07.011

6. D'Souza NJ, Kuswara K, Zheng M, et al. A systematic review of lifestyle patterns and their association with adiposity in children aged 5–12 years. *Obes Rev*. 2020;21(8). doi:10.1111/obr.13029

7. Fang K, Mu M, Liu K, He Y. Screen time and childhood overweight/obesity: A systematic review and meta-analysis. *Child Care Health Dev*. 2019;45(5):744-753.

8. Knell G, Durand CP, Kohl III HW, Wu IHC, Pettee Gabriel K. Prevalence and Likelihood of Meeting Sleep, Physical Activity, and Screen-Time Guidelines Among US YouthPrevalence and Likelihood of Meeting Sleep, Physical Activity and Screen-Time Guidelines Among US YouthLetters. *JAMA Pediatr*. 2019;173(4):387-389. doi:10.1001/jamapediatrics.2018.4847

9. Madigan S, Racine N, Tough S. Prevalence of Preschoolers Meeting vs Exceeding Screen Time Guidelines. *JAMA Pediatr*. 2020;174(1):93-95. doi:10.1001/jamapediatrics.2019.4495

10. Pearson N, Sherar LB, Hamer M. Prevalence and Correlates of Meeting Sleep, Screen-Time, and Physical Activity Guidelines among Adolescents in the United Kingdom. *JAMA Pediatr*. 2019;173(10):993-994. doi:10.1001/jamapediatrics.2019.2822

11. Ministerio de Sanidad Servicios Sociales e Igualdad. Actividad Física para la Salud y Reducción del Sedentarismo. Recomendaciones para la población. Estrategia de Promoción de la Salud y Prevención en el SNS. 2015.

12. Hill D, Ameenuddin N, Chassiakos YR, et al. Media and young minds. *Pediatrics*. 2016;138(5). doi:10.1542/peds.2016-2591

13. Ponti M, Bélanger S, Grimes R, et al. Screen time and young children: Promoting health and development in a digital world. *Paediatr Child Heal*. 2017;22(8):461-477. doi:10.1093/pch/pxx123

14. World Health Organization (WHO). Guidelines on physical activity, sedentary behaviour

and sleep for children under 5 years of age. *World Heal Organ*. 2019. https://apps.who.int/iris/handle/10665/311664.

15. Cartanyà-Hueso À, Lidón-Moyano C, Martín-Sánchez JC, et al. Association of screen time and sleep duration among Spanish 1-14 years old children. *Paediatr Perinat Epidemiol*. 2021;35(1):120-129. doi:10.1111/ppe.12695

16. Instituto Nacional de Estadística. *Encuesta Sobre Equipamiento y Uso de Tecnologías de Información y Comunicación En Los*.; 2017. https://www.ine.es/prensa/tich_2017.pdf. Accessed April 15, 2021.

17. Centers for Disease Control and Prevention (CDC). Body Mass Index (BMI) | Healthy Weight, Nutrition, and Physical Activity | CDC. https://www.cdc.gov/healthyweight/assessing/bmi/index.html. Accessed February 5, 2021.

18. De Onis M, Lobstein T. Defining obesity risk status in the general childhood population: Which cut-offs should we use? *Int J Pediatr Obes*. 2010;5(6):458-460. doi:10.3109/17477161003615583

19. Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. Establishing a standard definition for child overweight and obesity worldwide: international survey. *Bmj*. 2000;320(7244):1240.

20. World Health Organization (WHO). *COMPUTATION OF CENTILES AND Z-SCORES FOR HEIGHT-FOR-AGE, WEIGHT-FOR-AGE AND BMI-FOR-AGE*.; 2007.

21. Fernandez C, Lorenzo H, Vrotsou K, Aresti U, Rica I, Sánchez E. *Estudio de Crecimiento de Bilbao. Curvas y Tablas de Crecimiento. Estudio Transversal.* Bilbao: Fundación Faustino Orbegozo; 2011. https://www.fundacionorbegozo.com/wp-content/uploads/pdf/estudios_2011.pdf.

22. Valerio G, Balsamo A, Baroni MG, et al. Childhood obesity classification systems and cardiometabolic risk factors: a comparison of the Italian, World Health Organization and International Obesity Task Force references. *Ital J Pediatr*. 2017;43(1):19.

23. Ajejas Bazán MJ, Jiménez Trujillo MI, Wärnberg J, Domínguez Fernández S, López de Andrés A, Pérez Farinós N. Differences in the prevalence of diagnosis of overweight-obesity in Spanish children according to the diagnostic criteria set used. *Gac Sanit*. 2018;32(5):477-480. doi:10.1016/j.gaceta.2017.07.014

24. Instituto Nacional de Estadística. Spanish National Health Survey 2017 Methodology. https://www.ine.es/en/metodologia/t15/t153041917_en.pdf. Published 2018. Accessed November 5, 2020.

25. Freedman DS, Lawman HG, Pan L, et al. The prevalence and validity of high, biologically implausible values of weight, height, and BMI among 8.8 million children. *Obesity*. 2016;24(5):1132-1139.

26. Freedman DS, Lawman HG, Skinner AC, McGuire LC, Allison DB, Ogden CL. Validity of the WHO cutoffs for biologically implausible values of weight, height, and BMI in children and adolescents in NHANES from 1999 through 2012. *Am J Clin Nutr*. 2015;102(5):1000-1006.

27. Centers for Disease Control and Prevention (CDC). A SAS Program for the 2000 CDC Growth Charts (ages 0 to <20 years). Centers for Disease Control and Prevention (CDC).

Table 1: World Health Organization, International Obesity Task Force, and Orbegozo 2011 criteria to assess overweight and obesity.

Criterion	Overweight	Obesity
WHO	2-4 years: BMI-for-age z-score ≥ 2 and BMI-for-age z-score <3 5-14 years: BMI-for-age z-score ≥ 1 and BMI-for-age z-score < 2	2-4 years: BMI-for-age z-score ≥ 3 5-14 years: BMI-for-age z-score ≥ 2
IOTF	BMI ≥ corresponding for current age to 25Kg/m^2 at eighteen years and BMI< corresponding for current age to 30Kg/m^2 at eighteen years	BMI ≥ corresponding for current age to 30Kg/m^2 at eighteen years
Orbegozo 2011	Males: BMI-for-age ≥ 79th percentile and BMI-for-age < 97.5th percentile Females: BMI-for-age ≥ 89th percentile and BMI-for-age < 99th percentile	Males BMI-for-age ≥ 97.5th percentile Females BMI-for-age ≥ 99th percentile

WHO: World Health Organization; IOTF: International Obesity Task Force; BMI-for-age: Body Mass Index for age; z-score: standardized value according to reference population Kg: Kilograms; m: meters

Table 2: Relative and absolute frequencies of excess weight (overweight plus obesity) and obesity according to daily leisure screen time. Crude and adjusted prevalence ratios of having excess weight and obesity according to daily leisure screen time in minutes and daily leisure screen time in hours after one hour of exposure of it.

		Excess weight (overweight plus obesity)			Obesity		
Criterion	**Daily leisure screen time**	**n (%)**	**PR (95% CI)**	**aPR (95% CI)**	**n (%)**	**PR (95% CI)**	**aPR (95% CI)**
WHO (n=4,373)	0-59 min	341 (30.1)	1.00 Reference	1.00 Reference	127 (11.2)	1.00 Reference	1.00 Reference
	60-119 min	378 (31.6)	1.06 (0.93,1.21)	1.06 (0.93,1.21)	147 (12.3)	1.09 (0.87,1.37)	1.13 (0.90,1.42)
	120-179 min	432 (33.1)	1.10 (0.97,1.26)	1.10 (0.97,1.26)	166 (12.7)	1.13 (0.91,1.40)	1.22 (0.97,1.52)
	≥ 180 min	260 (35.2)	1.21 (1.05,1.40)	1.18 (1.02,1.38)	111 (15.0)	1.34 (1.05,1.69)	1.46 (1.14,1.88)
IOTF (n=4,528)	0-59 min	329 (27.8)	1.00 Reference	1.00 Reference	129 (10.9)	1.00 Reference	1.00 Reference
	60-119 min	326 (26.4)	0.92 (0.80,1.06)	0.96 (0.83,1.10)	114 (9.2)	0.85 (0.67,1.08)	0.94 (0.74,1.20)
	120-179 min	371 (27.6)	0.97 (0.84,1.11)	1.08 (0.94,1.24)	133 (9.9)	0.91 (0.72,1.14)	1.19 (0.95,1.50)
	≥ 180 min	226 (29.7)	1.04 (0.89,1.22)	1.23 (1.05,1.45)	81 (10.6)	0.98 (0.75,1.27)	1.44 (1.10,1.89)
Orbegozo 2011 (n=4,528)	0-59 min	292 (24.6)	1.00 Reference	1.00 Reference	102 (8.6)	1.00 Reference	1.00 Reference
	60-119 min	286 (23.2)	0.90 (0.77,1.05)	0.94 (0.80,1.09)	84 (6.8)	0.79 (0.60,1.04)	0.88 (0.67,1.17)
	120-179 min	328 (24.3)	0.94 (0.81,1.09)	1.07 (0.92,1.24)	95 (7.0)	0.82 (0.63,1.07)	1.15 (0.88,1.51)
	≥ 180 min	202 (26.6)	1.03 (0.88,1.22)	1.24 (1.05,1.47)	60 (7.9)	0.92 (0.67,1.24)	1.42 (1.04,1.95)

WHO: World Health Organization; IOTF: International Obesity Task Force; min: minutes; h: hours; n: absolute frequency; %: relative frequency; PR: prevalence ratio; aPR adjusted prevalence ratio; CI: confidence interval

Table 3: Crude and adjusted percentage change of expected number of met criteria of excess weight and obesity according to daily leisure screen time in minutes and daily leisure screen time after one hour of being exposed.

	Excess Weight (from 0 to 6)		Obesity (from 0 to 3)	
Daily leisure screen time	**%Δ expected number of met criteria (95% CI)**	**a%Δ expected number of met criteria (95% CI)**	**%Δ expected number of met criteria (95% CI)**	**a%Δ expected number of met criteria (95% CI)**
0-59 min	1.00 Reference	1.00 Reference	1.00 Reference	1.00 Reference
60-119 min	1.02 (0.93,1.11)	1.05 (0.96,1.15)	0.93 (0.77,1.13)	1.02 (0.83,1.24)
120-179 min	1.04 (0.96,1.13)	1.10 (1.00,1.20)	0.95 (0.79,1.15)	1.11 (0.92,1.35)
≥ 180 min	1.09 (0.99,1.20)	1.17 (1.06,1.30)	0.99 (0.81,1.22)	1.24 (0.99,1.54)

min: minutes; h: hours; **%Δ**: percentage change; a**%Δ**: adjusted percentage change; CI: confidence interval

4.5. Artículo III

Association between leisure screen time and junk food intake in a nationwide representative sample of spanish children (1–14 years): A cross–sectional study

healthcare

Article

Association between Leisure Screen Time and Junk Food Intake in a Nationwide Representative Sample of Spanish Children (1–14 Years): A Cross-Sectional Study

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Abstract: Evidence on the association between new patterns of leisure screen time and junk food consumption in Spanish children at the national level is scarce. The aim of this study is to assess the relation between daily leisure screen time and the frequency of sweet, soft drink, fast food, and snack intake in a representative sample of Spanish children and adolescents aged from 1 to 14 years. We conducted a cross-sectional study using a representative sample of the Spanish population under 15 years recruited for the 2017 Spanish National Health Survey (n = 5480). We dichotomized sweet, soft drink, fast food, and snack intake (high/low) and categorized daily leisure screen time (0–59, 60–119, 120–179, and ≥180 min). We calculated crude prevalence ratios and adjusted prevalence ratios, and their 95% confidence intervals (95% CI), of high frequency of sweet, soft drink, fast food, and snack intake. Children spending at least one hour of daily leisure screen time had higher prevalence of high frequency of sweet and snack intake than children being exposed less than one hour. For soft drinks and fast food, prevalence of high frequency intake was significantly higher from two and three hours of exposure, respectively. Longer periods of screen exposure in Spanish children during their leisure time may be associated with poorer dietary behaviors. The negative effects of excessive screen time in pediatrics population should be further studied.

Keywords: child; child, preschool; diet, western; screen time; Spain

Citation: Cartanyà-Hueso, A.; González-Marrón, A.; Lidón-Moyano, C.; Garcia-Palomo, E.; Martín-Sánchez, J.C.; Martínez-Sánchez, J.M. Association between Leisure Screen Time and Junk Food Intake in a Nationwide Representative Sample of Spanish Children (1–14 Years): A Cross-Sectional Study. *Healthcare* **2021**, *9*, 228. https://doi.org/10.3390/healthcare9020228

Academic Editors: Alessandro Sartorio and Parisi Attilio

Received: 22 December 2020
Accepted: 11 February 2021
Published: 18 February 2021

1. Introduction

Childhood overweight and obesity are two of the current main public health issues worldwide. Around 38 million children aged under 5 and over 340 million children and adolescents aged 5–19 years were overweight or obese worldwide in 2019 and 2016, respectively [1]. In Europe, between the years 2016 and 2017, figures were just as alarming, with prevalences of overweight and obesity ranging from 10% to 21% in children aged 6 to 9 years, finding the highest prevalences in Southern European countries [2]. This is in line with the fact that, in Spain, between the years 2014 and 2015, around 30% of children between 3 and 18 were overweight or obese [3].

Importantly, children who are obese are more likely to have health issues over their childhood and later in their adulthood [4–9]. Childhood overweight and obesity are associated with a combination of some genetic, behavioral, and environmental factors [9], which cause an energy imbalance between calories consumed and calories expended [1]. A systematic review published in 2020 shows that unhealthy lifestyle behaviors, including higher patterns of screen time, unhealthy dietary habits, and lower levels of physical activity during childhood are associated with adiposity risk [10]. In this sense, dietary patterns have become of poorer quality over the last years mainly due to a reduction in the adherence to the Mediterranean Diet, which evidence shows is a protective factor for adiposity [11], and an increase in the intake of junk food, defined as food that is unhealthy but is easy to eat [12], which might be due to Western influences [13–15]. Although childhood overweight and obesity are currently a pandemic, the consequences of junk food consumption go beyond. Junk food consumption at an early age has been associated with other physical conditions, such as metabolic syndrome [16], and also with behavioral problems, including hyperactivity [17], psychiatric distress, or violence [18].

Different systematic reviews [19,20] show a positive relationship between screen time, based on TV viewing, and unhealthier dietary patterns. Further, there is increasing evidence that screen time is related to a great variety of physiological and psychological issues [21]. A recent systematic review of reviews on the association between screen time and health outcomes in children and adolescents concluded that there is strong evidence on the association between screen time and adiposity, unhealthy diet, depressive symptoms, and quality of life, while evidence for other outcomes (e.g., cardiovascular risk and fitness) is weak [21]. Data on other forms of screen time different from television (e.g., computer, video, and mobile phones) were very sparse in these systematic reviews, reflecting the lack of evidence on the effects that new screen time patterns have on children's health. Currently there is, however, a constant increase in screen time exposure in children, which has prompted a number of worldwide and national health institutions to provide guidelines following the same definition of proper daily screen time: to avoid screen exposure for children under 2 years, to limit screen time to 1 h for children between 2 and 4 years, and to limit leisure screen time (i.e., screen time spent on non-educational issues) up to 2 h for children and adolescents between 5 and 17 years [22–24].

As mentioned above, the great amount of evidence regarding the association between health outcomes and lifestyle choices, including dietary patterns, and leisure screen time in children is not representative of the current screen time usage. In Spain concretely, this limitation is also found in the "Food, Physical Activity, Child development and Obesity" study (in Spanish: "Alimentación, Actividad Física, Desarrollo Infantil y Obesidad") ALADINO study [25], the largest study carried out, as far as we know, at the national level assessing the association between screen time and food and drink consumption, which took into account the exposure to TV, computers, and video games only, leaving out tablets and smartphones, since this study was carried out in 2011 and 2013. For the last five years, however, the prevalence of owning a mobile phone in Spain in children aged from 10 to 15 is higher than 65% [26–30].

Therefore, the aim of this study is to assess the relation between daily leisure screen time and the frequency of eating sweets, soft drinks, fast food, and snacks in a representative sample of Spanish children and adolescents aged from 1 to 14 years.

2. Methods

This is a cross-sectional study using a representative sample of the Spanish population under 15 years recruited for the 2017 Spanish National Health Survey (2017SNHS) (n = 6106). Data were collected between October 2016 and October 2017. Participants were selected through a stratified three-stage sampling, where the first stage was the census tracts and the second stage was the main family dwellings. Within each household, a participant aged 15 or over was selected to complete the Adult Questionnaire. If a children (aged 0–14) also lived in the household, a Child Questionnaire was also completed. The third stage was the individuals. The response rate for this survey was 72.2%. All the information was obtained through a computer-assisted personal interviewing answered by any of the parents, the legal guardian or other relative in the case of impossibility of the former [31]. Exclusion criteria for our study were (1) being under 1 year, as questions of screen time and junk food intake were not applicable for these children (n = 256); (2) having a limitation for doing any activity usually carried out by children due to any health issue, as reported by the person who answered the questionnaire (n = 332); and (3) being diagnosed by a doctor with diabetes, as diabetic children should control the sugar intake (n = 12), and having missing data in all outcome variables and/or the exposure variable (n = 26). Thus, the final sample included 5480 Spanish children from 1 to 14 years.

2.1. Research Ethics

The investigation was carried out considering the rules of the Declaration of Helsinki of 1975. Written informed consent was not necessary since anonymous data were used. This manuscript is part of a PhD thesis approved by the Ethics Committee of the Universitat Internacional de Catalunya with code CBAS-2020-06.

2.2. Frequency of Sweet, Soft Drink, Fast Food, and Snack Intake

Data on the frequency of sweet, soft drink, fast food, and snack intake were retrieved through the question "How often does the child eat each of the following groups of food?", with six possible responses (once or more than once a day, from 4 to 6 times a week, 3 times a week, once or twice a week, less than once a week, and never). We dichotomized the responses to the variables frequency of sweet, soft drink, fast food, and snack consumption as (a) high: respondents who answered that the child eats more than twice a week, and (b) low: otherwise.

2.3. Daily Leisure Screen Time

The questionnaire collected the leisure screen time through the question "Approximately, during the leisure time of the child in a day, how much time does the child spend in front of the screen, including computer, tablet, TV, videos, videogames, or cell phone?" differentiating between two periods of time: from Monday to Friday and from Saturday to Sunday (an independent question for each of the two periods). Respondents answered among three possible responses (never or almost never, less than 1 h, and at least 1 h). Then, those respondents that answered at least 1 h in any period of time, also reported the daily number of hours of leisure screen time, ranging from 1 h to 12 h, in the corresponding period of time. Next, we calculated the daily number of hours of leisure screen time through a weighted mean. We categorized the daily leisure screen time in minutes in 4 categories (0–59, 60–119, 120–179, and $\geq$180). Finally, we calculated the daily leisure screen time in hours after one hour of exposure.

2.4. Potential Confounding Variables and Covariates

Based on literature [10,20,32–37], we used the following variables as potential confounders: (1) sex (male and female) and (2) age of the child in years (1–2, 3–5, 6–11, and 12–14), categorized according to the Spanish school system, as we assume that children in different school stages have different routines, screen time usages, and dietary patterns; (3) education level of the parents (low, medium, and high); (4) relationship between who answered the questionnaire and the child (parents and others); (5) family structure (couple-parent, single-parent, couple-parent or single-parent living with other family members, and others); (6) sleep duration (proper sleep duration and short sleep duration), dichotomized according to the recommendations of the National Sleep Foundation (NSF) [38,39]; (7) physical activity in their leisure time (no exercise, physical or sports activity occasionally, physical activity several times a month, sports or physical training several times a week); (8) Body Mass Index for age (BMI-for-age) z-score, which is the standardized measure through weight and height reported by person who answered the questionnaire, calculated according to the child growth standards of the World Health Organization (WHO) [40]. We treated as missing data those z-scores classified as Biologically Implausible value (BIV) [41–43] for weight-for-age, height-for-age, and BMI-for-age; and (9) proxy of parent frequency of sweet, soft drink, fast food, and snack intake (high and low). Last, data were obtained through the answers of a person over 14 years that lived together with the child and answered the adult questionnaire. Due to the methodology of the 2017SNHS, we could not identify if that person was any of the parents, but around 93%

of children's families consisted in a couple or single-parent family. Therefore, we assume that most of persons responding the adult questionnaire was a parent.

2.5. Statistical Analysis

We described the outcomes, the exposure, potential confounding variables, and co-variates. We computed absolute and relative frequency for categorical variables and mean and standard deviation or median and interquartile range for numeric variables. We calculated the crude prevalence ratios (PR) and adjusted prevalence ratios (aPR), and their 95% confidence intervals (95% CI), of high frequency of sweet, soft drink, fast food, and snack intake according to the daily leisure screen time, taking as reference the category 0–59 min, and according to the daily leisure screen time after one hour of exposure. We also calculated the PR and aPR, and their 95% CI, of high frequency of soft drink, fast food, and snack intake, combined two by two, and the combination of the three together, according to the daily leisure screen time, taking as reference the category 0–59 min, and according to the daily leisure screen time after one hour of exposure. Models were fitted by generalized linear models with Poisson family and robust variances [44]. Associations were adjusted for potential confounding variables. Statistical software used was R-3.5.2.

3. Results

The median age of the children was 8 years (interquartile range: 4–11), 51.9% were male, 78.1% lived with a couple as family structure, 76.5% had proper sleep duration, and 21.6% did no exercise. An estimated 29.3%, 26.4%, 28.6%, and 15.7% of children spent less than 60, from 60 to 119, from 120 to 179, and at least 180 min of daily leisure screen time, respectively (Table 1). In addition, an estimated 29.0% of children between 12 and 14 years had at least 180 min of leisure screen time daily. Percentages decrease to 14.3%, 9.1%, and 4.9% for children between 6 and 11, 3–5, and 1–2 years, respectively. The average fruit and vegetable intake was 1.2 times and 0.66 times per day, respectively. An estimated 93.9% and 88.4% of children in our sample take dairy products and bread or cereals more than once daily. The highest percentage of high frequency of sweet intake, the group of junk food with a highest prevalence of consumption, corresponds to children between 3–5 years, with an estimated 78.1%.

3.1. Association between Daily Leisure Screen Time and Junk Food Intake

The largest prevalence of high frequency of consumption among the four outcomes analyzed corresponds to sweet intake, with 75% of children. Table 2 shows that the adjusted prevalence of high frequency of sweet and snack intake for children having at least one hour of daily leisure screen time are significantly higher than those for children having less than an hour of daily leisure screen time. The adjusted prevalence of high frequency of soft drink intake is significantly higher for children having at least two hours of exposure than that for children having less than an hour of exposure. For fast food, the adjusted prevalence from three hours of exposure is significantly higher than that for children having less than an hour of daily leisure screen time. Increasing point estimates for the prevalence of high risk in the four outcomes are generally observed for longer periods of daily leisure screen time.

Table 3 shows that the adjusted prevalence of high frequency of composite intakes for children having at least three hours of daily leisure screen time range from 2.29 (CI 95% 1.44, 3.65) to 4.27 (CI 95% 2.03, 8.96) times that those for children having less than an hour of daily leisure screen time.

3.2. Association between Daily Leisure Screen Time after One Hour of Exposure and Junk Food Intake

The prevalence of high frequency of snack intake increased around 25% for every hour of daily leisure screen time after one hour of exposure. Significant increases in the prevalence of high frequency of sweet, fast food, and soft drink intake after one hour of exposure are also observed. For composite intakes, aPR range from 1.31 (95% CI 1.20,1.43) to 1.45 (95% CI 1.31,1.61) (Tables 2 and 3).

Table 1. Characteristics of the study sample.

Variables of the Study (n = 5480)	n (%)/Mean (SD)
Sex of the child	
Male	2845 (51.9)
Female	2635 (48.1)
Age of the child (years)	
1–2	729 (13.3)
3–5	1038 (18.9)
6–11	2349 (42.9)
12–14	1364 (24.9)
Education level	
Low	453 (8.6)
Medium	3031 (57.4)
High	1799 (34.0)
Relationship between who answered the questionnarie and the child	
Parents	308 (5.6)
Other	5172 (94.4)
Family structure	
Couple	4281 (78.1)
Parent-single family	603 (11.0)
Couple or parent-single family with other family members	436 (8.0)
Others	160 (2.9)
Sleep duration	
Proper sleep duration	4190 (76.5)
Short sleep duration	1290 (23.5)
Physical activity	
No exercise	1181 (21.6)
Physical or sports activity occasionally	1361 (24.9)
Physical activity several times a month	1414 (25.8)
Sports or physical training several times a week	1504 (27.5)
BMI-for-age zscore	0.51 (1.54)
Frequency of sweets proxy of parents	
Low	2479 (51.8)
High	2308 (48.2)
Frequency of soft drinks proxy of parents	
Low	1089 (22.7)
High	3699 (77.3)
Frequency of fast food proxy of parents	
Low	376 (7.9)
High	4409 (92.1)
Frequency of snacks proxy of parents	
Low	415 (8.7)
High	4370 (91.3)

Table 1. *Cont.*

Variables of the Study	n (%)/Mean (SD)
Daily leisure screen time (min)	
0–59	1605 (29.3)
60–119	1444 (26.4)
120–179	1570 (28.6)
≥180	861 (15.7)
Daily leisure screen time after one hour of exposure (hours)	0.9 (1.1)
Sweet intake	
Low	1372 (25.0)
High	4106 (75.0)
Soft drink intake	
Low	4759 (87.0)
High	708 (13.0)
Fast food intake	
Low	4958 (90.6)
High	515 (9.4)
Snack intake	
Low	4869 (89.0)
High	604 (11.0)

n: absolute frequency; %: percentage; SD: standard deviation; BMI-for-age: Body Mass Index for age; min: minutes.

Table 2. Frequency of the categories of the variable daily leisure screen time and crude and adjusted prevalence ratios for the variables high frequency of sweet, soft drink, fast food, and snack intake and for daily leisure screen time after one hour of exposure according to the daily leisure screen time.

	High Frequency of Sweets (n = 5478)			High Frequency of Soft Drinks (n = 5467)			High Frequency of Fast Food (n = 5473)			High Frequency of Snacks (n = 5473)		
	%	**PR (95% CI)**	**aPR (95% CI)**	**%**	**PR (95% CI)**	**aPR (95% CI)**	**%**	**PR (95% CI)**	**aPR (95% CI)**	**%**	**PR (95% CI)**	**aPR (95% CI)**
Daily leisure screen time (min)												
0–59	69.2	1.00 Reference	1.00 Reference	7.9	1.00 Reference	1.00 Reference	8.1	1.00 Reference	1.00 Reference	7.9	1.00 Reference	1.00 Reference
60–119	76.1	1.10 (1.05,1.15)	1.05 (1.01,1.10)	9.5	1.21 (0.96,1.52)	1.09 (0.86,1.39)	7.6	0.93 (0.73,1.19)	0.83 (0.65,1.06)	9.0	1.15 (0.91,1.45)	1.30(1.00,1.68)
120–179	77.1	1.11 (1.07,1.16)	1.05 (1.01,1.10)	14.1	1.79 (1.45,2.20)	1.31 (1.05,1.63)	8.7	1.07 (0.85,1.35)	0.84 (0.67,1.07)	11.0	1.39 (1.12,1.74)	1.35 (1.06,1.73)
≥ 180	79.9	1.15 (1.10,1.21)	1.09 (1.03,1.14)	26.1	3.31 (2.71,4.05)	1.83 (1.47,2.27)	16.2	1.99 (1.59,2.49)	1.38 (1.08,1.75)	20.5	2.60 (2.10,3.22)	2.36 (1.84,3.02)
	Mean (SD)	**PR (95% CI)**	**aPR (95% CI)**	**Mean (SD)**	**PR (95% CI)**	**aPR (95% CI)**	**Mean (SD)**	**PR (95% CI)**	**aPR (95% CI)**	**Mean (SD)**	**PR (95% CI)**	**aPR (95% CI)**
Daily leisure screen time after one hour of exposure (hours)	0.9 (1.1)	1.04 (1.03,1.05)	1.02 (1.01,1.04)	1.4 (1.3)	1.40 (1.34,1.46)	1.20 (1.15,1.26)	1.3 (1.4)	1.28 (1.21,1.36)	1.15 (1.08,1.22)	1.3 (1.3)	1.31 (1.25,1.38)	1.25 (1.19,1.31)

%: percentage; PR: crude Prevalence Ratio; aPR: adjusted Prevalence Ratio; 95% CI: 95% Confidence Interval; SD: Standard Deviation; min: minutes.

Table 3. Frequency of the categories of the variable daily leisure screen time and crude and adjusted prevalence ratios for the composite variables of high frequency of sweet, soft drink, fast food, and snack intake and for daily leisure screen time after one hour of exposure according to the daily leisure screen time.

	High Frequency of Soft Drinks and Fast food (n = 5466)			High Frequency of Soft Drinks and Snacks (n = 5466)			High Frequency of Fast Food and Snacks (n = 5470)			High Frequency of Soft Drinks, Fast Food, and Snacks (n = 5465)		
	%	**PR (95% CI)**	**aPR (95% CI)**	**%**	**PR (95% CI)**	**aPR (95% CI)**	**%**	**PR (95% CI)**	**aPR (95% CI)**	**%**	**PR (95% CI)**	**aPR (95% CI)**
Daily leisure screen time (min)												
0–59	1.5	1.00 Reference	1.00 Reference	1.8	1.00 Reference	1.00 Reference	1.8	1.00 Reference	1.00 Reference	0.6	1.00 Reference	1.00 Reference
60–119	2.0	1.34 (0.78,2.29)	1.43 (0.82,2.48)	2.6	1.51 (0.93,2.44)	1.51 (0.91,2.50)	1.9	1.11 (0.66,1.87)	0.90 (0.53,1.53)	1.2	1.89 (0.87,4.11)	1.83 (0.84,3.96)
120–179	2.4	1.61 (0.97,2.67)	1.22 (0.71,2.09)	3.5	2.00 (1.28,3.14)	1.48 (0.92,2.39)	2.6	1.49 (0.93,2.40)	0.97 (0.58,1.60)	1.3	2.14 (1.01,4.52)	1.42 (0.65,3.13)
≥ 180	7.9	5.28 (3.34,8.34)	3.20 (1.91,5.33)	9.6	5.46 (3.58,8.31)	3.11 (1.95,4.94)	7.4	4.25 (2.75,6.58)	2.29 (1.44,3.65)	5.0	8.01 (4.04,15.86)	4.27 (2.03,8.96)
	Mean (SD)	**PR (95% CI)**	**aPR (95% CI)**	**Mean (SD)**	**PR (95% CI)**	**aPR (95% CI)**	**Mean (SD)**	**PR (95% CI)**	**aPR (95% CI)**	**Mean (SD)**	**PR (95% CI)**	**aPR (95% CI)**
Daily leisure screen time after one hour of exposure (hours)	1.8 (1.6)	1.59 (1.46,1.73)	1.42 (1.30,1.54)	1.6 (1.4)	1.52 (1.41,1.64)	1.32 (1.23,1.42)	1.6 (1.5)	1.51 (1.39,1.65)	1.31 (1.20,1.43)	1.9 (1.5)	1.65 (1.48,1.82)	1.45 (1.31,1.61)

%: percentage; PR: crude Prevalence Ratio; aPR: adjusted Prevalence Ratio; 95% CI: 95% Confidence Interval; SD: Standard Deviation; min: minutes.

4. Discussion

Children spending at least one hour of daily leisure screen time had higher prevalence of high frequency of sweet and snack intake than children being exposed less than one hour. For soft drinks and fast food, prevalence of high frequency intake was significantly higher from two and three hours of exposure, respectively. Further, the prevalence of high frequency of junk food consumption significantly increased for every hour of daily leisure screen time after the first hour of exposure.

Our results update, and add to the evidence, that longer periods of screen time may be associated with higher prevalences of junk food consumption. Mainly, our results are in line with those of the 2011 and 2013 ALADINO study [25], which included a representative sample of Spanish children from six to nine and from seven to eight years, respectively, and found that higher levels of screen time were associated with a larger frequency of consumption of energy-dense products. In other studies in which the association between Mediterranean Diet and screen exposure was assessed in Spanish children [15,45,46], longer periods of screen time were associated with a lower adherence to the Mediterranean Diet. This is consistent with our results, as the Mediterranean Diet is characterized by a low intake of junk food.

We have also found that children exposed to screens in their leisure time for at least 180 min daily have a higher frequency of different combinations of the variables of consumption. Remarkably, these associations were, in general, stronger than with the individual outcomes. This may indicate that screen exposure is associated not only with isolated unhealthy dietary behaviors but with broader, unhealthy nutritional patterns. Therefore, our results enforce the results obtained in previous systematic reviews [19,20].

Prevalence of childhood overweight and obesity are on the rise worldwide at present. In Spain, over 30% of children between three and eighteen are obese or overweight [3]. Among the plethora of social, biological, environmental, and economic determinants associated with these conditions, screen time exposure may play an important role not only because it may be associated with poorer dietary patterns, but also because it may act as a displacer of healthier habits, such as doing exercise. In this sense, and although it is not the main aim of the study, we have also found that children doing sports or physical training several times a week have lower adjusted prevalence of soft drink (aPR: 0.63, 95% CI: 0.52, 0.77) and fast food intake (aPR: 0.64, 95% CI: 0.47, 0.88) than children who do not do exercise. Physical activity has been proposed to be a stress-induced eating repressor, which may eventually limit junk food consumption [47]. Furthermore, greater screen time exposure has been found to be associated with lower levels of physical activity in Spanish children [48], meaning that physical activity could mediate in the association between screen time exposure and junk food consumption. The effect of increased levels of physical activity on the reduction of junk food consumption could also be explained by the displacement of screen time exposure, which results in a reduced junk food consumption (main association explored in this paper). In this case, screen time exposure could act as a mediator in the association between physical activity and junk food consumption.

4.1. Public Health Implications

One of the seventeen United Nations Sustainable Development Goals consists in ensuring good health and promoting well-being, with a special focus on children [49]. In this sense, further prospective studies should be carried out to confirm our results in order for governments to consider implementing comprehensive policies directed not only to reduce leisure screen time, but also to promote healthier habits overall which may impact children's future health. Specific programs may include school-based interventions to encourage children to change their lifestyles or information campaigns for parents to inform them on the consequences of the potential harmful use of screen devices in their kids.

4.2. Strengths and Limitations

This is the first study assessing the relation between dietary patterns and screen time in a representative sample of Spanish pediatric population including in the overall screen time smartphone and tablet use, as well as considering combinations of different junk food categories. Our study contains some limitations that should be mentioned. First, this study does not differentiate between different types of screen exposure, which may have different effects on junk food consumption, and may hamper the potential implementation of focused public health interventions directed to reduce specific screen exposures. Additionally, due to the cross-sectional design of the survey, a causal effect of leisure screen time on the frequency of junk food consumption cannot be established and reverse causality should not be discarded. However, we hypothesize that screen time may be associated with junk food consumption in our study through different pathways. First, evidence shows that children belonging to low-income families are more likely to spend longer periods using screens and follow worse dietary patterns [10] as parents have longer working hours, less time to look after their children, and are less informed on the harmful effects of low-quality diets. In this sense, parents having longer working hours may offer their children more readily available options requiring less of their time, such as mobile devices to entertain them and junk food to feed them. Furthermore, children may be more exposed to junk food advertisements while on screen time, triggering its consumption. Also, screen time may be associated with increased levels of stress, which may turn into stress-induced eating and subsequent junk food consumption. Finally, inaccurate estimates of junk food consumption and daily leisure screen time may have been reported, leading to information bias. This may be more relevant for older children due to their more independent lives (i.e., respondents could be unaware of certain intakes) and associated with a response bias from parents which could be reduced in future investigations with the use of dietary records and real-time monitoring.

5. Conclusions

The results of the present investigation suggest that longer periods of screen exposure in Spanish children during their leisure time may be associated with poorer dietary behaviors. This highlights the necessity to continue studying the potential negative effects of excessive screen time in pediatrics population for Spanish health institutions to consider promoting interventions to control its use. These findings, however, should be confirmed in prospective studies.

Author Contributions: Conceptualization, A.G.-M. and J.M.M.-S.; Methodology, À.C.-H.; Formal Analysis, À.C.-H., E.G.-P., and J.C.M.-S.; Data Curation, À.C.-H. and C.L.-M.; Writing—Original Draft Preparation, À.C.-H. and A.G.-M.; Writing—Review and Editing, À.C.-H., A.G.-M., C.L.-M., E.G.-P., J.C.M.-S., and J.M.M.-S.; Supervision, J.M.M.-S. All authors have read and agreed to the published version of the manuscript.

Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. À.C.-H., A.G.-M., C.L.-M., J.C.M.-S., and J.M.M.-S. are supported by the Ministry of Universities and Research, Government of Catalonia (2017SGR608).

Institutional Review Board Statement: The investigation was carried out considering the rules of the Declaration of Helsinki of 1975. This manuscript is part of a PhD thesis approved by the Ethics Committee of the Universitat Internacional de Catalunya with code CBAS-2020-06.

Informed Consent Statement: Written informed consent was not necessary since anonymous data were used.

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. World Health Organization (WHO). Obesity and Overwight. 2020. Available online: https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight (accessed on 18 February 2021).

2. World Health Organization (WHO). Childhood Obesity Surveillance Initiative: HIGHLIGHTS 2015–2017. 2018. Available online: https://www.euro.who.int/__data/assets/pdf_file/0006/372426/WH14_COSI_factsheets_v2.pdf (accessed on 18 February 2021).
3. Aranceta-Bartrina, J.; Gianzo-Citores, M.; Pérez-Rodrigo, C. Prevalencia de sobrepeso, obesidad y obesidad abdominal en población española entre 3 y 24 años. Estudio ENPE. *Revista Española de Cardiología* **2020**, *73*, 290–299. [CrossRef] [PubMed]
4. Umer, A.; Kelley, G.A.; Cottrell, L.E.; Giacobbi, P.; Innes, K.E.; Lilly, C.L. Childhood obesity and adult cardiovascular disease risk factors: A systematic review with meta-analysis. *BMC Public Health* **2017**, *17*, 683. [CrossRef]
5. Chung, S.T.; Onuzuruike, A.U.; Magge, S.N. Cardiometabolic risk in obese children. *Ann. N. Y. Acad. Sci.* **2018**, *1411*, 166–183. [CrossRef]
6. Narang, I.; Mathew, J.L. Childhood Obesity and Obstructive Sleep Apnea. *J. Nutr. Metab.* **2012**, *2012*, 134202. [CrossRef]
7. Mohanan, S.; Tapp, H.; McWilliams, A.; Dulin, M. Obesity and asthma: Pathophysiology and implications for diagnosis and management in primary care. *Exp. Biol. Med.* **2014**, *239*, 1531–1540. [CrossRef]
8. Pollock, N.K. Childhood obesity, bone development, and cardiometabolic risk factors. *Mol. Cell. Endocrinol.* **2015**, *410*, 52–63. [CrossRef] [PubMed]
9. Spinelli, A.; Buoncristiano, M.; Kovacs, V.A.; Yngve, A.; Spiroski, I.; Obreja, G.; Starc, G.; Pérez, N.; Rito, A.I.; Kunešová, M.; et al. Prevalence of Severe Obesity among Primary School Children in 21 European Countries. *Obes. Facts* **2019**, *12*, 244–258. [CrossRef] [PubMed]
10. D'Souza, N.J.; Kuswara, K.; Zheng, M.; Leech, R.; Downing, K.L.; Lioret, S.; Campbell, K.J.; Hesketh, K.D. A systematic review of lifestyle patterns and their association with adiposity in children aged 5–12 years. *Obes. Rev.* **2020**, *21*. [CrossRef]
11. Notario-Barandiaran, L.; Valera-Gran, D.; Gonzalez-Palacios, S.; Garcia-de-la Hera, M.; Fernández-Barrés, S.; Pereda-Pereda, E.; Fernández-Somoano, A.; Guxens, M.; Iñiguez, C.; Romaguera, D.; et al. High adherence to a mediterranean diet at age 4 reduces overweight, obesity and abdominal obesity incidence in children at the age of 8. *Int. J. Obes.* **2020**, *44*, 1906–1917. [CrossRef] [PubMed]
12. Cambridge Dictionary. Junk Food Definition. 2021. Available online: https://dictionary.cambridge.org/es/diccionario/ingles/junk-food (accessed on 18 February 2021).
13. Iaccarino Idelson, P.; Scalfi, L.; Valerio, G. Adherence to the Mediterranean Diet in children and adolescents: A systematic review. *Nutr. Metab. Cardiovasc. Dis.* **2017**, *27*, 283–299. [CrossRef]
14. Rosi, A.; Paolella, G.; Biasini, B.; Scazzina, F.; Alicante, P.; De Blasio, F.; dello Russo, M.; Paolella, G.; Rendina, D.; Rosi, A.; et al. Dietary habits of adolescents living in North America, Europe or Oceania: A review on fruit, vegetable and legume consumption, sodium intake, and adherence to the Mediterranean Diet. *Nutr. Metab. Cardiovasc. Dis.* **2019**, *29*, 544–560. [CrossRef] [PubMed]
15. Bawaked, R.A.; Gomez, S.F.; Homs, C.; Esteve, R.C.; Cardenas, G.; Fíto, M.; Schröder, H. Association of eating behaviors, lifestyle, and maternal education with adherence to the Mediterranean diet in Spanish children. *Appetite* **2018**, *130*, 279–285. [CrossRef]
16. Asghari, G.; Yuzbashian, E.; Mirmiran, P.; Mahmoodi, B.; Azizi, F. Fast food intake increases the incidence of metabolic syndrome in children and adolescents: Tehran lipid and glucose study. *PLoS ONE* **2015**, *10*, e0139641. [CrossRef]
17. Wiles, N.J.; Northstone, K.; Emmett, P.; Lewis, G. 'Junk food'diet and childhood behavioural problems: Results from the ALSPAC cohort. *Eur. J. Clin. Nutr.* **2009**, *63*, 491–498. [CrossRef] [PubMed]
18. Zahedi, H.; Kelishadi, R.; Heshmat, R.; Motlagh, M.E.; Ranjbar, S.H.; Ardalan, G.; Payab, M.; Chinian, M.; Asayesh, H.; Larijani, B.; et al. Association between junk food consumption and mental health in a national sample of Iranian children and adolescents: The CASPIAN-IV study. *Nutrition* **2014**, *30*, 1391–1397. [CrossRef] [PubMed]
19. Avery, A.; Anderson, C.; McCullough, F. Associations between children's diet quality and watching television during meal or snack consumption: A systematic review. *Matern. Child Nutr.* **2017**, *13*, e12428. [CrossRef]
20. Shqair, A.Q.; Pauli, L.A.; Costa, V.P.P.; Cenci, M.; Goettems, M.L. Screen time, dietary patterns and intake of potentially cariogenic food in children: A systematic review. *J. Dent.* **2019**, *86*, 17–26. [CrossRef] [PubMed]
21. Stiglic, N.; Viner, R.M. Effects of screentime on the health and well-being of children and adolescents: A systematic review of reviews. *BMJ Open* **2019**, *9*, e023191. [CrossRef]
22. World Health Organization (WHO). *Guidelines on Physical Activity, Sedentary Behaviour and Sleep for Children under 5 Years of Age*; World Health Organisation: Geneva, Switzerland, 2019.
23. Ministerio de Sanidad Servicios Sociales e Igualdad. Actividad Física para la Salud y Reducción del Sedentarismo. Recomendaciones para la Población. Estrategia de Promoción de la Salud y Prevención en el SNS. 2015. Available online: https://www.mscbs.gob.es/profesionales/saludPublica/prevPromocion/Estrategia/docs/Recomendaciones_ActivFisica_para_la_Salud.pdf (accessed on 18 February 2021).
24. American Academy of Pediatrics. Media and Young Minds. *Pediatrics* **2016**, *138*, e20162591. [CrossRef]
25. Pérez-Farinós, N.; Villar-Villalba, C.; López Sobaler, A.M.; Dal Re Saavedra, M.; Aparicio, A.; Santos Sanz, S.; Robledo de Dios, T.; Castrodeza-Sanz, J.J.; Ortega Anta, R.M. The relationship between hours of sleep, screen time and frequency of food and drink consumption in Spain in the 2011 and 2013 ALADINO: A cross-sectional study. *BMC Public Health* **2017**, *17*, 1–12. [CrossRef]
26. Instituto Nacional de Estadística. Encuesta sobre Equipamiento y Uso de Tecnologías de Información y Comunicación en los Hogares. 2016. Available online: https://www.ine.es/jaxi/Datos.htm?path=/t25/p450/base_2011/a2016/l0/&file=01005.px#!tabs-tabla (accessed on 18 February 2021).
27. Instituto Nacional de Estadística. Encuesta sobre Equipamiento y Uso de Tecnologías de Información y Comunicación en los Hogares. 2017. Available online: https://www.ine.es/prensa/tich_2017.pdf (accessed on 18 February 2021).

28. Instituto Nacional de Estadística. Encuesta sobre Equipamiento y Uso de Tecnologías de Información y Comunicación en los Hogares. 2018. Available online: https://www.ine.es/prensa/tich_2018.pdf (accessed on 18 February 2021).
29. Instituto Nacional de Estadística. Encuesta sobre Equipamiento y Uso de Tecnologías de Información y Comunicación en los Hogares. 2019. Available online: https://www.ine.es/prensa/tich_2019.pdf (accessed on 18 February 2021).
30. Instituto Nacional de Estadística. Encuesta sobre Equipamiento y Uso de Tecnologías de Información y Comunicación en los Hogares. 2020. Available online: https://www.ine.es/prensa/tich_2020.pdf (accessed on 18 February 2021).
31. National Institute of Statistics. Spanish National Health Survey 2017 Methodology. 2018. Available online: https://www.ine.es/en/metodologia/t15/t153041917_en.pdf (accessed on 18 February 2021).
32. Marshall, S.J.; Biddle, S.J.H.; Gorely, T.; Cameron, N.; Murdey, I. Relationships between media use, body fatness and physical activity in children and youth: A meta-analysis. *Int. J. Obes.* **2004**, *28*, 1238–1246. [CrossRef]
33. Lizandra, J.; Devís-Devís, J.; Valencia-Peris, A.; Tomás, J.M.; Peiró-Velert, C. Screen time and moderate-to-vigorous physical activity changes and displacement in adolescence: A prospective cohort study. *Eur. J. Sport Sci.* **2019**, *19*, 686–695. [CrossRef]
34. Paudel, S.; Jancey, J.; Subedi, N.; Leavy, J. Correlates of mobile screen media use among children aged 0–8: A systematic review. *BMJ Open* **2017**, *7*, e014585. [CrossRef]
35. Chen, L.; Zhu, H.; Gutin, B.; Dong, Y. Race, Gender, Family Structure, Socioeconomic Status, Dietary Patterns, and Cardiovascular Health in Adolescents. *Curr. Dev. Nutr.* **2019**, *3*, nzz117. [CrossRef]
36. Langøy, A.; Smith, O.R.F.; Wold, B.; Samdal, O.; Haug, E.M. Associations between family structure and young people's physical activity and screen time behaviors. *BMC Public Health* **2019**, *19*, 433. [CrossRef] [PubMed]
37. Xu, H.; Wen, L.M.; Rissel, C. Associations of parental influences with physical activity and screen time among young children: A systematic review. *J. Obes.* **2015**, *2015*, 546925 . [CrossRef]
38. Hirshkowitz, M.; Whiton, K.; Albert, S.M.; Alessi, C.; Bruni, O.; DonCarlos, L.; Hazen, N.; Herman, J.; Adams Hillard, P.J.; Katz, E.S.; et al. National Sleep Foundation's updated sleep duration recommendations: Final report. *Sleep Health* **2015**, *1*, 233–243. [CrossRef]
39. Hirshkowitz, M.; Whiton, K.; Albert, S.M.; Alessi, C.; Bruni, O.; DonCarlos, L.; Hazen, N.; Herman, J.; Katz, E.S.; Kheirandish-Gozal, L.; et al. National Sleep Foundation's sleep time duration recommendations: methodology and results summary. *Sleep Health* **2015**, *1*, 40–43. [CrossRef] [PubMed]
40. de Onis, M.; Lobstein, T. Defining obesity risk status in the general childhood population: Which cut-offs should we use? *Int. J. Pediatr. Obes.* **2010**, *5*, 458–460. [CrossRef] [PubMed]
41. Freedman, D.S.; Lawman, H.G.; Skinner, A.C.; McGuire, L.C.; Allison, D.B.; Ogden, C.L. Validity of the WHO cutoffs for biologically implausible values of weight, height, and BMI in children and adolescents in NHANES from 1999 through 2012. *Am. J. Clin. Nutr.* **2015**, *102*, 1000–1006. [CrossRef] [PubMed]
42. Freedman, D.S.; Lawman, H.G.; Pan, L.; Skinner, A.C.; Allison, D.B.; McGuire, L.C.; Blanck, H.M. The prevalence and validity of high, biologically implausible values of weight, height, and BMI among 8.8 million children. *Obesity* **2016**, *24*, 1132–1139. [CrossRef]
43. Centers for Disease Control and Prevention (CDC). A SAS Program for the 2000 CDC Growth Charts (ages 0 to <20 years). 2019. Available online: https://www.cdc.gov/nccdphp/dnpao/growthcharts/resources/sas.htm (accessed on 18 February 2021).
44. Espelt, A.; Marí-dell'Olmo, M.; Panello, E.; Bosque-Prous, M. Applied Prevalence Ratio estimation with different Regression models: An example from a cross-national study on substance use research. *Adicciones* **2016**, *29*, 37–54.
45. López-Gil, J.F.; Gaya, A.R.; Duarte-Junior, M.A.D.S.; Yuste-Lucas, J.L. Meeting international screen-time guidelines is associated with healthy dietary patterns in Spanish schoolchildren. *Nutr. Hosp.* **2020**, *37*, 1123–1129. [CrossRef] [PubMed]
46. Serrano, T.; Vaquero-Solís, M.; López-Gajardo, M.A.; Sánchez-Miguel, P.A. Adherence to the Mediterranean diet, and importance of physical activity and screen time in Extremaduran high school adolescents. *Nutr. Hosp.* **2020**. [CrossRef]
47. Leow, S.; Jackson, B.; Alderson, J.A.; Guelfi, K.J.; Dimmock, J.A. A role for exercise in attenuating unhealthy food consumption in response to stress. *Nutrients* **2018**, *10*, 176. [CrossRef]
48. Serrano-Sanchez, J.A.; Martí-Trujillo, S.; Lera-Navarro, A.; Dorado-García, C.; González-Henríquez, J.J.; Sanchís-Moysi, J. Associations between screen time and physical activity among Spanish adolescents. *PLoS ONE* **2011**, *6*, e24453. [CrossRef] [PubMed]
49. United Nations. The 17 Goals. Available online: https://sdgs.un.org/goals (accessed on 18 February 2021).

4.6. Artículo IV

Association between screen time and emotional and behavioural problems in Spanish children

ARTICLE TITLE: Association between leisure screen time and emotional and behavioural problems in Spanish children

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ABSTRACT

Evidence shows that excessive screen time is related to emotional and behavioural problems; however, there is a lack of evidence assessing this relation in Southern European countries. This study aims to assess the relation between leisure screen time and emotional and behavioural problems in Spaniards aged 4-14 years. This cross-sectional study used a representative sample of children aged 4-14 years included in the 2017 Spanish National Health survey (n=4,073). Emotional and behavioural problems of children were assessed through the Parental Strengths and Difficulties Questionnaire. Daily leisure screen time in minutes was categorized as: (1) 0–59, (2) 60–119, (3) 120–179, and (4) ≥180. We calculated adjusted prevalence ratios (aPR) and their 95% confidence intervals (95% CI) of being at risk of developing emotional and behavioural problems. Associations were adjusted for potential confounding variables. Children spending 180 minutes or more of daily leisure screen time were more likely to be at risk of developing emotional and behavioural problems (reference: 0-59 minutes): $aPR_{\geq 180}$: 1.93 (95% CI 1.39,2.68).

Conclusions: We have found significant association between daily leisure screen time and emotional and behavioural problems in Spanish children between 4 and 14 years. However, these findings should be confirmed in cohort studies, so institutions might consider including screen time as a new risk factor for children in the new health programmes.

KEYWORDS: Adolescent; Child; Emotion; Problem Behavior; Screen Time; Spain

INTRODUCTION

Childhood and adolescence are crucial periods for mental health, since during these periods children and adolescents acquire cognitive and social-emotional skills which determine their future mental health [1, 2]. Having a psychological problem during the childhood increases 6 times the odds of suffering at least one adverse adult outcome (including health, legal, financial and social outcomes) [3]. Between 10% and 20% of children and adolescents worldwide experience mental health disorders [1]. In Europe, anxiety and depression are in the top 5 conditions of the overall disease burden among children and adolescents[4]. In 2017, in Spain, 1.8% of children under 15 years had conduct disorders, including hyperactivity, and 0.6% had mental disorders, including depression and anxiety [5]. Different environmental and behavioural factors might contribute to mental health [2]. On the one hand, family features, since children belonging to low-income families and/or single parent families present higher risk of emotional and behavioural problems [6–8]. Further, the mental health of a parent or other caregiver might be a good predictor of emotional and behavioural problems in children in charge [1, 9, 10]. On the other hand, behavioural features, such as sleep problems, might be associated with poorer mental health [11], while physical activity seems to be a protective factor of good mental health [12]. In this sense, two systematic reviews indicate that longer periods of screen time are associated with poorer psychological well-being, worse perceived quality of life in children from 5 to 18 years [13], and greater depressive symptoms and psychological distress in children from 10 to 18 years [14]. Further, different studies show that longer periods of screen time are related to a higher risk of developing hyperactivity/inattention [15–17], emotional symptomology [17, 18], conduct problems [16, 17], and worse prosocial behaviour [16, 17, 19, 20]. Previous works have evaluated the emotional and behavioural problems in children through the Strengths and Difficulties Questionnaire (SDQ), which is an internationally recommended tool for the assessment of these conditions in children from 3 to 16 years. There are three different versions of the SDQ according to whom answers the questionnaire: parents, teachers, or self-reported, the latter only for children from 10 to 16 years [21]. Published studies assessing the effect of screen time on emotional and behavioural problems, however, are based on northern European and Asiatic children. To the best of our knowledge, there is only one study addressing this association in southern European paediatric population. This is a cohort study [22] published in 2018 which aimed, among other objectives, to assess the relationship between time spent watching TV and behavioural and emotional problems using a sample of Spanish children aged 4 years at baseline and 7 years at the end of the follow-up. This study concluded that there was no association between time spent watching TV and the development of behavioural and emotional problems [22]. However, current screen time is not based on TV viewing only. Screen time has been in constant change over the last decade, since screen devices (e.g., smartphones and tablets) are more accessible and portable, making children be exposed at earlier ages, and increase the time of using and exposition [23]. Due to this constant evolution, there is a need to update the current screen time information [24]. In Spain, in 2017, percentages of children exceeding 3 hours of daily leisure screen time were 4.9%, 9.0%, 14.3%, and 29.1% for children between 1 and 2, 3 and 5, 6 and 11, and 12 and 14 years, respectively [25]. However, Spanish children had extensively been exposed to screens well before 2017. In fact, in 2015, the Spanish “Ministry of Health, Social Services and Equity” [26] (Ministerio de Salud, Servicios Socials e Igualdad: MSSSI) already provided recommendations for healthy screen time for children under 18 years. These recommendations were as follows: children under 2 years should not be exposed to screens; screen time for children from 2 to 4 years should be limited to less than 1 hour daily; and for children between 5 and 17 years, screen time should not exceed 2 hours daily [26]. Apart from emotional and behavioural problems, excessive screen time is related to sleep problems [27], obesity [28], unhealthy dietary patterns [29], and lower levels of physical activity [30].

Providing updated evidence on the association between leisure screen time and emotional and behavioural problems in southern European children is important since there are socioeconomic, cultural, and behavioural differences in comparison to children living in those areas where studies are already carried out. In this sense, previously published works show that southern European children spend shorter periods of screen time [31], but also sleep less [32], than children from northern European countries. These differences might be explained because southern European children might tend to do their routines after school later in the day, making them have less sleep time available, which might be the cause of higher risk of developing emotional and behavioural problems eventually [33], since an adequate sleep helps the consolidation of memory and is crucial for the healthy development of the central nervous system [34]. Furthermore, focusing on Spain, its Health expenditure per capita was below the European Union average in 2017 and also Spain was in the top 3 countries of the European Union regarding direct or indirect economic cost due to poor mental health, according to Health at a Glance: Europe 2018 report [35].

Taking into account that current screen time during childhood and adolescence is on steady increase and the lack of updated evidence, that are not based on TV viewing, on the relationship between screen time and mental health in the southern European paediatric population, this study aimed to assess the relationship between emotional and behavioural problems and leisure screen time of Spanish children from 4 to 14 years.

METHODS

Sample and procedure

We used data collected in the cross-sectional Spanish National Health Survey conducted in 2017. The Spanish National Health Survey is a serial set of surveys that constitutes the main source of information on the perceived health of the population residing in Spain. Its answer rate was 72.2% in 2017. It includes data from 29,195 individuals, 23,089 adults (above 14 years) and 6,106 children (under 15 years). Individuals were selected through a stratified three-stage sampling, where the first stage was census tracts, the second was the main family dwellings and the third stage was the individuals. All the information was obtained through face to face questionnaire. Regarding children, the questionnaire was answered by parents, legal guardians or other cohabiting relatives (e.g. brothers/sisters, grandparents) in the case of impossibility of the former [36]. To carry out this study we only used data from children and their household. Due to the aim of our study, exclusion criteria were: (a) children under 4 years (n=1383); (b) the person who answered the questionnaire was not any of the parents (n=247); (c) children whose parents self-declared that: (I) a doctor diagnosed the child with conduct disorders or mental disorders or autism and/or (II) the child having a limitation to do any activity for children due to a health issue, because we cannot discard this limitation modifies the screen time use (n=391); having missing observations in (d) all five SDQ scales (n=4) or (e) in the daily leisure screen time variable (n=8). As a result, the final sample includes 4,073 Spanish children aged 4-14 years.

Research ethics

The investigation was carried out considering the rules of the Declaration of Helsinki of 2013. We used secondary data which is publicly available in the following repository (https://www.mscbs.gob.es/estadEstudios/estadisticas/encuestaNacional/encuesta2017.htm). Written informed consent was not necessary since anonymous data were used and an ethics committee approval not required. However, this manuscript results from a PhD thesis having the approval by the ethics committee of the Universitat Internacional de Catalunya with code CBAS-2020-06.

Study variables

We evaluated the emotional and behavioural problems of the children through the parental SDQ (SDQ-P) (Cronbach's alpha > 0.7 [37, 38]. These reliability factors were obtained from studies using different data than the current study. However, the population of reference is similar). The SDQ questionnaire consists of 25 questions, of which 15 assess difficulties and 10 assess strengths. These 25 questions are grouped in 5 scales: (i) emotional symptomology and (ii) peer problems, which represent emotional problems; (iii) hyperactivity/inattention and (iv) conduct problems, which represent behavioural problems; and (v) prosocial behaviour. Every question has three possible answers (not true, somewhat true, and certainly true) scored from 0 to 2 for questions assessing difficulties, and from 2 to 0 for questions assessing strengths. The score of each scale ranges from 0 to 10, 10 being the best score for the prosocial behaviour scale, and 0 the best score for the rest of the scales. The Total Difficulties score results from the sum of the hyperactivity/inattention, emotional symptomology, conduct problems and peer problems scores. Hence, its score ranges from 0 to 40, 0 being the best score.

We got the variable being at risk of developing emotional and behavioural problems dichotomizing the total difficulties score in: (a) yes: children whose total difficulties score was above the 90^{th} percentile and (b) no: otherwise. We followed this approach because evidence suggests that scores above the 90^{th} percentile in the SDQ predict a substantially raised probability of being independently diagnosed with psychiatric disorders [39]. We used the 90^{th} percentile as a cut-off for the hyperactivity/inattention, emotional symptomology, conduct problems, and peer problems scales, to determine who is at risk of developing each of the previous emotional and behavioural problems independently. On contrary to the rest of SDQ scales, individuals with values lower than the 10^{th} percentile in the prosocial behaviour scale were classified as being at risk of behaving less prosocially.

The leisure screen time variable was obtained through two questions: (a) "During leisure time of the child, how long does the child spend in front of the screen, including laptop, tablet, TV, videos, videogames or smartphones?" differentiating between weekdays and weekend days. These questions had three possible responses: never or almost never, less than 1 hour, and 1 hour or more. (b) Additionally, parents that answered "1 hour or more" in a weekday and/or in a weekend day also reported the average number of hours spent in front of a screen daily, ranging from 1 to 12 hours. We calculated the average number of hours of daily leisure screen time through a weighted mean only if the parents reported the average number of hours for both weekdays and weekends. Afterwards, we categorized the daily leisure screen time variable in minutes in four categories, according to the recommendations of the Spanish Health Institutions [26] and the nature of the question: (a) 0–59, (b) 60–119 (c) 120–179, and (d) ≥ 180.

According to previous literature, we selected the following variables as potential confounders [7, 9, 11, 23–25, 27, 28, 33, 40–44]: sex (male and female) and age in years (4-5, 6-11, and 12-14) of the child. We categorized the age according to the stages of the Spanish school system, because we assume that children of different school stages have distinct routines, school hours and cognitive development. Further, we selected education level of the parents (low: unschooled, elementary school completed or uncompleted and special education; medium: high school and training cycles; and high: university education); family structure (couple, single-parent family, couple or single-parent family living with other relatives, and others); a proxy of the parental mental health status (good mental health: those parents whose score in the 12 item in the General Health Questionnaire [45] (GHQ-12) was below 3 and poor mental health: otherwise); sleep duration (proper sleep duration: those children who slept equal or more than the National Sleep Foundation (NSF) recommends according to child's age [46, 47], and short sleep duration: those children who did not); physical activity in their leisure time (no exercise, physical activity or sports occasionally (e.g. walking, riding a bike, or low impact physical activity), physical activity several times a month (e.g. gymnastics, jogging, swimming or team sports), and sports or physical training several times a week); and Body Mass Index, obtained through the parent's report of the child's weight in kilograms and height in centimetres, for age (BMI-for-age) *z-score,* which is the standardized measure calculated according to the child growth standards of the WHO [48, 49]. We treated as missing data those *z-scores* classified as Biologically Implausible value (BIV) [50–52] for weight-for-age, height-for-age, and BMI-for-age.

Statistical analysis

We described the study sample, calculating absolute frequencies and percentages for categorical variables and mean and standard deviation (SD) for numeric variables. Further, we calculated percentages, unadjusted and adjusted prevalence ratios (PR and aPR) with 95% confidence intervals (95% CI) of being at risk of developing emotional and behavioural problems, hyperactivity/inattention, emotional symptomology, conduct problems, and peer problems, and behaving less prosocially, according to daily leisure screen time. Associations were adjusted for confounders. We calculated PR, aPR, and 95% CI through generalized linear regression models (GLM) with Poisson family and robust variance [53]. In regard to missing data, they did not exceed 2% in outcome variables, and they were equal to 0.7% in the education level of the parents, 0.2% in sleep duration variable, 11.8% in proxy of parental mental health status, and 12.2% in BMI-for-age *z-score*. We imputed missing data in those variables for which their missing data percentage exceeds 5% through predictive mean matching method using all available information [54]. The statistical program used was R-3.5.2.

RESULTS

This study included 4,073 children. 2,074 (51%) were males and the average of age was 9.31 years (SD: 3.17). In addition, 3,211 (79%) slept properly, and 1,360 (33%) did sports or physical training several times a week. Further, there were 2,378 (59%) children whose parents had medium education level, 3,277 (81%) of children lived with a couple, and 3,066 (85%) of children's parents had good mental health. Regarding daily leisure screen time, 989 (24%) of children spent between 0 and 59 minutes, 1,108 (27%) of children spent between 60 and 119 minutes, 1,275 (31%) of children spent between 120 and 179 minutes, and 701 (17%) of children spent 180 minutes or more (Table 1).

Table 2 shows that the prevalence of being at risk of developing emotional and behavioural problems increases according to the daily leisure screen time, ranging from 5.9% for 0-59 minutes to 11.7% 180 minutes or more. Additionally, children spending 180 minutes or more of daily leisure screen time were more likely to be at risk of developing emotional symptomology, conduct problems, and peer problems, and to be at risk of behaving less prosocially, than children spending up to 59 minutes of daily leisure screen time. These patterns remained significant even after we adjusted for confounders (Table 2).

DISCUSSION

Spanish children between 4 and 14 years that spent at least 180 minutes of daily leisure screen time were more likely to be at risk of developing emotional and behavioural problems, in particular to develop emotional symptomology, peer problems, and conduct problems, and to behave less prosocially, than children spending up to 59 minutes of daily leisure screen time.

Regarding the association between daily leisure screen time and risk of developing emotional and behavioural problems, our results are in contrast with the results obtained in a cohort study [22] published in 2018 of a sample of school-aged children from two regions of Spain, which showed no association between time spent watching TV and risk of behavioural problems. This discrepancy might be due to the fact that this research only included TV time to compute the screen time variable. Furthermore, our results are also in contrast with those obtained in a cross-sectional study [15] conducted in 2019 of a sample of 5-year-old Dutch children that concluded that there was no association between watching TV for longer periods and being more likely to have psychological problems. In contrast, our results are consistent with those obtained in a cross-sectional study [16] conducted in a sample of German children aged 2-to-9-years which aimed, among other objectives, to investigate the associations between media use and behavioural strengths and difficulties [16].

In addition, our results are partially in line with those obtained in the German study [16], regarding association between daily leisure screen time and to be at risk of developing hyperactivity/inattention, emotional symptomology, conduct problems, and peer problems, and to behave less prosocially, since previous study found an association between higher patterns of screen time and to be at risk of developing conduct problems and behaving less prosocially. In contrast, our results show discrepancies with the results arising from both the German [16] and Dutch [15] studies, since they found an association between screen time and hyperactivity/inattention but not between screen time and emotional symptomology and peer problems [15, 16]. These discrepancies between our study and the Dutch [15] and German [16] studies might occur because our sample included a wider range of ages, and we used more restrictive cut-offs for determining the risk of developing hyperactivity/inattention, emotional symptomology and risk of behaving less prosocially. Further, the Dutch study [15] treated separately the computer use and TV viewing, while we included more electronic devices, and we categorized differently the daily screen time for leisure.

Although the following findings do not derive from the main aim of this study, we also found that girls (aPR_{female}: 0.63, 95% CI 0.50-0.78) and children from 12 to 14 years ($aPR_{12\text{-}14\ years}$: 0.53, 95% CI 0.38-0.74) were less likely to develop emotional and behavioural problems than males and children, respectively. These findings were consistent with a study carried out with a sample of children from Catalonia, a northern region of Spain [6]. In this sense, after stratifying the analysis by age, we found that in children older than 6 years old, children spending at least 180 minutes using screens for leisure were more likely to be at risk of developing emotional and behavioural problems than children using screens for leisure less than 1 hour daily. Further, we also found, in line with previous evidence, that children having short sleep duration ($aPR_{short\ sleep\ duration}$: 1.58, 95% CI 1.25-2.00) [22, 55–57] , and whose parents have low or medium educational level (aPR_{medium}: 1.68, 95% CI 1.27-2.23 and aPR_{low}: 1.63, 95% CI

1.06-2.49) [6] and poorer mental health ($aPR_{poor\ mental\ health}$: 1.47, 95% CI 1.14-1.90) [58] were more likely to be at risk of developing emotional and behavioural problems than children sleeping proper duration, and whose parents have high educational level and good mental health. In this regard, children belonging to lower-income families, in this work as well as in the literature, were more likely to have poorer mental health [6]. Besides, in this sense, evidence indicates that lower-income families have more difficulties to access mental health services [7].

Strengths and limitations

This study adds more evidence on the possible adversary effects of screen time on emotional and behavioural problems using a paediatric population, which to the best of our knowledge was previously explored in only one other study [22]. Further, other strengths of this study are the large sample size, which adds more power to the study, and the adjustment for potential confounders including physical activity. However, physical activity is a well-known potential confounder of screen time, even though, Suchert et.al. concluded that screen time is a risk factor for mental health after adjusting for physical activity [13] as we have also found after adjusting for potential confounding variables and adding the interaction between physical activity during leisure time and daily screen time for leisure ($aPR_{\geq 180}$ = 2.84 95% CI: 1.09,7.39). Furthermore, this survey is representative at national level, meaning every area of Spain is represented, including rural and urban areas. We assume that differences exist according to the patterns of screen time and accessibility of mental health services between these areas. In this sense, we repeated all the analyses adding as confounders the variables autonomous community, which is the first-level political and administrate division of Spain, and size of the municipality according to the number of citizens, and the overall results did not change (data not shown). Nonetheless, this study also has limitations. Firstly, the assessment of emotional and behavioural problems was done only by parents. This would be more informative if we added the teacher and/or the child aged from 10-to-16-years self-reported information. Secondly, we only have the time that children spent using screens. Other information related to screen time (e.g. if children use screens during meals and before going to bed) might have added more value to our analyses. Additionally, due to the nature of the questionnaire, we could not stratify the screen time for leisure by device/activity (e.g. TV viewing vs. tablet use vs. videogames vs. smartphone use). Besides, the quantified daily leisure screen time was reported only for children spending at least one hour of daily leisure screen time, and only as an ordinal variable, providing a very inaccurate value and some source of misclassification bias. Further, due to the nature of the survey, we used a proxy of parental mental health status through answers of a person over 15 years that lived together with the child. In this sense, we could not identify if the respondent is actually one of the parents. However, as around 93% of families were a couple or single-parent, we assume that most of those data belongs to parents. Further, due to the cross-sectional design of this study, we cannot establish causation. Finally, we cannot disregard the common method bias (i.e. self-reported exposure and outcomes measured at one point of time).

Public health implications

It is not realistic to think in a world without screen time during childhood, since children need it in their educational steps and after in the adulthood for facing their careers. Since children's screen time is on steady increase, it is essential to know the adversary effects of excessive screen time. In this sense, our findings provide more evidence on this topic. However, these findings must be confirmed in cohort studies. Further, health institutions should work on the communication of healthy screen time, and institutions should provide support in order to follow the recommendations given.

Conclusions

More than one out of ten children between 4 and 14 years exceeding 180 minutes of daily leisure screen time were at risk of developing emotional and behavioural problems and conduct problems. Our findings must be confirmed in cohort studies in order for institutions to consider including the screen time as a new risk factor for children in future mental health programmes.

AUTHOR'S CONTRIBUTION:

JMMS and CLM conceptualized and designed the study, and reviewed and revised the manuscript.

ACH carried out the initial analyses, drafted the initial manuscript, and reviewed and revised the manuscript.

JCMS, AGM, and FA contributed to the interpretation of the data and the successive versions of the manuscript, and reviewed and revised the manuscript.

All authors approved the final manuscript as submitted and agree to be accountable for all aspects of work.

COMPLIANCE WITH ETHICAL STATEMENTS

Conflict of Interest: The authors declare that they have no known competing financial interests or personal relationship that could have appeared to influence the work reported in this paper

Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. À.C.-H., C.L.-M., A.G.-M., J.C.M.-S., and J.M.M.-S. are supported by the Departament de Universitats i Recerca de la Generalitat de Catalunya (2017SGR608).

Ethical approval: The investigation was carried out considering the rules of the Declaration of Helsinki of

2013. We used secondary data which is publicly available in the following repository (https://www.mscbs.gob.es/estadEstudios/estadisticas/encuestaNacional/encuesta2017.htm). Ethics committee approval is not required. However, this manuscript results from a PhD thesis having the approval of the ethics committee of the Universitat Internacional de Catalunya with code CBAS-2020-06.

Informed consent: We used publicly secondary data and written informed consent was not necessary since anonymous data were used.

REFERENCES

1. World Health Organization (WHO) (2020) Improving the mental and brain health of children and adolescents. https://www.who.int/activities/Improving-the-mental-and-brain-health-of-children-and-adolescents. Accessed 30 Dec 2020

2. World Health Organization (WHO) (2020) Adolescent mental health. https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health. Accessed 30 Dec 2020

3. Copeland WE, Wolke D, Shanahan L, Costello EJ (2015) Adult Functional Outcomes of Common Childhood Psychiatric Problems: A Prospective, Longitudinal Study. JAMA Psychiatry 72:892–899. https://doi.org/10.1001/jamapsychiatry.2015.0730

4. World Health Organization (WHO) (2020) Child and adolescent mental health (Regional office for Europe). https://www.euro.who.int/en/health-topics/noncommunicable-diseases/mental-health/areas-of-work/child-and-adolescent-mental-health. Accessed 30 Dec 2020

5. Ministerio de Sanidad C y BS (2019) Encuesta Nacional de Salud ENSE, España 2017. Serie informes monográficos #1 - SALUD MENTAL. https://www.mscbs.gob.es/estadEstudios/estadisticas/encuestaNacional/encuestaNac2017/SALUD_MENTAL.pdf. Accessed 9 Jun 2020

6. Rajmil L, López-Aguilà S, Mompart Penina A, et al (2010) Desigualdades sociales en la salud mental infantil en Cataluña. An Pediatría 73:233–240. https://doi.org/10.1016/j.anpedi.2010.02.022

7. Hodgkinson S, Godoy L, Beers LS, Lewin A (2017) Improving Mental Health Access for Low-Income Children and Families in the Primary Care Setting. Pediatrics 139:e20151175. https://doi.org/10.1542/peds.2015-1175

8. Reiss F (2013) Socioeconomic inequalities and mental health problems in children and adolescents: A systematic review. Soc Sci Med 90:24–31. https://doi.org/https://doi.org/10.1016/j.socscimed.2013.04.026

9. Chronis AM, Lahey BB, Pelham Jr. WE, et al (2007) Maternal depression and early positive parenting predict future conduct problems in young children with attention-deficit/hyperactivity

disorder. Dev. Psychol. 43:70–82

10. Oliver-Parra A, Dalmau-Bueno A, Ruiz-Muñoz D, García-Altés A (2020) Relationship between parents' mental disorders and socioeconomic status and offspring's psychopathology: A cross-sectional study. PLoS One 15:e0240681–e0240681. https://doi.org/10.1371/journal.pone.0240681

11. Sivertsen B, Harvey AG, Reichborn-Kjennerud T, et al (2015) Later emotional and behavioral problems associated with sleep problems in toddlers: A longitudinal study. JAMA Pediatr. https://doi.org/10.1001/jamapediatrics.2015.0187

12. Biddle SJH, Asare M (2011) Physical activity and mental health in children and adolescents: a review of reviews. Br J Sports Med 45:886 LP – 895. https://doi.org/10.1136/bjsports-2011-090185

13. Suchert V, Hanewinkel R, Isensee B (2015) Sedentary behavior and indicators of mental health in school-aged children and adolescents: A systematic review. Prev Med (Baltim) 76:48–57

14. Hoare E, Milton K, Foster C, Allender S (2016) The associations between sedentary behaviour and mental health among adolescents: a systematic review. Int J Behav Nutr Phys Act 13:108

15. Guxens M, Vermeulen R, Steenkamer I, et al (2019) Radiofrequency electromagnetic fields, screen time, and emotional and behavioural problems in 5-year-old children. Int J Hyg Environ Health 222:188–194. https://doi.org/10.1016/j.ijheh.2018.09.006

16. Poulain T, Ludwig J, Hiemisch A, et al (2019) Media Use of Mothers, Media Use of Children, and Parent-Child Interaction Are Related to Behavioral Difficulties and Strengths of Children. Int J Environ Res Public Health 16:4651. https://doi.org/10.3390/ijerph16234651

17. Song Y, Li L, Xu Y, et al (2020) Associations between screen time, negative life events, and emotional and behavioral problems among Chinese children and adolescents. J Affect Disord 264:506–512. https://doi.org/https://doi.org/10.1016/j.jad.2019.11.082

18. Pan W, Jiang L, Geng ML, et al (2019) Correlation between screen-watching time and emotional problems as well as combination effect of outdoor time among preschool children. Zhonghua liu Xing Bing xue za zhi= Zhonghua Liuxingbingxue Zazhi 40:1569–1572

19. Zhao J, Zhang Y, Jiang F, et al (2018) Excessive Screen Time and Psychosocial Well-Being: The

Mediating Role of Body Mass Index, Sleep Duration, and Parent-Child Interaction. J Pediatr 202:157-162.e1. https://doi.org/10.1016/j.jpeds.2018.06.029

20. Wu X, Tao S, Rutayisire E, et al (2017) The relationship between screen time, nighttime sleep duration, and behavioural problems in preschool children in China. Eur Child Adolesc Psychiatry 26:541–548. https://doi.org/10.1007/s00787-016-0912-8

21. Goodman R (1997) The Strengths and Difficulties Questionnaire: a research note. J child Psychol psychiatry 38:581–586

22. Peralta GP, Forns J, García de la Hera M, et al (2018) Sleeping, TV, Cognitively Stimulating Activities, Physical Activity, and Attention-Deficit Hyperactivity Disorder Symptom Incidence in Children: A Prospective Study. J Dev Behav Pediatr 39:

23. Duch H, Fisher EM, Ensari I, Harrington A (2013) Screen time use in children under 3 years old: a systematic review of correlates. Int J Behav Nutr Phys Act 10:102. https://doi.org/10.1186/1479-5868-10-102

24. Stiglic N, Viner RM (2019) Effects of screentime on the health and well-being of children and adolescents: a systematic review of reviews. BMJ Open 9:e023191. https://doi.org/10.1136/bmjopen-2018-023191

25. Cartanyà-Hueso À, Lidón-Moyano C, Martín-Sánchez JC, et al (2020) Association of screen time and sleep duration among Spanish 1-14 years old children. Paediatr Perinat Epidemiol 00:1–10. https://doi.org/10.1111/ppe.12695

26. Ministerio de Sanidad Servicios Sociales e Igualdad (2015) Actividad Física para la Salud y Reducción del Sedentarismo. Recomendaciones para la población. Estrategia de Promoción de la Salud y Prevención en el SNS

27. Hale L, Guan S (2015) Screen time and sleep among school-aged children and adolescents: A systematic literature review. Sleep Med Rev 21:50–58. https://doi.org/10.1016/J.SMRV.2014.07.007

28. Fang K, Mu M, Liu K, He Y (2019) Screen time and childhood overweight/obesity: A systematic review and meta- analysis. Child Care Health Dev 45:744–753

29. Shqair AQ, Pauli LA, Costa VPP, et al (2019) Screen time, dietary patterns and intake of potentially cariogenic food in children: A systematic review. J Dent 86:17–26. https://doi.org/https://doi.org/10.1016/j.jdent.2019.06.004

30. Lizandra J, Devís-Devís J, Valencia-Peris A, et al (2019) Screen time and moderate-to-vigorous physical activity changes and displacement in adolescence: A prospective cohort study. Eur J Sport Sci 19:686–695. https://doi.org/10.1080/17461391.2018.1548649

31. Ghekiere A, Van Cauwenberg J, Vandendriessche A, et al (2018) Trends in sleeping difficulties among European adolescents: Are these associated with physical inactivity and excessive screen time? Int J Public Health. https://doi.org/10.1007/s00038-018-1188-1

32. Hense S, Barba G, Pohlabeln H, et al (2011) Factors that influence weekday sleep duration in European children. Sleep 34:633–639

33. Hale L, Kirschen GW, LeBourgeois MK, et al (2018) Youth screen media habits and sleep: sleep-friendly screen behavior recommendations for clinicians, educators, and parents. Child Adolesc Psychiatr Clin 27:229–245

34. Hosker DK, Elkins RM, Potter MP (2019) Promoting Mental Health and Wellness in Youth Through Physical Activity, Nutrition, and Sleep. Child Adolesc Psychiatr Clin N Am 28:171–193. https://doi.org/https://doi.org/10.1016/j.chc.2018.11.010

35. OECD (2018) Health expenditure per capita. pp 132–133

36. Instituto Nacional de Estadística (2018) Spanish National Health Survey 2017 Methodology. https://www.ine.es/en/metodologia/t15/t153041917_en.pdf. Accessed 5 Nov 2020

37. Español-Martín G, Pagerols M, Prat R, et al (2020) Strengths and Difficulties Questionnaire: Psychometric Properties and Normative Data for Spanish 5- to 17-Year-Olds. Assessment 1073191120918929. https://doi.org/10.1177/1073191120918929

38. Ortuño-Sierra J, Aritio-Solana R, Fonseca-Pedrero E (2018) Mental health difficulties in children and adolescents: The study of the SDQ in the Spanish National Health Survey 2011–2012. Psychiatry Res 259:236–242. https://doi.org/https://doi.org/10.1016/j.psychres.2017.10.025

39. Goodman R (2001) Psychometric properties of the strengths and difficulties questionnaire. J Am

Acad Child Adolesc Psychiatry 40:1337–1345

40. Cartanyà-Hueso À, Lidón-Moyano C, González-Marrón A, et al (2019) Screen time use and sleep in children: Are there differences among social classes? Sleep Med. https://doi.org/10.1016/J.SLEEP.2019.12.006

41. Rodrigues D, Gama A, Machado-Rodrigues AM, et al (2020) Social inequalities in traditional and emerging screen devices among Portuguese children: a cross-sectional study. BMC Public Health 20:902. https://doi.org/10.1186/s12889-020-09026-4

42. Carson V, Janssen I (2012) Associations between factors within the home setting and screen time among children aged 0–5 years: a cross-sectional study. BMC Public Health 12:539. https://doi.org/10.1186/1471-2458-12-539

43. Langøy A, Smith ORF, Wold B, et al (2019) Associations between family structure and young people's physical activity and screen time behaviors. BMC Public Health 19:433. https://doi.org/10.1186/s12889-019-6740-2

44. Paudel S, Jancey J, Subedi N, Leavy J (2017) Correlates of mobile screen media use among children aged 0–8: a systematic review. BMJ Open 7:e014585

45. Lobo A, Muñoz PE (1996) Cuestionario de Salud General (GHQ). Guía para el usuario de las distintas versiones

46. Hirshkowitz M, Whiton K, Albert SM, et al (2015) National Sleep Foundation's sleep time duration recommendations: methodology and results summary. Sleep Heal 1:40–43. https://doi.org/10.1016/J.SLEH.2014.12.010

47. Hirshkowitz M, Whiton K, Albert SM, et al (2015) National Sleep Foundation's updated sleep duration recommendations: final report. Sleep Heal 1:233–243. https://doi.org/10.1016/J.SLEH.2015.10.004

48. De Onis M, Onyango AW, Borghi E, et al (2007) Development of a WHO growth reference for school-aged children and adolescents. Bull World Health Organ. https://doi.org/10.2471/BLT.07.043497

49. WHO Multicentre Growth Reference Study Group (2006) WHO child growth standards :

length/height-for-age, weight-for-age, weight-for-length, weight-forheight and body mass index-for-age : methods and development. Geneva

50. Freedman DS, Lawman HG, Skinner AC, et al (2015) Validity of the WHO cutoffs for biologically implausible values of weight, height, and BMI in children and adolescents in NHANES from 1999 through 2012. Am J Clin Nutr 102:1000–1006

51. Freedman DS, Lawman HG, Pan L, et al (2016) The prevalence and validity of high, biologically implausible values of weight, height, and BMI among 8.8 million children. Obesity 24:1132–1139

52. Centers for Disease Control and Prevention (CDC) (2019) A SAS Program for the 2000 CDC Growth Charts (ages 0 to <20 years). In: Centers Dis. Control Prev. https://www.cdc.gov/nccdphp/dnpao/growthcharts/resources/sas.htm. Accessed 23 Jan 2020

53. Espelt A, Marí-dell'Olmo M, Panello E, Bosque-Prous M (2016) Applied Prevalence Ratio estimation with different Regression models: An example from a cross-national study on substance use research. Adicciones 29:37–54

54. Van Buuren S (2018) Predictive Mean Matching. https://stefvanbuuren.name/fimd/sec-pmm.html. Accessed 9 Apr 2021

55. Chaput J-P, Gray CE, Poitras VJ, et al (2016) Systematic review of the relationships between sleep duration and health indicators in school-aged children and youth. Appl Physiol Nutr Metab 41:S266–S282. https://doi.org/10.1139/apnm-2015-0627

56. Hestetun I, Svendsen MV, Oellingrath IM (2018) Sleep problems and mental health among young Norwegian adolescents. Nord J Psychiatry 72:578–585

57. Kahn M, Schnabel O, Gradisar M, et al (2020) Sleep, screen time and behaviour problems in preschool children: an actigraphy study. Eur Child Adolesc Psychiatry. https://doi.org/10.1007/s00787-020-01654-w

58. Oliver-Parra A, Dalmau-Bueno A, Ruiz-Muñoz D, García-Altés A (2020) Relationship between parents' mental disorders and socioeconomic status and offspring's psychopathology: A cross-sectional study. PLoS One 15:e0240681–e0240681. https://doi.org/10.1371/journal.pone.0240681

Table 1: Characteristics of the study sample

Variables of the study	n (%) / Mean (SD)
Sex of the child	
Male	2,074 (50.9)
Female	1,999 (49.1)
Age of the child (years)	
4-5	657 (16.1)
6-11	2,166 (53.2)
12-14	1,250 (30.7)
Age of the child in years (numeric)	9.31 (3.17)
Education level of parents	
Low	332 (8.2)
Medium	2,378 (58.8)
High	1334 (33)
Family structure	
Couple	3,277 (80.5)
Single-parent	505 (12.4)
Couple or single-parent living with other relatives	235 (5.8)
Others	56 (1.4)
Proxy of parental mental health status	
Good mental health	3,066 (85.3)
Poor mental health	527 (14.7)
Sleep duration	
Proper sleep duration	3,211 (78.9)
Short sleep duration	861 (21.1)
Physical activity during leisure time	
No exercise	564 (13.8)
Physical or sports activity occasionally	888 (21.8)
Physical activity several times a month	1,261 (31)
Sports or physical training several times a week	564 (33.4)
BMI-for-age z-score	0.48 (1.47)
Daily leisure screen time (min)	
0-59	989 (24.3)
60-119	1,108 (27.2)
120-179	1,275 (31.3)
≥ 180	701 (17.2)
Being at risk of developing emotional and behavioural problems	
No	3,682 (92.3)
Yes	308 (7.7)
Being at risk of developing hyperactivity/inattention	
No	3,781 (93.7)
Yes	253 (6.3)
Being at risk of developing emotional symptomology	
No	3847 (94.7)
Yes	214 (5.3)
Being at risk of developing conduct problems	
No	3,703 (91.2)
Yes	357 (8.8)

Being at risk of developing peer problems	
No	3,816 (94.5)
Yes	220 (5.5)
Being at risk of behaving less prosocially	
No	3,795 (94.2)
Yes	232 (5.8)
n: absolute frequency; %: percentage; BMI-for-age: Body Mass Index for age; SD: standard deviation; min: minutes	

Table 2: Percentage, unadjusted and adjusted prevalence ratio with 95% confidence intervals of being at risk of developing emotional and behavioural problems and behaving less prosocially according to daily leisure screen time.

	Being at risk of developing emotional and behavioural problems (n=3,990)			Being at risk of developing hyperactive/inattention (n=4,034)			Being at risk of developing emotional symptomology (n=4,061)		
Daily leisure screen time daily (min)	**%**	**PR (95% CI)**	**aPR (95% CI)**	**%**	**PR (95% CI)**	**aPR (95% CI)**	**%**	**PR (95% CI)**	**aPR (95% CI)**
0–59	5.9	Ref	Ref	5.8	Ref	Ref	4.3	Ref	Ref
60–119	7.4	1.26 (0.91,1.75)	1.26 (0.91,1.75)	6.8	1.16 (0.83,1.63)	1.18 (0.84,1.64)	4.3	0.98 (0.65,1.47)	0.97 (0.64,1.46)
120–179	7.3	1.25 (0.90,1.72)	1.22 (0.88,1.68)	6.0	1.03 (0.73,1.43)	1.05 (0.75,1.47)	4.5	1.03 (0.70,1.52)	1.00 (0.67,1.49)
≥ 180	11.7	**2.00 (1.45,2.78)**	**1.93 (1.39,2.68)**	6.7	1.16 (0.80,1.69)	1.25 (0.86,1.82)	9.6	**2.21 (1.53,3.21)**	**2.05 (1.38,3.03)**
	Being at risk of developing conduct problems (n=4,060)			**Being at risk of developing peer problems (n=4,036)**			**Being at risk of behaving less prosocial behaviour (n=4,027)**		
Daily leisure screen time daily (min)	**%**	**PR (95% CI)**	**aPR (95% CI)**	**%**	**PR (95% CI)**	**aPR (95% CI)**	**%**	**PR (95% CI)**	**aPR (95% CI)**
0–59	7.6	Ref	Ref	4.2	Ref	Ref	4.5	Ref	Ref
60–119	7.7	1.01 (0.75,1.36)	1.05 (0.78,1.41)	4.7	1.12 (0.75,1.67)	1.12 (0.75,1.69)	4.3	0.95 (0.64,1.42)	1.04 (0.69,1.58)
120–179	8.2	1.07 (0.81,1.43)	1.06 (0.79,1.41)	6.0	1.44 (0.99,2.08)	1.39 (0.96,2.03)	6.4	1.42 (0.99,2.03)	**1.55 (1.07,2.25)**
≥ 180	13.3	**1.75 (1.31,2.34)**	**1.65 (1.22,2.21)**	7.5	**1.81 (1.22,2.69)**	**1.61 (1.08,2.41)**	8.7	**1.92 (1.32,2.80)**	**2.07 (1.38,3.11)**

%: percentage; PR: unadjusted Prevalence Ratio; aPR: adjusted Prevalence Ratio; 95% CI: 95% Confidence Intervals; min: minutes; Ref: reference category

4.7. Artículo V

Smartphone and tablet usage during COVID-19 pandemic confinement in children under 48 months in Barcelona (Spain)

healthcare

Article

Smartphone and Tablet Usage during COVID-19 Pandemic Confinement in Children under 48 Months in Barcelona (Spain)

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Abstract: Background: Total lockdown due to COVID-19 pandemic might have potentially increased screen time in children. This study aims to describe the smartphone and tablets usage in children under 48 months living in Barcelona during the COVID-19 confinement. Methods: Cross-sectional study using a non-probabilistic sample of parents with children under 48 months living in Barcelona (Spain) during COVID-19 confinement (n = 313). We calculated percentages of exposure to smartphones and tablets. Moreover, for those children were exposed, we calculated unadjusted and adjusted Geometric Mean Ratios (GMR) of daily smartphones and tablets usage and their 95% confidence intervals (95% CI) trough Generalized Linear Models with Gamma family and link log. Associations were adjusted for potential confounders. Results: During COVID-19 confinement, 67.5% of children under 48 months were daily exposed to smartphones and tablets. Further, those children who were exposed during meals, as well as before going to bed, spend longer durations using them, aGMR = 2.38 (95% CI 1.73, 3.34) and aGMR = 1.95 (95% CI 1.34, 2.91) respectively. Conclusion: Two out of three children under 48 months living in Barcelona were daily exposed to smartphones and tablets during total lockdown due to COVID-19. Taking this findings into account cohort studies are needed to assess any change in the screen time patterns due to total confinement in order to allow the Government help families, particularly those more vulnerable, in a possible pandemic resurgence.

Keywords: coronavirus infections; pandemics; child; preschool; infant; screen time; Spain

Citation: Cartanyà-Hueso, À.; Lidón-Moyano, C.; Cassanello, P.; Díez-Izquierdo, A.; Martín-Sánchez, J.C.; Balaguer, A.; Martínez-Sánchez, J.M. Smartphone and Tablet Usage during COVID-19 Pandemic Confinement in Children under 48 Months in Barcelona (Spain). *Healthcare* **2021**, *9*, 96. https://doi.org/10.3390/healthcare9010096

Received: 15 December 2020
Accepted: 15 January 2021
Published: 19 January 2021

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1. Introduction

Since SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronarivus 2) came up into our lives in December 2019 Governments applied measures that directly affected children, such as 1.57 billion children were unable to go to school [1]. Spain was one of the countries that applied hardest restrictions in order to avoid COVID-19 transmission, making more than 2 million of children under 5 years totally confined around 45 days, since the first measure applied by Government was closing kindergartens, schools, and high-schools and banning children and teenagers going out [2].

Totally locked due to SARS-CoV-2 pandemic might have altered children routines. Firstly, children might have increased high-calorie food consumption, in this sense a previous study show that during COVID-19 confinement people changed their dietary patterns as a way of facing the anxiety and boredom up, and because they did not feel motivated enough to follow a healthy diet [3]. Regarding to Spain, in addition to previous reasons, our supposition is this change in the eating behaviour also might be due to parents had to work from home, at the same time, had to take care of their children, making that some parents might have had less time for cooking, and consequently, they might have recurred to precooked food, fast food, or poor-nutrient products. Further, a decline of physical activity, due to children were banned to go out, and besides, some homes were not big enough and/or had not outdoors areas, such as balconies, terraces, or gardens, making children were sitting most of the time. In this sense, during COVID-19 confinement children behaved more sedentary including an increment in the daily screen time since might have been a usual way to entertain children while parents have worked from home, and besides, video calls were the predominant via of communication that children had with other family members and friends.

During the last decade the screen time usage in children constantly change, having the first contact sooner and increasing the variety and the accessibility of screen devices and media content [4]. Wide evidence suggests excessive screen time in childhood and adolescence is related to great variety of physiological and psychological issues [5], as well as for the youngest [6]. Hence, firstly American Academy of Pediatarics (AAP) in 2016 and more recently World Health Organization (WHO) in 2019 recommended that those children below 2 years should not be exposed to screens and those from 2 years to 5 years the daily screen time should be limited to 1 h [7,8]. However, the percentages of exceeding 1 h of screen time in 2017 were 40.9% and 66.8% for those children from 1 and 2 years and from 3 to 5 years respectively [9].

Due to the exceptionality of the moment and emergent knowledge of the possible adversary effects of excessive screen time on children's health, the aim of this study is to describe the smartphone and tablet usage, including if they use during meals and before going to bed, in children under 48 months living in Barcelona during the COVID-19 total lockdown.

2. Methods

Cross-sectional study using a sample of parents with children under 48 months living in Barcelona (Spain) (n = 313) included in the EpiSon-II study, which is the second phase of EpiSon study. The aim of EpiSon-II study is to study the sleep quality of children during the confinement due to COVID-19. More detailed information about EpiSon study can be found elsewhere [10]. The sampling of EpiSon-II study was non-probabilistic and the sample was gathered through online questionnaires (www.epison.es). Paediatricians of Hospital Universitari General de Catalunya (HUGC) spread the information of the study and the questionnaire within parents of patients, and besides, paediatricians encouraged parents to spread the questionnaire within their contacts and through online free-access parental support groups. To gain access to completing the survey, participants filled in the informed consent online. Previously, we got the approval from the Ethics Committee of the HUGC and the Ethics Committee of Research (CER) of the Universitat Internacional de Catalunya (UIC-Barcelona). The sample was recruited from April to June 2020. Exclusion criteria were (1) not to live in Barcelona (n = 8) and (2) to have missing data in smartphone and tablet usage during confinement variables (n = 3). Therefore, the final sample included 302 parents with children under 48 months living in Barcelona. Assuming an expected prevalence of being exposed of 50%, an alpha error of 5% and precision of 6% the theoretical sample size is 267 individuals, therefore our sample achieve enough statistical power.

2.1. Daily Smartphone and Tablet Usage during Confinement

Daily smartphone and tablet usage during confinement variable was obtained through the question "During the confinement, how much time, in minutes, on average did your child use or did you show to your child a smartphone or tablet?". We dichotomized to be daily exposed to smartphones and tablets during confinement (1) no: those children reported 0 minutes and (2) yes: those children reported more than 0 minutes. Further, those parents who answered that their children were exposed, reported if during COVID-19 confinement their children were exposed to smartphones and tablets during meals (yes/no) and before going to bed (yes/no).

2.2. Potential Confounders and Covariates

Based on the literature we selected the following variables as potential confounders [11–14]. Features of children: age in months (0–11, 12–23, 24–35, and 36–48), since evidence shows that older children spent longer duration of screen time [11]. Further, features of father or mother, depending who answered the questionnaire: relationship between him/her and children (mother/father), since evidence shows that maternal variables had more effect on behaviour of the children than paternal variables [11], education level (high: university education; medium: high school and training cycles; low: unschooled, elementary school completed or uncompleted and special education), since evidence shows that children belonged families with low socio-education level were more likely to be exposed longer periods of screen time [12–14], and age in years (18–34, 35–39 and ≥40), since previous researches find weak association between maternal age and screen time usage [11]. Finally, we used as potential confounder if parents answered questionnaire after 26 April 2020 [15], which is the day that government relaxed COVID-19 confinement restrictions and allowed children going out 1 h daily (no/yes), although the questions were based on total confinement, parents who answered the questionnaire after Government relaxed the restrictions were more susceptible to recall bias.

Additionally, we used as covariates sex of the children (male/female), if children had siblings (no/yes), and if children went to a kindergarten (no/yes), the last covariate included only those children were born after 1 January 2017.

2.3. Statistical Analysis

We calculated the percentages of not being and being exposed to smartphones and tablets during COVID-19 confinement overall and stratified by potential confounding variables. Further, for those children were exposed to them during COVID-19 confinement we calculated median and interquartile range (IQR: first and third quartile) of daily smartphone and tablet usage during COVID-19 confinement, due to the not normal distribution of the variable. Further, we calculated the percentage of being exposed to smartphones and tablets during COVID-19 confinement meals and before going to sleep during the COVID-19 confinement. Additionally, we calculated unadjusted and adjusted prevalence ratios (PR) with their 95% confidence intervals (95% CI) of being exposed to smartphones and tablets during COVID-19 confinement according to potential confounding variables. PR were fitted through Generalized Linear Models (GLM) with Poisson family and robust variances [16]. Finally, for those children were exposed to smartphones and tablets during COVID-19 confinement, we calculated the unadjusted and adjusted geometric mean ratios with their 95% CI of daily smartphones and tablets usage during COVID-19 confinement average trough GLM with Gamma family and link log [17]. Associations were adjusted for potential confounding variables. The statistical program used was R-3.5.2.

3. Results

3.1. Descriptive of the Sample

This study included 302 children under 48 months, 50.3% were female, the median of the age were 22 months (IQR: 11–33.75), 62.9% had siblings, 96.0% questionnaires were answered by mothers, 78.1% of parents had high education level, and 42.2% of parents were between 35 and 39 years.

3.2. Smartphone and Tablet Usage during Total COVID-19 Lockdown

67.5% of children under 48 months were daily exposed to smartphones and tablets during COVID-19 confinement. The percentage of being exposed to smartphones and tablets during confinement increased according to the age of the child, rising from 38.5% to 87.1%, as well as, the percentage of being exposed to smartphones and tablets during

COVID-19 confinement meals, ranging from 16.7% to 37.0%, and of being exposed to smartphones and tablets before going to bed during COVID-19 confinement ranging from 10.0% to 27.8%. Regarding to educational level, those children whose parents had lower education level were more likely to be exposed to smartphones and tablets during COVID-19 confinement meals (Table 1).

Table 2 shows that daily smartphone and tablet usage during confinement were higher for those children were exposed to them during COVID-19 confinement meals and before going to bed during COVID-19 confinement, these associations were maintained once we adjusted for potential confounders (Table 2).

Table 1. Percentage of children exposed to smartphones and tablets, median and interquartile range of daily smartphone and tablets usage, and percentages of children exposed to smartphones and tablets during meals and before going to bed during COVID-19 confinement overall and according to potential confounders.

		To Be Exposed to Smartphones or Tablets during COVID-19 Confinement		Daily Smartphone and Tablet Usage during Confinement (min) [4]		To Be Exposed to Smartphones and Tablets during COVID-19 Confinement Meals [4]		To Be Exposed to Smartphones and Tablets before Going to Bed during COVID-19 Confinement [4]	
	n (%)	**n (%)**	***p*-Value**	**Median (IQR)**	***p*-Value**	**n (%)**	***p*-Value**	**n (%)**	***p*-Value**
Overall	302 (100)	204 (67.5)		45 (15–90)		58 (28.6)		41 (20.2)	
Sex of the child			0.839 [5]		0.895 [8]		0.002 [5]		0.222 [5]
Male	150 (49.7)	104 (68.4)		60 (15–60)		40 (38.5)		25 (24.0)	
Female	152 (50.3)	100 (66.7)		31.5 (15–90)		18 (18.2)		16 (16.2)	
Age of the child (months)			<0.001 [6]		<0.001 [9]		0.011 [6]		0.011 [6]
0–11	78 (25.8)	30 (38.5)		22.5 (6.75–60)		5 (16.7)		3 (10.0)	
12–23	85 (28.1)	53 (62.4)		30 (15–60)		10 (19.2)		6 (11.5)	
24–35	77 (25.5)	67 (87.0)		60 (30–120)		23 (34.3)		17 (25.4)	
36–47	62 (20.5)	54 (87.1)		60 (30–90)		20 (37.0)		15 (27.8)	
Siblings			0.968 [5]		0.508 [8]		0.240 [5]		0.599 [5]
No	112 (37.1)	75 (67.0)		45 (15–67.5)		17 (23.0)		13 (17.6)	
Yes	190 (62.9)	129 (67.9)		45 (15–90)		41 (31.8)		28 (21.7)	
Relationship between who answered the questionnaire and child			0.349 [7]		0.726 [8]		1.000 [7]		0.218 [7]
Mother	290 (96)	194 (66.9)		45 (15–90)		55 (28.5)		41 (21.2)	
Father	12 (4)	10 (83.3)		33 (30–60)		3 (30.0)		0 (0.0)	
Education level of mother/father [1]			0.525 [6]		0.041 [9]		0.022 [6]		0.786 [6]
High	235 (78.1)	162 (68.9)		30 (15–60)		41 (25.5)		33 (20.5)	
Medium	46 (15.3)	27 (58.7)		60 (30–90)		8 (29.6)		4 (14.8)	
Low	20 (6.6)	14 (70.0)		60 (30–108.75)		8 (57.1)		3 (21.4)	
Age of mother/father (years)			0.496 [6]		0.255 [9]		0.915 [6]		0.249 [6]
18–34	106 (38.3)	68 (64.2)		30 (15–60)		18 (26.5)		17 (25.0)	
35–39	117 (42.2)	81 (69.2)		36 (15–90)		22 (27.2)		14 (17.3)	
≥40	54 (19.5)	37 (68.5)		60 (30–90)		9 (24.3)		7 (18.9)	
Kindergarten [2]			<0.001 [5]		0.027 [8]		0.627 [5]		0.283 [5]
No	117 (43.2)	59 (50.4)		30 (7.5–60)		14 (23.7)		8 (13.6)	
Yes	154 (56.8)	117 (76.0)		45 (24–75)		33 (28.9)		25 (21.9)	
Questionnaire was answered after government allowed children going out 1 h/day [3]			1.000 [5]		<0.001 [8]		<0.001 [7]		<0.001 [7]
No	20 (6.6)	13 (65.0)		30 (30–60)		3 (23.1)		2 (15.4)	
Yes	282 (93.4)	191 (67.7)		45 (15–90)		55 (28.9)		39 (20.5)	

IQR: interquartile range, first and third quartile. [1] High: university education; medium: high school and training cycles; low: unschooled, elementary school completed or uncompleted and special education. [2] Includes those children were born after 01/01/2017. [3] If parents answered questionnaire after 26 April 2020, which is the day that government relaxed COVID-19 confinement restrictions and allowed children going out 1 h/day. [4] Includes those children were exposed to smartphones and tablets during COVID-19 confinement (n = 204). [5] *p*-value obtained through Chi-square test. [6] *p*-value obtained through Chi-square trend test. [7] *p*-value obtained through Fisher exact test. [8] *p*-value obtained through Mann-Whitney test. [9] *p*-value obtained through Kruskal-Wallis test.

Table 2. Prevalence ratio (unadjusted and adjusted with their 95% confidence intervals) of being exposed to smartphones and tablets during COVID-19 confinement according to potential confounders, and geometric mean ratios (unadjusted and adjusted with their 95% confidence intervals) of daily smartphone and tablet usage during COVID-19 confinement according to potential confounders.

	To Be Exposed to Smartphones and Tablets during COVID-19 Confinement		Daily Smartphone and Tablets Usage during COVID-19 Confinement [1]	
	PR (95% CI)	**aPR [4] (95% CI)**	**GMR (95% CI)**	**aGMR [4] (95% CI)**
To be exposed to screens during COVID-19 confinement meals				
No	———	———	1.00 Reference	1.00 Reference
Yes	———	———	2.42 (1.82, 3.25)	2.38 (1.73, 3.34)
To be exposed to screens before going to bed during COVID-19 confinement				
No	———	———	1.00 Reference	1.00 Reference
Yes	———	———	2.00 (1.41, 2.91)	1.95 (1.34, 2.91)
Sex of the child				
Male	1.00 Reference	1.00 Reference	1.00 Reference	1.00 Reference
Female	0.97 (0.83, 1.14)	0.96 (0.83, 1.12)	1.00 (0.73, 1.36)	0.99 (0.71, 1.38)
Age of the child (months)				
0–11	1.00 Reference	1.00 Reference	1.00 Reference	1.00 Reference
12–23	1.62 (1.17, 2.25)	1.42 (1.01, 1.99)	1.19 (0.72, 1.91)	1.31 (0.76, 2.21)
24–35	2.26 (1.69, 3.03)	2.16 (1.61, 2.89)	2.07 (1.28, 3.27)	2.10 (1.23, 3.52)
36–47	2.26 (1.68, 3.05)	2.15 (1.59, 2.90)	1.88 (1.14, 3.02)	2.11 (1.22, 3.59)
Siblings				
No	1.00 Reference	1.00 Reference	1.00 Reference	1.00 Reference
Yes	1.01 (0.86, 1.19)	0.92 (0.79, 1.09)	1.04 (0.75, 1.43)	0.95 (0.67, 1.34)
Relationship between who answered the questionnaire and child				
Mother	1.00 Reference	1.00 Reference	1.00 Reference	1.00 Reference
Father	1.25 (0.96, 1.62)	1.17 (0.87, 1.57)	0.91 (0.48, 2.03)	1.11 (0.51, 2.73)
Education level of mother/father [2]				
High	1.00 Reference	1.00 Reference	1.00 Reference	1.00 Reference
Medium	0.85 (0.66, 1.10)	0.85 (0.67, 1.08)	1.28 (0.84, 2.05)	1.36 (0.84, 2.30)
Low	1.02 (0.75, 1.37)	0.93 (0.67, 1.28)	1.66 (0.96, 3.19)	1.47 (0.76, 3.23)
Age of mother/father (years)				
18–34	1.00 Reference	1.00 Reference	1.00 Reference	1.00 Reference
35–39	1.08 (0.90, 1.30)	1.01 (0.85, 1.20)	1.10 (0.75, 1.59)	0.97 (0.66, 1.40)
≥40	1.07 (0.85, 1.34)	0.91 (0.73, 1.12)	1.20 (0.76, 1.93)	0.99 (0.62, 1.60)
Questionnaire was answered after government allowed children going out 1 h/day [3]				
No	1.00 Reference	1.00 Reference	1.00 Reference	1.00 Reference
Yes	1.04 (0.75, 1.45)	1.04 (0.72, 1.50)	1.57 (0.79, 2.78)	1.94 (0.93, 3.59)

PR: prevalence ratio; aPR: adjusted prevalence ratio; 95% CI: 95% confidence interval GMR: geometric mean ratio obtained through generalized linear model with Gamma family and link log aGMR: adjusted geometric mean ratio obtained through generalized linear model with Gamma family and link log. [1] Includes those children were exposed to smartphones and tablets during COVID-19 confinement (n = 204). [2] High: university education; medium: high school and training cycles; low: unschooled, elementary school completed or uncompleted and special education. [3] If parents answered questionnaire after 26 April 2020, which is the day that government relaxed COVID-19 confinement restrictions and allowed children going out 1 h/day. [4] Adjusted for age of the children, relationship between who answered the questionnaire and child, education level of mother/father, age of mother/father, and if parents answered questionnaire after government allowed children going out 1 h/day.

4. Discussion

During COVID-19 confinement, around two out of three children and one out of two children under 48 months and under 24 months living in Barcelona (Spain) were exposed to smartphones and tablets, respectively. Moreover, when children were totally locked due to the SARS-CoV-2 pandemic, those children who were exposed to screen during meals, as well as, before going to bed, spend longer periods in front of smartphones and tablets.

Children were exposed to smartphones and tablets in meals during COVID-19 presented longer periods using smartphones and tablets. Our results are consistent with those obtained for a Lithuanian study published in 2019 which showed the prevalence and the associated factors of screen use during meals in children aged from 2 to 5 years [18]. Further, previous literature showed that exposing children to screens during meals in the early childhood is linked to worse dietary patterns [19]. To be exposed to screens during meals might have an effect on the development of autonomous eating habits and self-regulatory skills [18]. Moreover, our findings suggest that those children were exposed to smartphones and tablets before going to bed had higher patterns of daily smartphones and tablets usage. Using screen devices just before going to bed gets worse sleep, since the light from the screens stimulates brain activity and supress melatonin production [20].

Our results show that about three out of four of children from 12 months to 47 months were exposed to smartphones and tablets during COVID-19 confinement. This result is slightly lower than those obtained in the 2017 National Health Survey (NHS) (82.3% in 2017 NHS vs. 77.7% in our study) [21]. This discrepancy might be due to (1) in our study there was an overrepresentation of those children whose parents had higher education level [22], as previous evidence suggests those children belonged to lower education family were more likely to be exposed to screens [12–14], (2) 2017 NHS included in this percentage those children who were never exposed to screens, as well as, those children who were almost never exposed to screens, and (3) our study only included smartphone and tablet exposure.

Our results agreed with previous literature showing positive association between time spent in front of smartphones and tablets and age of the children [11]. In reference to educational level our findings do not suggest negative association between being exposed to smartphones and tablets and education level of the parents, in contrast to evidence [12–14]. This discrepancy might be due to parents with high education level were overrepresented [22]. Considering only those children were exposed, those children had lower educated parents spent longer periods in front of smartphones and tablets, as well as, were more likely to be exposed during meals.

Additionally, we do not find association between to be exposed to smartphones and tablets during COVID-19 confinement and age of the mother/father, nor between daily smartphones and tablets udage during COVID-19 confinement and age of the mother/father. Regarding that Duch et al. [11] concluded an unclear association between maternal age and screen time, our results might provide more evidence that there is not association between age of mother/father and screen time in children.

Nowadays, screen time patterns in children are based on smartphone and tablets exposure, unlike few years ago where the screen time patterns were based on TV exposure. In this sense, taking into account the existed research gap of studies including these devices, our work provides more evidence of the updated screen time patterns in children. However, more evidence is needed of the screen time patterns of these screen devices during COVID-19 pandemic, as well as, before and after COVID-19 pandemic.

Children, as well as other vulnerable collectives, were those that spend most time confined. First measures applied by Government were to close kindergartens, schools, and high-schools and to ban children of going out [2]. These restrictions might have had an effect on children's health, such as schools closures might have made that during COVID-19 confinement might have eaten less healthily, since schools are not only a place for learning, but also a place for guaranteeing that some children eat healthily at least once [23]. In addition, the effect that might have had this quarantine on psychological well-being of the children is already unclear. In this context, a recent systematic review showed that children presented better prognostic and softer cases than adults [24], and besides, children do not seem to be the main transmitters [25].

Strengths and Limitations

This study is the first study to describe smartphones and tablets usage in children during COVID-19 lockdown. Moreover, this study focuses on smartphone and tablets exposure in toddlers and pre-schoolers adding more evidence of current screen time patterns. Nevertheless, this study also has some limitations. Firstly, final sample was gathered through non-probabilistic sampling, therefore, final sample might not be representative of Barcelona. We have compared our sample with 2019 municipal population register of Barcelona and we found certain limitations, girls and children whose parents had high education level are overrepresented and children were under 12 months and between 36 and 47 months are underrepresented [22,26]. Moreover, this study does not consider some important information that might be related to daily smartphones and tablets usage during COVID-19 confinement, such as if the parents had to work from home, size of home, if children lived in homes with outdoors spaces, in this sense we assume that families with higher education level were more likely to have bigger homes and homes with outdoor areas, or if children use screen devices to connect with school. Additionally, due to the cross-sectional design of the study, we can not assess causality and temporal sequence between COVID-19 confinement and screen time. Finally, on account of data was obtained through online questionnaire we cannot discard some sources of bias, with most concern in the selection bias [27].

5. Conclusions

Two out of three children under 48 months living in Barcelona were exposed to smartphones and tablets during confinement due to COVID-19 pandemic. Considering our findings and evidence shows that excessive screen time may have adverse effects on children's health. Cohort studies are needed to confirm any change in the screen time patterns due to COVID-19 total confinement in order to allow the Government help families, particularly those more vulnerable, in a possible pandemic resurgence.

Author Contributions: Conceptualization, A.B., P.C. and J.M.M.-S.; Methodology, À.C.-H.; Formal Analysis, À.C.-H., C.L.-M. and J.C.M.-S.; Data Curation, P.C. and J.C.M.-S.; Writing—Original Draft Preparation, À.C.-H.; Writing—Review & Editing, À.C.-H., C.L.-M., P.C., A.D.-I., J.C.M.-S., A.B. and J.M.M.-S.; Supervision, C.L.-M. and J.M.M.-S. All authors have read and agreed to the published version of the manuscript.

Funding: The Group of Evaluation of Health Determinants and Health Policies (À.C.-H., C.L., A.D.-I., J.C.M.-S., and J.M.M.-S.) receives support from the Ministry of Universities and Research, Government of Catalonia (grant 2017SGR609) from the Government of Catalonia.

Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of GRUPO HOSPITALARIO QUIRÓNSALUD-CATALUNYA (2020/63-PED-HUGC and 12th of May 2020).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. Written informed consent has been obtained from the patient(s) to publish this paper.

Conflicts of Interest: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

1. UNESCO. Reopening Schools: When, Where and How? 2020. Available online: https://en.unesco.org/news/reopening-schools-when-where-and-how (accessed on 15 December 2020).
2. Ministerio de la Presidencia Relaciones, Con las cortes y Memoria Democratica. Real Decreto 463/2020, de 14 de Marzo, por el Que se Declara el Estado de Alarma Para la Gestión de la Situación de Crisis Sanitaria Ocasionada Por el COVID-19. 2020. Available online: https://www.boe.es/eli/es/rd/2020/03/14/463/con (accessed on 15 December 2020).
3. Ammar, A.; Brach, M.; Trabelsi, K.; Chtourou, H.; Boukhris, O.; Masmoudi, L.; Bouaziz, B.; Bentlage, E.; How, D.; Ahmed, M. Effects of COVID-19 Home Confinement on Eating Behaviour and Physical Activity: Results of the ECLB-COVID19 International Online Survey. *Nutrients* **2020**, *12*, 1583. [CrossRef] [PubMed]

4. Wolf, C.; Wolf, S.; Weiss, M.; Nino, G. Children's Environmental Health in the Digital Era: Understanding Early Screen Exposure as a Preventable Risk Factor for Obesity and Sleep Disorders. *Children* **2018**, *5*, 31. [CrossRef] [PubMed]
5. Lissak, G. Adverse physiological and psychological effects of screen time on children and adolescents: Literature review and case study. *Environ. Res.* **2018**, *164*, 149–157. [CrossRef] [PubMed]
6. Poitras, V.J.; Gray, C.E.; Janssen, X.; Aubert, S.; Carson, V.; Faulkner, G.; Goldfield, G.S.; Reilly, J.J.; Sampson, M.; Tremblay, M.S. Systematic review of the relationships between sedentary behaviour and health indicators in the early years (0–4 years). *BMC Public Health* **2017**, *17*, 868. [CrossRef] [PubMed]
7. World Health Organization (WHO). *Guidelines on Physical Activity, Sedentary Behaviour and Sleep for Children under 5 Years of Age*; World Health Organisation: 2019. Available online: https://apps.who.int/iris/handle/10665/311664 (accessed on 15 December 2020).
8. American Academy of Pediatrics. Media and Young Minds. *Pediatrics* **2016**, *138*, e20162591. [CrossRef] [PubMed]
9. Cartanyà-Hueso, À.; Lidón-Moyano, C.; Martín-Sánchez, J.C.; González-Marrón, A.; Matilla-Santander, N.; Miró, Q.; Martínez-Sánchez, J.M. Association of screen time and sleep duration among Spanish 1–14 years old children. *Paediatr. Perinat. Epidemiol.* **2020**, 1–10. [CrossRef] [PubMed]
10. Díez-Izquierdo, A.; Cassanello, P.; Cartanyà-Hueso, À.; Matilla-Santander, N.; Balaguer, A.; Martinez-Sanchez, J.M. Knowledge and attitudes toward thirdhand smoke among parents with children under 3 years in Spain. *Pediatr. Res.* **2018**, *84*, 645–649. [CrossRef] [PubMed]
11. Duch, H.; Fisher, E.M.; Ensari, I.; Harrington, A. Screen time use in children under 3 years old: A systematic review of correlates. *Int. J. Behav. Nutr. Phys. Act.* **2013**, *10*, 102. [CrossRef] [PubMed]
12. Rodrigues, D.; Gama, A.; Machado-Rodrigues, A.M.; Nogueira, H.; Silva, M.R.G.; Rosado-Marques, V.; Padez, C. Social inequalities in traditional and emerging screen devices among Portuguese children: A cross-sectional study. *BMC Public Health* **2020**, *20*, 902. [CrossRef] [PubMed]
13. Carson, V.; Janssen, I. Associations between factors within the home setting and screen time among children aged 0–5 years: A cross-sectional study. *BMC Public Health* **2012**, *12*, 539. [CrossRef] [PubMed]
14. Cartanyà-Hueso, À.; Lidón-Moyano, C.; González-Marrón, A.; Martín-Sánchez, J.C.; Martínez-Sánchez, J.M. Screen time use and sleep in children: Are there differences among social classes? *Sleep Med.* **2019**. [CrossRef] [PubMed]
15. Ministerio de la Presidencia, Relaciones con las Cortes y Memoria Democratica. Orden SND/370/2020, de 25 de Abril, Sobre las Condiciones en las que Deben Desarrollarse los Desplazamientos por Parte de la Población Infantil durante la Situación de Crisis Sanitaria Ocasionada por el COVID-19. 2020. Available online: https://www.boe.es/buscar/doc.php?id=BOE-A-2020-4665 (accessed on 15 December 2020).
16. Espelt, A.; Marí-dell'Olmo, M.; Panello, E.; Bosque-Prous, M. Applied Prevalence Ratio estimation with different Regression models: An example from a cross-national study on substance use research. *Adicciones* **2016**, *29*, 37–54.
17. Anderson, S.C. Gamma Hurdle Models. 2014. Available online: https://seananderson.ca/2014/05/18/gamma-hurdle/ (accessed on 15 December 2020).
18. Jusienė, R.; Urbonas, V.; Laurinaitytė, I.; Rakickienė, L.; Breidokienė, R.; Kuzminskaitė, M.; Praninskienė, R. Screen use during meals among young children: Exploration of associated variables. *Medicina* **2019**, *55*, 688. [CrossRef] [PubMed]
19. Avery, A.; Anderson, C.; McCullough, F. Associations between children's diet quality and watching television during meal or snack consumption: A systematic review. *Matern. Child Nutr.* **2017**, *13*, e12428. [CrossRef] [PubMed]
20. Hale, L.; Guan, S. Screen time and sleep among school-aged children and adolescents: A systematic literature review. *Sleep Med. Rev.* **2015**, *21*, 50–58. [CrossRef] [PubMed]
21. Ministerio de Sanidad, Consumo y Bienestar Social. Encuesta Nacional de Salud ENSE, España 2017. Serie Informes Monográficos #2-ACTIVIDAD FÍSICA, DESCANSO Y OCIO. 2019. Available online: https://www.mscbs.gob.es/estadEstudios/estadisticas/encuestaNacional/encuestaNac2017/ACTIVIDAD_FISICA.pdf (accessed on 15 December 2020).
22. Ajuntament de Barcelona. Academic Level of the Population of Barcelona. 2018. Available online: https://www.bcn.cat/estadistica/catala/dades/anuari/cap05/C0501030.htm (accessed on 15 December 2020).
23. Lancker, W.V.; Parolin, Z. COVID-19, school closures, and child poverty: A social crisis in the making. *Lancet Public Health* **2020**, *5*, e243–e244. [CrossRef]
24. Ludvigsson, J.F. Systematic review of COVID-19 in children shows milder cases and a better prognosis than adults. *Acta Paediatr.* **2020**, *109*, 1088–1095. [CrossRef] [PubMed]
25. Rajmil, L. Role of children in the transmission of the COVID-19 pandemic: A rapid scoping review. *BMJ Paediatr. Open* **2020**, *4*, e000722. [CrossRef] [PubMed]
26. Statistical Institute of Catalonia. Municipal Population Register. 2020. Available online: http://www.idescat.cat/pub/?geo=prov%3A08&id=pmh&lang=en (accessed on 15 December 2020).
27. Choi, B.C.K.; Pak, A.W.P. A catalog of biases in questionnaires. *Prev. Chronic Dis.* **2005**, *2*, A13. [PubMed]

Capítulo 5

Discusión conjunta

5.1. Resultados principales y efectos en la salud

Los resultados de la presente tesis aportan evidencia científica actualizada sobre el tiempo de pantalla actual, teniendo en cuenta una gran variedad de dispositivos de pantalla, en la población pediátrica y su efecto en la salud física y psíquica.

En el primer artículo de la tesis [79] se muestra que en 2017 el 44.3 % de los niños españoles de entre 1 y 14 años pasó al menos 2 horas diarias delante de una pantalla para fines recreativos. Respecto al 2011, esta prevalencia ha aumentado más del 10 %. Atribuimos este crecimiento al aumento de dispositivos de pantalla, aunque estos resultados no son directamente comparables debido a la inconsistencia de preguntas entre las ENSEs de los años 2011 y 2017, ya que la ENSE 2011 solo incluía en la pregunta del tiempo de pantalla la televisión y el ordenador [80]. Además, observamos que nuestro resultado obtenido en el primer artículo de la tesis [79] es ligeramente inferior al resultado obtenido en el estudio publicado en 2017 donde se describe el comportamiento sedentario basado en el tiempo de pantalla a partir de una muestra representativa de niños y adolescentes españoles de entre 9 y 17 años para el año 2013 [48], estas discrepancias podrían ser explicadas a que utilizaron una muestra de niños más mayores en comparación con la muestra utilizada en el primer artículo de la tesis [79], existiendo una tendencia creciente del tiempo de pantalla con la edad, tal y como se muestra en el primer artículo de la presente tesis, siendo el grupo de 12 a 14 años los que tenían el porcentaje más elevado de estar 2 horas diarias o más de tiempo de pantalla para fines recreativos (63.0 %) [79]. Si comparamos el porcentaje de estar al menos 2 horas diarias frente las pantalla en niños de entre 12 y 14 años publicado en el primer artículo de la tesis [79] con el porcentaje de superar las 2 horas diarias en niños de entre 13 y 17 años obtenido en el estudio descriptivo publicado en 2017 [48] observamos que el porcentaje mostrado en nuestro trabajo [79] es mayor teniendo en cuenta que el estudio descriptivo publicado en 2017 incluye niños de hasta 17 años y el tiempo de pantalla dedicado a tareas educativas (59.2 % vs 63.0 %), en este sentido el aumento de dispositivos de pantalla que existían en 2017 en comparación con 2013, y que el estudio descriptivo publicado en 2013 no incluye en su porcentaje los que pasan exactamente 2 horas diarias podrían explicar las discrepancias entre el primer artículo de la tesis [79] y el estudio descriptivo publicado en 2017 [48].

En referencia a la tendencia positiva del tiempo de pantalla con la edad mostrada en el primer artículo de la tesis [79] se observa que es consistente con la literatura que estudia el tiempo de pantalla en la población pediátrica española, ya que esta ya se observó tanto en 2011 [80] como en 2013 [48]. Si nos centramos en el uso de teléfonos inteligentes y tabletas, esta tendencia creciente también se mantiene, tal y como hemos publicado en los resultados del quinto artículo de la tesis [81], además, estos resultados van en la misma línea que los estudios publicados previamente [82].

A partir de los resultados de la presente tesis doctoral se observa que períodos más largos de pantalla están asociados con duraciones más cortas de sueño (primer artículo de la tesis) [79], exceso de peso (segundo artículo de la tesis) [83], alta frecuencia de consumo de dulces, refrescos, comida rápida y aperitivos (tercer artículo de la tesis) [84] y problemas emocionales y de comportamiento (cuarto artículo de la tesis) [85].

En referencia a la asociación entre el tiempo de pantalla y la duración de sueño insuficiente publicada en el primer artículo de la tesis doctoral [79], a nivel nacional, nuestros resultados concuerdan con los resultados obtenidos en un estudio de cohortes de niños de tres regiones de España de 2 y 6 años en el tiempo basal y 4 y 9 años en el primer seguimiento publicado en 2014 cuyo objetivo era examinar el tiempo de visionado de televisión con la duración del sueño [66]. Además, nuestros resultados publicados en el primer artículo de la presente tesis doctoral [79] también están en línea con los resultados obtenidos en un estudio transversal con una muestra de niños y adolescentes griegos de entre 8 y 17 años publicado en 2018 que como objetivo tenia estudiar la asociación entre el sueño insuficiente y factores de vida, incluido el tiempo de pantalla (televisión, uso de internet recreativo, juegos de ordenador y consola) [86]. Además, nuestros resultados publicados en el primer artículo de la tesis [79] actualizan los resultados mostrados en los artículos publicados previamente ya que incluimos en el tiempo de pantalla dispositivos escasamente estudiados como son los teléfonos inteligentes y las tabletas.

Los resultados del segundo artículo de la tesis doctoral (manuscrito en revisión) [83] donde estudiamos la asociación entre el tiempo de pantalla y el exceso de peso apoyan los resultados obtenidos en un estudio transversal con una muestra de adolescentes (13–18 años) residentes en Barcelona en 2011 que entre sus objetivos estaba analizar la potencial asociación entre el exceso de peso y la adopción de conductas de riesgo, entre ellas estar al menos 2 horas diarias de tiempo de pantalla. Sin embargo nuestros resultados mostrados en el segundo artículo de la tesis doctoral (manuscrito en revisión) [83] no concuerdan con los resultados obtenidos en el estudio transversal publicado en 2011 cuyo objetivo era identificar la prevalencia de exceso de peso y sus determinantes en niños de 8 y 9 años residentes en Barcelona, porque ellos no encontraron asociación entre el tiempo de uso de nuevas tecnologías y el exceso de peso [53]. Nuestros resultados obtenidos en el segundo artículo de la presente tesis doctoral (manuscrito en revisión) [83] tampoco concuerdan con los obtenidos en un estudio transversal con una muestra de niños de entre 5–18 años incluidos en el estudio EnKid publicado en 2017, ya que no observan asociación entre tener exceso de peso y superar las 2 horas diarias delante las pantallas [56]. Las discrepancias entre nuestros resultados [83] y los obtenidos en el estudio transversal publicado en 2016 para niños barceloneses de 8 y 9 años [53] y en el estudio transversal que utilizo datos del estudio EnKid publicado en 2017 [56], se podrían explicar por las diferencias entre la medición del tiempo de pantalla ya que en ambos, a diferencia del segundo artículo de la tesis doctoral (manuscrito en revisión) [83], no se incluyen los teléfonos inteligentes y tabletas. Además, ambos estudios [53, 56] tratan el tiempo de pantalla dicotómicamente, utilizando como límite las 2 horas, en este sentido, en el segundo artículo de la tesis doctoral (manuscrito en revisión) [83] encontramos asociación a partir de los 180 minutos diarios de tiempo de pantalla.

A nivel internacional, nuestros resultados obtenidos en el segundo artículo de la presente tesis doctoral (manuscrito en revisión) [83] estan en línea con los obtenidos en un estudio transversal con una muestra de niños de entre 6 y 9 años de 35 países europeos incluidos en la cuarta ronda (2015–2017) del estudio *WHO European Childhood Obesity Surveillance Initative* (COSI) en el que se muestra que en los países mediterráneos los niños con una mayor prevalencia de sobrepeso y obesidad se caracterizaban por pasar largos períodos de tiempo de pantalla [87].

Nuestros resultados publicados en el tercer artículo de la tesis doctoral [84] sobre la asociación entre el tiempo de pantalla y la alta frecuencia de consumo de dulces, refrescos, comida rápida y aperitivos, están en línea con los resultados obtenidos en el estudio transversal publicado en 2017 con una muestra representativa de España de niños de entre 6 y 9 años, el cuál mostró asociación entre el tiempo de pantalla y la alta frecuencia de consumo de alimentos con alto contenido calórico [55]. Además, también concuerdan con los resultados mostrados en el recientemente publicado estudio transversal con una muestra de participantes de entre 8 y 17 años incluidos en el estudio *Physical Activity, Sedentrism, lifestyles and Obesity in Spanish youth* (PASOS), en el que se muestra que períodos más largos de tiempo de pantalla están asociados con una mayor ingesta de dulces, comida rápida y golosinas [88]. En este sentido nuestros resultados publicados en el tercer artículo de la tesis doctoral [84] además de mostrar asociación del tiempo de pantalla con grupos de alimentos poco saludables de forma aislada también muestra asociación entre el tiempo de pantalla y la alta frecuencia de consumo alimentos poco saludables de forma conjunta (p. ej. refrescos y aperitivos o comida rápida y aperitivos).

A nivel internacional, nuestros resultados publicados en el tercer artículo de la presente tesis doctoral [84] están en línea con los resultados obtenidos en un estudio transversal con una muestra de niños de entre 6 y 9 años de 5 países de Europa distintos incluidos en el estudio COSI, que tenía como objetivo principal investigar simultáneamente las asociaciones entre la duración de sueño, el tiempo de pantalla y la frecuencia de consumo de alimentos, que concluyó que períodos más largos de tiempo frente a las pantallas están asociados a un alto consumo de alimentos con alto contenido en grasa, azúcares libres y sal [89].

En referencia a la asociación entre el tiempo de pantalla y los problemas emocionales y de comportamiento estudiada en el cuarto artículo de la tesis doctoral (manuscrito en revisión) [85], nuestros resultados [85] no apoyan los obtenidos por un estudio longitudinal con una cohorte de niños de 4 años en el tiempo basal y 7 años en el primer seguimiento de 2 regiones de España publicado en 2018 que entre sus objetivos estaba evaluar la relación entre el tiempo de visionado de televisión y los problemas emocionales y de comportamiento, concluyendo que no existía asociación entre el visionado de televisión y los problemas emocionales de comportamiento [69]. Estas discrepancias podrían ser explicadas por la inconsistencia entre la medición del tiempo de pantalla, ya que a diferencia del cuarto artículo de la tesis doctoral (manuscrito en revisión) [85], el estudio de cohortes publicado en 2018 [69] solo se incluye en el tiempo de pantalla el tiempo de visionado de televisión, además en el cuarto artículo de la presente tesis doctoral (manuscrito en revisión) [85] incluimos niños más mayores que como se ha visto en los resultados publicados en el primer artículo de la tesis [79] son los que presentan períodos más largos delante las pantallas.

A nivel internacional, nuestros resultados mostrados en el cuarto artículo de la presente tesis doctoral (manuscrito en revisión) [85] presentan concordancias con los resultados obtenidos en un estudio transversal publicado en 2019 con una muestra de niños alemanes de entre 2 y 9 años que entre otros objetivos investigó las asociaciones entre el uso de nuevas tecnologías y las fortalezas y dificultades del comportamiento [90], sin embargo, nuestros resultados obtenidos en el cuarto artículo de la tesis doctoral (manuscrito en revisión) [85] discrepan con los resultados obtenidos en un estudio transversal publicado en 2019 con una muestra de niños de 5 años de edad de los Países Bajos, el cual concluyó que no había asociación entre el visionado de televisión y los problemas emocionales y de comportamiento [91]. La discordancias entre los resultados obtenidos en el cuarto artículo de la tesis doctoral (manuscrito en revisión) [85] y el estudio transversal con una muestra de niños neerlandeses de 5 años de edad [91] podrían explicarse porque el cuarto artículo de la tesis doctoral (manuscrito en revisión) [85] incluye un rango más amplio de edades y recoge el tiempo de pantalla conjuntamente, a diferencia del estudio transversal neerlandés que recoge el tiempo de visionado de televisión y ordenador de forma separada [91].

En los resultados publicados en el primer artículo de la tesis doctoral [79] y en la carta al editor [92] se muestran que los niños pertenecientes a familias con niveles educativos y/o socioeconómicos más bajos presentan períodos más largos de pantalla. Nuestros resultados [79, 92] concuerdan con los resultados obtenidos por una revisión sistemática [21] cuyo objetivo era resumir la evidencia del efecto conjunto de la dieta, la actividad física, el sueño y el tiempo de pantalla con la adiposidad, que concluyó que familias socioeconómicamente más bajas presentaban estilos de vida menos saludables [21].

Además, también en los resultados publicados en el primer artículo de la tesis [79] y en la carta al editor [92] se ha visto que los niños de familias con niveles socioeconómicos y educativos más bajos tienen mayor prevalencia de sueño insuficiente, resultados consistentes con la literatura [93]. Además, en el cuarto artículo de la presente tesis doctoral (manuscrito en revisión) [85] se muestra que niños de familias con niveles socioeconómicos y educativos más bajos presentan una mayor prevalencia de estar a riesgo de sufrir problemas emocionales y de comportamiento, también en línea con la evidencia científica [94]. Nuestros resultados [79, 85, 92] sugieren que las familias que tienen niveles socioeconómicos y educativos más bajos presentan más desinformación sobre los estilos de vida poco saludables y sus efectos negativos en la salud.

A diferencia de los resultados de los dos artículos publicados (primer y tercer artículos de la tesis) [79, 84], los dos artículos en revisión (segundo y cuarto artículos de la tesis) [83, 85] y la carta al editor [92] de la presente tesis doctoral, donde el tiempo de pantalla fue medido antes de la pandemia provocada por el COVID-19, los resultados publicados en el quinto artículo de la tesis doctoral [81] nos reflejan el tiempo de pantalla, exposición y uso a teléfonos inteligentes y tabletas, durante el confinamiento total de la primera ola de la pandemia del COVID-19 en España. Otra diferencia que existe entre el quinto artículo de la tesis doctoral [81] y los otros artículos de la tesis (primer, segundo, tercer y cuarto artículo) [79,83–85] y la carta al editor [92], es que este se centra solo en el uso de teléfonos inteligentes y tabletas y en niños menores de 48 meses de edad. A partir de los resultados publicados en el quinto artículo de la presente tesis doctoral [81] se observa que más de 2 de cada 3 niños residentes en Barcelona durante el confinamiento total de la primera ola de la pandemia del COVID-19 estuvieron expuestos a los teléfonos inteligentes y/o tabletas a diario. Además, la mediana del tiempo de uso diario de teléfonos inteligentes y tabletas fue de 45 minutos (Rango Intercuartílico: 15-90), ligeramente inferior que los resultados obtenidos en dos estudios, con muestras de niños españoles menores de 13 años [95] y chilenos de entre 1 y 5 años [96]. Estas discordancias podrían ser debidas a que en el quinto artículo de la tesis doctoral [81] solo tenemos en cuenta la exposición a los teléfonos inteligentes y las tabletas, en cambio, ellos incluyen más dispositivos de pantalla [95, 96]. Además, en el quinto artículo de la presente tesis [81] se muestra que los niños que estuvieron expuestos durante las comidas y justo antes de irse a la cama durante el confinamiento total de la primera ola de la pandemia del COVID-19 presentaron períodos más largos de uso y/o exposición a los teléfonos inteligentes y/o tabletas.

5.2. Fortalezas y limitaciones

Las principales fortalezas del primer, segundo, tercer y cuarto artículo de la presente tesis doctoral [79, 83–85] y la carta al editor [92] son la representatividad de la muestra para la población pediátrica española, visibilizando todas las áreas de España desde las más urbanas hasta las más rurales, el gran tamaño de la muestra añadiendo más potencia a nuestros estudios y el amplio rango de edades que incluyen visibilizando la mayoría de etapas infantiles. Además, nuestros artículos [79, 81, 83–85] y la carta al editor [92], y especialmente el quinto artículo [81], de la presente tesis doctoral añaden más evidencia sobre el uso de teléfonos inteligentes y tabletas, dispositivos cuya evidencia es escasa tal y como resaltan algunas revisiones sistemáticas que estudian los efectos del tiempo de pantalla con la salud infantil y adolescente [3–5].

Las limitaciones del primer, segundo, tercer y cuarto artículo de la presente tesis doctoral [79,83–85] y la carta al editor [92] son la medición del tiempo de pantalla, ya que se recogió de forma imprecisa y de manera conjunta, en este sentido información adicional como el momento de uso (p. ej. durante las comidas o justo antes de irse a la cama), el dispositivo más utilizado o recoger el tiempo de pantalla separando por dispositivo. En el caso del quinto artículo de la tesis doctoral [81] debido a que la muestra fue recogida a través de métodos no probabilísticos la muestra no era representativa de la población residente en Barcelona durante el confinamiento total de la primera ola de la pandemia del COVID-19, la limitación más destacable es la sobre-representatividad de niños con padres con nivel educativo alto, por lo que no hay representatividad de aquellas familias que posiblemente lo habrán pasado peor durante la pandemia. Finalmente, como limitación general de los artículos publicados de la presente tesis doctoral (primer, tercer y quinto artículos) [79, 81, 84], los manuscritos en revisión (segundo y cuarto artículos) [83, 85] y la carta al editor [92] tenemos que todos los estudios son transversales, por ello no podemos inferir causalidad y no podemos descartar causalidad inversa, por ello todos nuestros resultados deben confirmarse con estudios longitudinales. Además, toda la información fue recogida mediante cuestionarios, por lo que no podemos descartar algunas fuentes de sesgo, con una mayor atención al sesgo de recuerdo, el sesgo de selección y el sesgo común del método, exposición y variable objetivo auto-reportadas en el mismo momento.

5.3. Futuras investigaciones

Futuros estudios deberían medir el tiempo de pantalla de forma más precisa, reportando el tiempo de pantalla separando por dispositivos, si se utilizan los dispositivos de pantalla en momentos claves como las comidas, justo antes de irse a la cama o después de levantarse y si los niños tienen algún dispositivo propio. Otro aspecto a tener en cuenta es la inclusión del tiempo de pantalla de los padres como posible mediadora. Así como ampliar la evidencia de los posibles efectos negativos del tiempo de pantalla con otras variables de salud que no se han tenido en cuenta en esta tesis doctoral, como por ejemplo dolor cervical y sus consecuencias, problemas oculares o problemas auditivos. Además, también sería importante conocer el papel que juegan los pediatras y si el tiempo de pantalla es un tema que se trata en las revisiones pediátricas. Finalmente, otro aspecto a tener en cuenta es el papel que juega el contenido que se esta consumiendo (e.g. redes sociales, juegos de recompensa, juegos violentos, juegos interactivos, videos o contenido educativo).

Capítulo 6

Conclusiones

- Más de 4 de cada 10 niños españoles en 2017 estuvieron expuestos al menos dos horas diarias a los dispositivos de pantalla durante su tiempo libre.
- Períodos más largos de pantalla dedicados a fines recreativos están asociados con una mayor prevalencia de sueño insuficiente según la edad en población infantil.
- Períodos más largos de pantalla para ocio están asociados con una mayor prevalencia de exceso peso en población infantil.
- Períodos más largos de pantalla durante el tiempo de ocio están asociados con una mayor frecuencia de consumo de dulces, refrescos, comida rápida y aperitivos en población infantil.
- Passar periodos más largos de pantalla recreativos estan asociados con una mayor prevalencia de tener una alta probabilidad de desarrollar problemas emocionales y de conducta en población infantil.
- Más de 2 de cada 3 niños menores de 48 meses fueron expuestos diariamente a los teléfonos inteligentes y tabletas durante el confinamiento total de la primera ola de la pandemia del COVID-19.
- Estar expuestos o usar teléfonos inteligentes y/o tabletas en las comidas y justo antes de acostarse durante el cierre total de la primera ola de la pandemia del COVID-19 esta asociado con períodos más largos de uso y exposición a los teléfonos inteligentes y tabletas durante el confinamiento total de la primera ola de la pandemia del COVID-19.
- Niños pertenecientes a familias con niveles socioeconómicos y educativos más bajos son más susceptibles a pasar más tiempo frente a las pantallas durante el tiempo de ocio. Además, también son más propensos de dormir insuficiente y de estar a riesgo de desarrollar problemas emocionales y de comportamiento.

Capítulo 7

Recomendaciones e implicaciones en salud pública

- Los efectos negativos del uso excesivo de las pantallas en la salud (sueño, obesidad y salud mental) de la población pediátrica sugieren que el uso de pantallas en población infantil podría ser considerado un nuevo determinante de la salud.
- Aunque existe una asociación entre el tiempo de pantalla y la salud de la población infantil, a partir de los estudios transversales de la presente tesis doctoral, son necesarios estudios longitudinales para confirmarlo.
- Existen pocos estudios sobre el uso de las nuevas pantallas, especialmente teléfonos inteligentes y tabletas, por ello son necesarios más estudios centrados en la exposición a estos dispositivos y mediante una monitorización continua.
- Se debería consensuar unas recomendaciones sobre el patrón de uso y comportamiento de la población infantil con las pantallas, además de aportar el tiempo adecuado para cada grupo de edad.
- Debido al aumento del uso de pantallas entre la población infantil se debería considerar un problema de salud pública. Además, desde las instituciones sanitarias y la atención primaria en pediatría se debería fomentar un uso saludable y responsable de pantallas incluyendo una reducción del uso de pantallas entre los niños y adolescentes españoles.
- Son necesarias intervenciones educacionales de promoción de la salud para fomentar un uso saludable y responsable de las pantallas, especialmente teléfonos inteligentes y tabletas, entre la población pediátrica.
- La pandemia del COVID-19 ha modificado los hábitos de la población infantil aumentando el uso de pantallas. Más estudios son necesarios para saber el impacto de este aumento en la salud infantil.

Bibliografía

[1] Tremblay MS, Aubert S, Barnes JD, Saunders TJ, Carson V, Latimer-Cheung AE, et al. Sedentary Behavior Research Network (SBRN) – Terminology Consensus Project process and outcome. The international journal of behavioral nutrition and physical activity. 2017 6;14(1):75. Available from: https://pubmed.ncbi.nlm.nih.gov/28599680https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5466781/.

[2] LeBlanc AG, Gunnell KE, Prince SA, Saunders TJ, Barnes JD, Chaput JP. The Ubiquity of the Screen: An Overview of the Risks and Benefits of Screen Time in Our Modern World. Translational Journal of the American College of Sports Medicine. 2017;2(17). Available from: https://journals.lww.com/acsm-tj/Fulltext/2017/09010/The_Ubiquity_of_the_Screen__An_Overview_of_the.1.aspx.

[3] Stiglic N, Viner RM. Effects of screentime on the health and well-being of children and adolescents: a systematic review of reviews. BMJ Open. 2019;9(1). Available from: https://bmjopen.bmj.com/content/9/1/e023191.

[4] Fang K, Mu M, Liu K, He Y. Screen time and childhood overweight/obesity: A systematic review and meta-analysis. Child: Care, Health and Development. 2019;45(5):744–753. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/cch.12701.

[5] Janssen X, Martin A, Hughes AR, Hill CM, Kotronoulas G, Hesketh KR. Associations of screen time, sedentary time and physical activity with sleep in under 5s: A systematic review and meta-analysis. Sleep Medicine Reviews. 2020;49:101226. Available from: https://www.sciencedirect.com/science/article/pii/S1087079219301947.

[6] Chaudron S, Di Gioia R, Gemo M. Young children (0-8) and digital technology, a qualitative study across Europe. JRC Science for Policy Report. 2018. Available from: https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/young-children-0-8-and-digital-technology-qualitative-study-across-europe.

[7] Ministerio de Sanidad Servicios Sociales e Igualdad. Actividad Física para la Salud y Reducción del Sedentarismo. Recomendaciones para la población. Estrategia de Promoción de la Salud y Prevención en el SNS. Madrid; 2015. Accedido el 12 de mayo de 2021. Available from: https://www.mscbs.gob.es/profesionales/saludPublica/prevPromocion/Estrategia/docs/Recomendaciones_ActivFisica_para_la_Salud.pdf.

[8] American Academy of Pediatrics (AAP). Media and Young Minds. Pediatrics. 2016;138(5). Available from: https://pediatrics.aappublications.org/content/138/5/e20162591.

[9] American Academy of Pediatrics (AAP). Media Use in School-Aged Children and Adolescents. Pediatrics. 2016;138(5). Available from: https://pediatrics.aappublications.org/content/138/5/e20162592.

[10] Canadian Paediatric Society, Digital Health Task Force, Ottawa, Ontario. Screen time and young children: Promoting health and development in a digital world. Paediatrics & Child Health. 2017 10;22(8):461–468. Available from: https://doi.org/10.1093/pch/pxx123.

[11] Canadian Paediatric Society, Digital Health Task Force, Ottawa, Ontario. Digital media: Promoting healthy screen use in school-aged children and adolescents. Paediatrics & Child Health. 2019 09;24(6):402–408. Available from: https://doi.org/10.1093/pch/pxz095.

[12] World Health Organization (WHO). Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age. Geneva, Switzerland: World Health Organization; 2019. Available from: https://apps.who.int/iris/handle/10665/311664.

[13] Bull FC, Al-Ansari SS, Biddle S, Borodulin K, Buman MP, Cardon G, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. British Journal of Sports Medicine. 2020;54(24):1451–1462. Available from: https://bjsm.bmj.com/content/54/24/1451.

[14] Straker L, Zabatiero J, Danby S, Thorpe K, Edwards S. Conflicting Guidelines on Young Children's Screen Time and Use of Digital Technology Create Policy and Practice Dilemmas. The Journal of Pediatrics. 2018 11;202:300–303. Available from: https://www.sciencedirect.com/science/article/abs/pii/S0022347618309120?via%3Dihub.

[15] Okely AD, Tremblay MS, Reilly JJ, Draper C, Robinson TN. Advocating for a cautious, conservative approach to screen time guidelines in young children. Journal of

Pediatrics. 2019 4;207:261–262. Available from: https://www.jpeds.com/article/S0022-3476(18)31708-6/fulltext.

[16] Duch H, Fisher EM, Ensari I, Harrington A. Screen time use in children under 3 years old: a systematic review of correlates. International journal of behavioral nutrition and physical activity. 2013;10(1):1–10. Available from: https://link.springer.com/article/10.1186/1479-5868-10-102.

[17] Busch V, Ananda Manders L, Rob Josephus de Leeuw J. Screen Time Associated with Health Behaviors and Outcomes in Adolescents. American Journal of Health Behavior. 2013 nov;37(6):819–830. Available from: https://www.ingentaconnect.com/content/png/ajhb/2013/00000037/00000006/art00011.

[18] Suchert V, Hanewinkel R, Isensee B. Sedentary behavior and indicators of mental health in school-aged children and adolescents: A systematic review. Preventive Medicine. 2015;76:48–57. Available from: https://www.sciencedirect.com/science/article/pii/S0091743515001073.

[19] Belmon LS, van Stralen MM, Busch V, Harmsen IA, Chinapaw MJM. What are the determinants of children's sleep behavior? A systematic review of longitudinal studies. Sleep Medicine Reviews. 2019;43:60–70. Available from: https://www.sciencedirect.com/science/article/pii/S1087079218300637.

[20] Shqair AQ, Pauli LA, Costa VPP, Cenci M, Goettems ML. Screen time, dietary patterns and intake of potentially cariogenic food in children: A systematic review. Journal of Dentistry. 2019;86:17–26. Available from: https://www.sciencedirect.com/science/article/pii/S0300571219301289.

[21] D'Souza NJ, Kuswara K, Zheng M, Leech R, Downing KL, Lioret S, et al. A systematic review of lifestyle patterns and their association with adiposity in children aged 5–12 years. Obesity Reviews. 2020;21(8):e13029. E13029 OBR-12-19-4213.R2. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/obr.13029.

[22] Chaput JP, Gray CE, Poitras VJ, Carson V, Gruber R, Birken CS, et al. Systematic review of the relationships between sleep duration and health indicators in the early years (0–4 years). BMC Public Health. 2017;17(5):91–107. Available from: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-017-4850-2.

[23] Chaput JP, Gray CE, Poitras VJ, Carson V, Gruber R, Olds T, et al. Systematic review of the relationships between sleep duration and health indicators in school-aged children and youth. Applied Physiology, Nutrition, and Metabolism. 2016;41(6 (Suppl. 3)):S266–S282. PMID: 27306433. Available from: https://doi.org/10.1139/apnm-2015-0627.

[24] de Ruiter I, Olmedo-Requena R, Sánchez-Cruz JJ, Jiménez-Moleón JJ. Changes in sleep duration in Spanish children aged 2–14 years from 1987 to 2011. Sleep Medicine. 2016 5;21:145–150. Available from: https://www.sciencedirect.com/science/article/pii/S1389945716000435?via%3Dihub.

[25] Ministerio de Sanidad, Consumo y Bienestar Social. Encuesta Nacional de Salud ENSE, España 2017. Serie informes monográficos #2 – ACTIVIDAD FÍSICA, DESCANSO Y OCIO.. Madrid; 2019. Accedido el 12 de mayo de 2021. Available from: https://www.mscbs.gob.es/estadEstudios/estadisticas/encuestaNacional/encuestaNac2017/ACTIVIDAD_FISICA.pdf.

[26] Hale L, Guan S. Screen time and sleep among school-aged children and adolescents: A systematic literature review. Sleep Medicine Reviews. 2015;21:50–58. Available from: https://www.sciencedirect.com/science/article/pii/S1087079214000811.

[27] LeBourgeois MK, Hale L, Chang AM, Akacem LD, Montgomery-Downs HE, Buxton OM. Digital Media and Sleep in Childhood and Adolescence. Pediatrics. 2017;140(Supplement 2):S92–S96. Available from: https://pediatrics.aappublications.org/content/140/Supplement_2/S92.

[28] World Health Organization (WHO). Obesity and overweight. Geneva, Switzerland; 2020. Accedido el 12 de mayo de 2021. Available from: https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight.

[29] World Health Organization (WHO). Taking action on childhood obesity. Geneva, Switzerland; 2018. Accedido el 12 de mayo de 2021. Available from: https://apps.who.int/iris/bitstream/handle/10665/274792/WHO-NMH-PND-ECHO-18.1-eng.pdf?ua=1.

[30] Aranceta-Bartrina J, Gianzo-Citores M, Pérez-Rodrigo C. Prevalencia de sobrepeso, obesidad y obesidad abdominal en población española entre 3 y 24 años. Estudio ENPE. Revista Española de Cardiología. 2020;73(4):290–299. Available from: https://www.sciencedirect.com/science/article/pii/S0300893219303306.

[31] Marsh S, Ni Mhurchu C, Maddison R. The non-advertising effects of screen-based sedentary activities on acute eating behaviours in children, adolescents, and young adults. A systematic review. Appetite. 2013;71:259–273. Available from: https://www.sciencedirect.com/science/article/pii/S0195666313003759.

[32] Asghari G, Yuzbashian E, Mirmiran P, Mahmoodi B, Azizi F. Fast Food Intake Increases the Incidence of Metabolic Syndrome in Children and Adolescents: Tehran Lipid and Glucose Study. PLOS ONE. 2015 10;10(10):1–11. Available from: https://doi.org/10.1371/journal.pone.0139641.

[33] Wiles NJ, Northstone K, Emmett P, Lewis G. 'Junk food' diet and childhood behavioural problems: Results from the ALSPAC cohort. European Journal of Clinical Nutrition. 2009 12;63(4):491–498. Available from: www.nature.com/ejcn.

[34] Zahedi H, Kelishadi R, Heshmat R, Motlagh ME, Ranjbar SH, Ardalan G, et al. Association between junk food consumption and mental health in a national sample of Iranian children and adolescents: The CASPIAN-IV study. Nutrition. 2014;30(11):1391–1397. Available from: https://www.sciencedirect.com/science/article/pii/S0899900714002068.

[35] Liu M, Wu L, Yao S. Dose–response association of screen time-based sedentary behaviour in children and adolescents and depression: a meta-analysis of observational studies. British Journal of Sports Medicine. 2016;50(20):1252–1258. Available from: https://bjsm.bmj.com/content/50/20/1252.

[36] Hoare E, Milton K, Foster C, Allender S. The associations between sedentary behaviour and mental health among adolescents: a systematic review. International journal of behavioral nutrition and physical activity. 2016;13(1):1–22. Available from: https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-016-0432-4.

[37] World Health Organization (WHO). Improving the mental and brain health of children and adolescents.. Geneva; 2020. Accedido el 12 de mayo de 2021. Available from: https://www.who.int/activities/Improving-the-mental-and-brain-health-of-children-and-adolescents.

[38] World Health Organization (WHO). Adolescent mental health.. Geneva; 2020. Accedido el 12 de mayo de 2021. Available from: https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health.

[39] World Health Organization (WHO). Child and adolescent mental health (Regional office for Europe). Geneva; 2020. Accedido el 12 de mayo de 2021. Available from: https://www.euro.who.int/en/health-topics/noncommunicable-diseases/mental-health/areas-of-work/child-and-adolescent-mental-health.

[40] Ministerio de Sanidad, Consumo y Bienestar Social. Encuesta Nacional de Salud ENSE, España 2017. Serie informes monográficos #1 – SALUD MENTAL.. Madrid; 2019. Accedido el 12 de mayo de 2021. Available from: https://www.mscbs.gob.es/estadEstudios/estadisticas/encuestaNacional/encuestaNac2017/SALUD_MENTAL.pdf.

[41] Ministerio de la presidencia, relaciones con las cortes y memoria democrática. Real Decreto 463/2020, de 14 de marzo, por el que se declara el estado de alarma pa-

ra la gestión de la situación de crisis sanitaria ocasionada por el COVID-19. Madrid: Boletin oficial del estado; 2020. Accedido el 12 de mayo de 2021. Available from: https://apps.who.int/iris/bitstream/handle/10665/274792/WHO-NMH-PND-ECHO-18.1-eng.pdf?ua=1.

[42] Medrano M, Cadenas-Sanchez C, Oses M, Arenaza L, Amasene M, Labayen I. Changes in lifestyle behaviours during the COVID-19 confinement in Spanish children: A longitudinal analysis from the MUGI project. Pediatric Obesity;n/a(n/a):e12731. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/ijpo.12731.

[43] López-Bueno R, López-Sánchez GF, Casajús J, Calatayud J, Gil-Salmerón A, Grabovac I, et al. Health-Related Behaviors Among School-Aged Children and Adolescents During the Spanish Covid-19 Confinement. Frontiers in Pediatrics. 2020;8:573. Available from: https://www.frontiersin.org/article/10.3389/fped.2020.00573.

[44] Nagata JM, Abdel Magid HS, Pettee Gabriel K. Screen time for children and adolescents during the coronavirus disease 2019 pandemic. Obesity. 2020;28(9):1582–1583. Available from: https://onlinelibrary.wiley.com/doi/full/10.1002/oby.22917.

[45] Caviedes Altable BE, Quesada Fernández E, Herranz JL. La televisión y los niños: ¿es responsable la televisión de todos los males que se le atribuyen? Atención Primaria. 2000;25(3):142–147. Available from: https://www.sciencedirect.com/science/article/pii/S0212656700784770.

[46] Bercedo Sanz A, Redondo Figuerob C, Capa Garcíac L, González-Alciturri Casanueva†d MA. Hábito televisivo en los niños de Cantabria. Anales de Pediatría. 2001;54(1):44–52. Available from: https://www.sciencedirect.com/science/article/pii/S1695403301786481.

[47] Martínez Gómez D, Veiga OL, Zapatera B, Cabanas-Sánchez V, Gomez-Martinez S, Martinez-Hernández D, et al. Patterns of sedentary behavior and compliance with public health recommendations in Spanish adolescents: the AFINOS study. Cadernos de saude publica. 2012;28:2237–2244. Available from: https://www.scielosp.org/article/csp/2012.v28n12/2237-2244/en/.

[48] Mielgo-Ayuso J, Aparicio-Ugarriza R, Castillo A, Ruiz E, Avila JM, Aranceta-Bartrina J, et al. Sedentary behavior among Spanish children and adolescents: findings from the ANIBES study. BMC Public Health. 2017;17(1):1–9. Available from: https://link.springer.com/article/10.1186/s12889-017-4026-0.

[49] Pons M, Bordoy A, Alemany E, Huget O, Zagaglia A, Slyvka S, et al. Hábitos familiares relacionados con el uso excesivo de pantallas recreativas (televisión y videojuegos) en la infancia. Revista Española de Salud Pública. 2021;95. Available from: https://www.mscbs.gob.es/biblioPublic/publicaciones/recursos_propios/resp/revista_cdrom/VOL95/ORIGINALES/RS95C_202101002.pdf.

[50] Hoyos Cillero I, Jago R. Sociodemographic and home environment predictors of screen viewing among Spanish school children†. Journal of Public Health. 2010 11;33(3):392–402. Available from: https://doi.org/10.1093/pubmed/fdq087.

[51] Hoyos Cillero I, Jago R, Sebire S. Individual and social predictors of screen-viewing among Spanish school children. European journal of pediatrics. 2011;170(1):93–102. Available from: https://link.springer.com/article/10.1007%2Fs00431-010-1276-6.

[52] Pons M, Bennasar-Veny M, Yañez AM. Maternal Education Level and Excessive Recreational Screen Time in Children: A Mediation Analysis. International Journal of Environmental Research and Public Health. 2020;17(23). Available from: https://www.mdpi.com/1660-4601/17/23/8930.

[53] Sánchez-Martínez F, Torres Capcha P, Serral Cano G, Valmayor Safont S, Castell Abat C, Ariza Cardenal C. Factores asociados al sobrepeso y la obesidad en escolares de 8 a 9 añoss de Barcelona. Revista Española de Salud Pública. 2016 00;90. Available from: http://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1135-57272016000100428&nrm=iso.

[54] Continente X, Pérez A, Espelt A, Ariza C, López MJ. Multiple lifestyle risk behaviours and excess weight among adolescents in Barcelona, Spain. Gaceta Sanitaria. 2017;31(4):332–335. Available from: http://linkinghub.elsevier.com/retrieve/pii/S0213911117300614.

[55] Pérez-Farinós N, Villar-Villalba C, Sobaler AML, Saavedra MÁDR, Aparicio A, Sanz SS, et al. The relationship between hours of sleep, screen time and frequency of food and drink consumption in Spain in the 2011 and 2013 ALADINO: a cross-sectional study. BMC public health. 2017;17(1):1–12. Available from: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-016-3962-4.

[56] Schröder H, Bawaked RA, Ribas-Barba L, Izquierdo-Pulido M, Roman-Viñas B, Fíto M, et al. Cumulative effect of obesogenic behaviours on adiposity in Spanish children and adolescents. Obesity facts. 2017;10(6):584–596. Available from: https://www.karger.com/Article/Abstract/480403.

[57] Cabanas-Sánchez V, Martínez-Gómez D, Esteban-Cornejo I, Pérez-Bey A, Piñero JC, Veiga OL. Associations of total sedentary time, screen time and non-screen sedentary time with adiposity and physical fitness in youth: the mediating effect of physical activity. Journal of Sports Sciences. 2019;37(8):839–849. PMID: 30326777. Available from: https://doi.org/10.1080/02640414.2018.1530058.

[58] Serrano-Sanchez JA, Martí-Trujillo S, Lera-Navarro A, Dorado-García C, González-Henríquez JJ, Sanchís-Moysi J. Associations between Screen Time and Physical Activity among Spanish Adolescents. PLOS ONE. 2011 09;6(9):1–9. Available from: https://doi.org/10.1371/journal.pone.0024453.

[59] Devís-Devís J, Peiró-Velert C, Beltrán-Carrillo VJ, Tomás JM. Brief report: Association between socio-demographic factors, screen media usage and physical activity by type of day in Spanish adolescents. Journal of Adolescence. 2012;35(1):213–218. Available from: https://www.sciencedirect.com/science/article/pii/S0140197110001703.

[60] Añez E, Fornieles-Deu A, Fauquet-Ars J, López-Guimerà G, Puntí-Vidal J, Sánchez-Carracedo D. Body image dissatisfaction, physical activity and screen-time in Spanish adolescents. Journal of Health Psychology. 2018;23(1):36–47. PMID: 27557652. Available from: https://doi.org/10.1177/1359105316664134.

[61] Lizandra J, Devís-Devís J, Valencia-Peris A, Tomás JM, Peiró-Velert C. Screen time and moderate-to-vigorous physical activity changes and displacement in adolescence: A prospective cohort study. European Journal of Sport Science. 2019;19(5):686–695. PMID: 30550370. Available from: https://doi.org/10.1080/17461391.2018.1548649.

[62] López-Gil JF, Brazo-Sayavera J, de Campos W, Yuste Lucas JL. Meeting the Physical Activity Recommendations and Its Relationship with Obesity-Related Parameters, Physical Fitness, Screen Time, and Mediterranean Diet in Schoolchildren. Children. 2020;7(12). Available from: https://www.mdpi.com/2227-9067/7/12/263.

[63] Bawaked RA, Gomez SF, Homs C, Casas Esteve R, Cardenas G, Fíto M, et al. Association of eating behaviors, lifestyle, and maternal education with adherence to the Mediterranean diet in Spanish children. Appetite. 2018;130:279–285. Available from: https://www.sciencedirect.com/science/article/pii/S0195666318301442.

[64] López Gil JF, Gaya AR, Duarte Junior MADS, Yuste Lucas JL. Meeting international screen-time guidelines is associated with healthy dietary patterns in Spanish schoolchildren. Nutricion hospitalaria. 2020 December;37(6):1123—1129. Available from: https://doi.org/10.20960/nh.03229.

[65] Tapia Serrano MA, Vaquero-Solís M, López-Gajardo MA, Sánchez-Miguel PA. Adherence to the Mediterranean diet, and importance of physical activity and screen time in Extremaduran high school adolescents. Nutricion hospitalaria. 2020 December. Available from: https://doi.org/10.20960/nh.03372.

[66] Marinelli M, Sunyer J, Alvarez-Pedrerol M, Iñiguez C, Torrent M, Vioque J, et al. Hours of television viewing and sleep duration in children: a multicenter birth cohort study. JAMA pediatrics. 2014;168(5):458–464. Available from: https://jamanetwork.com/journals/jamapediatrics/article-abstract/1840249.

[67] Cabré-Riera A, Torrent M, Donaire-Gonzalez D, Vrijheid M, Cardis E, Guxens M. Telecommunication devices use, screen time and sleep in adolescents. Environmental Research. 2019;171:341–347. Available from: https://www.sciencedirect.com/science/article/pii/S0013935118305693.

[68] Martínez-Gómez D, Veses AM, Gómez-Martínez S, Pérez de Heredia F, Castillo R, Santaliestra-Pasias AM, et al. Television viewing time and risk of eating disorders in Spanish adolescents: AVENA and AFINOS studies. Pediatrics International. 2015;57(3):455–460. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/ped.12662.

[69] Peralta GP, Forns J, de la Hera MG, González L, Guxens M, López-Vicente M, et al. Sleeping, TV, cognitively stimulating activities, physical activity, and attention-deficit hyperactivity disorder symptom incidence in children: A prospective study. Journal of Developmental & Behavioral Pediatrics. 2018;39(3):192–199. Available from: https://journals.lww.com/jrnldbp/Abstract/2018/04000/Sleeping,_TV,_Cognitively_Stimulating_Activities,.2.aspx.

[70] Martinez-Gomez D, Rey-López JP, Chillón P, Gómez-Martínez S, Vicente-Rodríguez G, Martín-Matillas M, et al. Excessive TV viewing and cardiovascular disease risk factors in adolescents. The AVENA cross-sectional study. BMC Public health. 2010;10(1):1–8. Available from: https://link.springer.com/article/10.1186/1471-2458-10-274.

[71] Padilla-Moledo C, Castro-Piñero J, Ortega F, Pulido-Martos M, Sjöström M, Ruiz J. Television viewing, psychological positive health, health complaints and health risk behaviors in Spanish children and adolescents. J Sports Med Phys Fit. 2015;55:675–683. Available from: https://www.minervamedica.it/en/journals/sports-med-physical-fitness/article.php?cod=R40Y2015N06A0675#.

[72] Conference International Health. Constitution of the World Health Organization. 1946. Bulletin of the World Health Organization. 2002;80(12):983–984. Available from: https://apps.who.int/gb/bd/PDF/bd47/EN/constitution-en.pdf?ua=1.

[73] Xu H, Wen LM, Rissel C. Associations of parental influences with physical activity and screen time among young children: a systematic review. Journal of obesity. 2015;2015:546925. Available from: https://www.hindawi.com/journals/jobe/2015/546925/.

[74] Ministerio de Sanidad, Servicios Sociales e Igualdad, Instituto Nacional de Estadística (INE). Encuesta Nacional de Salud 2017. ENSE 2017. Metodología. Madrid; 2017. Accedido el 12 de mayo de 2021. Available from: https://www.mscbs.gob.es/estadEstudios/estadisticas/encuestaNacional/encuestaNac2017/ENSE17_Metodologia.pdf.

[75] Ministerio de Sanidad, Servicios Sociales e Igualdad, Instituto Nacional de Estadística (INE). Encuesta Nacional de Salud 2017. Cuestionario de adultos. Madrid; 2017. Accedido el 12 de mayo de 2021. Available from: https://www.mscbs.gob.es/estadEstudios/estadisticas/encuestaNacional/encuestaNac2017/ENSE17_ADULTO_.pdf.

[76] Ministerio de Sanidad, Servicios Sociales e Igualdad, Instituto Nacional de Estadística (INE). Encuesta Nacional de Salud 2017. Cuestionario de menores. Madrid; 2017. Accedido el 12 de mayo de 2021. Available from: https://www.mscbs.gob.es/estadEstudios/estadisticas/encuestaNacional/encuestaNac2017/ENSE17_MENOR.pdf.

[77] Ministerio de Sanidad, Servicios Sociales e Igualdad, Instituto Nacional de Estadística (INE). Encuesta Nacional de Salud 2017. Cuestionario de menores. Madrid; 2017. Accedido el 12 de mayo de 2021. Available from: https://www.mscbs.gob.es/estadEstudios/estadisticas/encuestaNacional/encuestaNac2017/ENSE17_HOGAR.pdf.

[78] Ministerio de Sanidad, Servicios Sociales e Igualdad, Instituto Nacional de Estadística (INE). Nota Técnica. Encuesta Nacional de Salud. España 2017. Principales resultados. Madrid; 2017. Accedido el 12 de mayo de 2021. Available from: https://www.mscbs.gob.es/estadEstudios/estadisticas/encuestaNacional/encuestaNac2017/ENSE2017_notatecnica.pdf.

[79] Cartanyà-Hueso À, Lidón-Moyano C, Martín-Sánchez JC, González-Marrón A, Matilla-Santander N, Miró Q, et al. Association of screen time and sleep duration among Spanish 1-14 years old children. Paediatric and Perinatal Epidemiology. 2021;35(1):120–129. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/ppe.12695.

[80] Ministerio de Sanidad, Servicios Sociales e Igualdad. Encuesta Nacional de Salud. España 2011/12. Actividad física, descanso y ocio. Serie Informes monográficos nº4. Madrid; 2014. Accedido el 12 de mayo de 2021. Available from: https://www.mscbs.gob.es/estadEstudios/estadisticas/encuestaNacional/encuestaNac2011/informesMonograficos/Act_fis_desc_ocio.4.pdf.

[81] Cartanyà-Hueso À, Lidón-Moyano C, Cassanello P, Díez-Izquierdo A, Martín-Sánchez JC, Balaguer A, et al. Smartphone and Tablet Usage during COVID-19 Pandemic Confinement in Children under 48 Months in Barcelona (Spain). Healthcare. 2021;9(1). Available from: https://www.mdpi.com/2227-9032/9/1/96.

[82] Paudel S, Jancey J, Subedi N, Leavy J. Correlates of mobile screen media use among children aged 0–8: a systematic review. BMJ Open. 2017;7(10). Available from: https://bmjopen.bmj.com/content/7/10/e014585.

[83] Cartanyà-Hueso À, Lidón-Moyano C, Martín-Sánchez JC, González-Marrón A, Pérez-Martín H, Martínez-Sánchez JM. Association between leisure screen time and excess weight and obesity according to three sets of criteria among spanish children;. Under review.

[84] Cartanyà-Hueso À, González-Marrón A, Lidón-Moyano C, Garcia-Palomo E, Martín-Sánchez JC, Martínez-Sánchez JM. Association between Leisure Screen Time and Junk Food Intake in a Nationwide Representative Sample of Spanish Children (1–14 Years): A Cross-Sectional Study. Healthcare. 2021;9(2). Available from: https://www.mdpi.com/2227-9032/9/2/228.

[85] Cartanyà-Hueso À, Lidón-Moyano C, González-Marrón A, Martín-Sánchez JC, Amigo F, Martínez-Sanchez JM. Association between screen time and emotional and behavioural problems in Spanish children;. Under review.

[86] Tambalis KD, Panagiotakos DB, Psarra G, Sidossis LS. Insufficient Sleep Duration Is Associated With Dietary Habits, Screen Time, and Obesity in Children. Journal of Clinical Sleep Medicine. 2018;14(10):1689–1696. Available from: https://jcsm.aasm.org/doi/abs/10.5664/jcsm.7374.

[87] Bel-Serrat S, Ojeda-Rodríguez A, Heinen MM, Buoncristiano M, Abdrakhmanova S, Duleva V, et al. Clustering of Multiple Energy Balance-Related Behaviors in School Children and its Association with Overweight and Obesity—WHO European Childhood Obesity Surveillance Initiative (COSI 2015–2017). Nutrients. 2019;11(3). Available from: https://www.mdpi.com/2072-6643/11/3/511.

[88] Wärnberg J, Pérez-Farinós N, Benavente-Marín JC, Gómez SF, Labayen I, G Zapico A, et al. Screen Time and Parents' Education Level Are Associated with

Poor Adherence to the Mediterranean Diet in Spanish Children and Adolescents: The PASOS Study. Journal of Clinical Medicine. 2021;10(4). Available from: https://www.mdpi.com/2077-0383/10/4/795.

[89] Börnhorst C, Wijnhoven TM, Kunešová M, Yngve A, Rito AI, Lissner L, et al. WHO European Childhood Obesity Surveillance Initiative: associations between sleep duration, screen time and food consumption frequencies. BMC Public health. 2015;15(1):1–11. Available from: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-015-1793-3.

[90] Poulain T, Ludwig J, Hiemisch A, Hilbert A, Kiess W. Media Use of Mothers, Media Use of Children, and Parent–Child Interaction Are Related to Behavioral Difficulties and Strengths of Children. International Journal of Environmental Research and Public Health. 2019;16(23). Available from: https://www.mdpi.com/1660-4601/16/23/4651.

[91] Guxens M, Vermeulen R, Steenkamer I, Beekhuizen J, Vrijkotte TGM, Kromhout H, et al. Radiofrequency electromagnetic fields, screen time, and emotional and behavioural problems in 5-year-old children. International Journal of Hygiene and Environmental Health. 2019;222(2):188–194. Available from: https://www.sciencedirect.com/science/article/pii/S1438463918305029.

[92] Àurea Cartanyà-Hueso, Lidón-Moyano C, González-Marrón A, Martín-Sánchez JC, Martínez-Sánchez JM. Screen time use and sleep in children: are there differences among social classes? Sleep Medicine. 2020;68:153. Available from: https://www.sciencedirect.com/science/article/pii/S1389945719316570.

[93] Hale L, Troxel W, Buysse DJ. Sleep Health: An Opportunity for Public Health to Address Health Equity. Annual Review of Public Health. 2020;41(1):81–99. Available from: https://doi.org/10.1146/annurev-publhealth-040119-094412.

[94] Rajmil L, López-Aguilà S, Mompart Penina A, Medina Bustos A, Rodríguez Sanz M, Brugulat Guiteras P. Socio-economic inequalities in children's mental health in Catalonia. Anales de Pediatria. 2010;73(5):233–240. Available from: https://www.analesdepediatria.org/es-linkresolver-desigualdades-sociales-salud-mental-infantil-S169540331000202X.

[95] Cachón-Zagalaz J, Zagalaz-Sánchez ML, Arufe-Giráldez V, Sanmiguel-Rodríguez A, González-Valero G. Physical Activity and Daily Routine among Children Aged 0–12 during the COVID-19 Pandemic in Spain. International Journal of Environmental Research and Public Health. 2021;18(2). Available from: https://www.mdpi.com/1660-4601/18/2/703.

[96] Aguilar-Farias N, Toledo-Vargas M, Miranda-Marquez S, Cortinez-O'Ryan A, Cristi-Montero C, Rodriguez-Rodriguez F, et al. Sociodemographic Predictors of Changes in Physical Activity, Screen Time, and Sleep among Toddlers and Preschoolers in Chile during the COVID-19 Pandemic. International Journal of Environmental Research and Public Health. 2021;18(1). Available from: https://www.mdpi.com/1660-4601/18/1/176.

Anexo A

Correspondencia con los editores y revisores del artículo I

Carta de presentación a Paediatric and Perinatal Epidemiology

Barcelona, March 24th, 2020.

Dear Editor-in-Chief Prof. Cande V. Ananth

Please find enclosed our response to the referee and the updated manuscript "Association of screen time and sleep duration among Spanish paediatric population (1-14 years old)" for your consideration in Paediatric and Perinatal Epidemiology.

All the authors carefully read the manuscript and fully approve of it. In their name I also declare that the manuscript is original and it is not submitted anywhere other than your journal. The authors declare there are no conflicts of interest.

We would of course be ready to provide further information about our data and methods you desire. Correspondence about the manuscript should be addressed to me as indicated in the first page of the manuscript.

Thank you very much for your kind attention.

Yours faithfully,

Jose M Martínez-Sánchez, PhD, MPH, BSc

E-mail: jmmartinez@uic.es

Primeros comentarios del editor y los revisores de Paediatric and Perinatal Epidemiology

From: ananthcv@rwjms.rutgers.edu
To: jmmartinez@uic.es
CC: Sarah.Keim@nationwidechildrens.org
Subject: Paediatric and Perinatal Epidemiology - Decision on Manuscript PPE-2020-4512
Body: 23-Feb-2020

Dear Dr. Martínez-Sánchez:

Your manuscript (PPE-2020-4512) entitled "Association of screen time and sleep duration among Spanish paediatric population (1-14 years old)", which you submitted to Paediatric and Perinatal Epidemiology, has completed the first round of peer-review. The comments of the referees are included at the bottom of this letter.

The referees have recommended some major revisions to your manuscript, after which it will be re-reviewed. Therefore, we invite you to respond to the referees' comments and revise your manuscript. The Editors cannot guarantee acceptance of manuscripts following major revisions, and we do occasionally reject a small fraction of manuscripts at this stage.

Click the following link to create your revision:
*** PLEASE NOTE: This is a two-step process. After clicking on the link, you will be directed to a webpage to confirm. ***

https://mc.manuscriptcentral.com/ppe?URL_MASK=51f2b33a2f6c47cb90e23a764a1f5100

Alternatively, log into https://mc.manuscriptcentral.com/ppe and enter your Author Center, where you will find your manuscript listed under "Manuscripts with Decisions." Under "Actions," click on "Create a Revision." Your manuscript number has been appended to denote a revision.

You will be unable to make your revisions on the originally submitted version of the manuscript. Instead, revise your manuscript using a word processing program and save it on your computer. Please also highlight the changes to your manuscript within the document by using the track changes mode in MS Word or by using bold or colored text. Once the revised manuscript is prepared, you can upload it and submit it through your Author Center.

When submitting your revised manuscript, you will be able to respond to the comments made by the referees in the space provided. You can use this space to document any changes you make to the original manuscript. In order to expedite the processing of the revised manuscript, please be as specific as possible in your response to the referee.

IMPORTANT: Your original files are available to you when you upload your revised manuscript. Please delete any redundant files before completing the submission.

Because we are trying to facilitate timely publication of manuscripts submitted to Paediatric and Perinatal Epidemiology, your revised manuscript should be submitted within 30 days from the date of this letter. If it is not possible for you to submit your revision in a reasonable amount of time, we may have to consider your paper as a new submission.

Once again, thank you for submitting your manuscript to Paediatric and Perinatal Epidemiology and we look forward to receiving your revision.

With best wishes,

Sarah Keim
Associate Editor

Cande V. Ananth
Editor-in-Chief
Paediatric and Perinatal Epidemiology

Editors comments

The editors were concerned that this manuscript appears to represent only an incremental advance to the existing literature and may be more appropriate for a journal with a more regional scope. However, one of the reviewers wondered if there was something unique about the Spanish cultural context regarding sleep habits that might make it a distinctive setting for addressing this question. If so and if the results offer some unique insight into how the cultural context might affect the associations of interest, we invite the authors to revise the manuscript accordingly to integrate more interpretation of those issues. At the time, the editors will consider whether the study offers enough new knowledge to the field to warrant further consideration for the journal.

Please ensure that the revised manuscript conforms to the manuscript formatting guidelines (attached). It is important that very aspect of the formatting requirement be fully addressed.

Referee Comments to Author

Referee: 1

(i) Critique of study design (where applicable)

This analysis uses recent data from a national representative survey from Spain to examine the association between screen use and sleep duration in children aged 1 to 14 years old. The analysis is cross-sectional, but the sample size is large (>5,000) and nation-wide. As most surveys, the study collected key sociodemographic variables to adjust for, but lacks other individual-level or family-level behavioural data to adjust the models adequately.

(ii) Methodology

Screen time and sleep duration were assessed by questionnaire and declared by the parents. There are hardly better methods to assess screen time in a more objective manner in young children. In older children and adolescents, this method may misestimate real screen time since the children are more independent from their parents. The authors state this as a limitation. Assessment of sleep duration has the similar issue. There are more objective and accurate ways to measure sleep duration, but these are hardly possible in a national survey study. Unfortunately, sampling and examining large samples always come along with a loss in terms of data quality. As part of this reflexion, the potential confounders accounted for are rather limited in number, although key sociodemographic variables were collected and used. The statistical analysis method is adequate and well executed. The authors stratified their analysis by child age, and by education level of the family.

(iii) Interpretation

The findings are clear and correctly interpreted. Findings stratified by education level shown in Table 3 may necessitate further comment and interpretation.

(iv) Style

The paper is very well structured. The results are presented in a clear manner. Language is of quality although few grammar and language mistakes were spotted.

(v) Originality

Per se, the study is not of a high originality, but this topic is a hot one with the recent spread of digital devices such as tablets and smartphones and the increased use by young children. Current studies examining the association of screen time with sleep duration (or quality) are usually led in much smaller sample sizes. Although the present study remains cross-sectional in nature, it benefits from a large sample representative of a large European country. The authors were also able to examine the association by age group from 1 to 14 years, which is quite interesting.

Further comments below

Introduction, first paragraph

- Screen time also consisted in the exposure to computer screen, for office workers. Perhaps precise that you mean leisure screen time. Or that you refer to children's screen use, therefore excluding computer screens and occupational purposes.

- Smartphones appeared in 2007 (iPhone), tablets in 2010 (iPad).

- I am not clear to what shift from 4 years to 4 months the authors are referring too. Where are those data from? And what is the alpha generation?

- WHO recommends children below 2 years of age not to use screens (not below 1 year). And the 1-hour daily limit is between 2 and 5 years (not 1 to 4).

Introduction, second paragraph

- Please give more global and/or national statistics about the evolution of sleep duration in children, by precising the age groups. E.g. In Spain, it has decreased by 30 min: for which age range? Also precise what were the durations in 1987 and in 2011, on top of the 30-min difference.

- Stereotypes seem to say Spanish people tend to have later diner and bed time than people from Northern Europe. Is it a stereotype or is it supported by facts and data? Is it the case in adults only, or also in children? Is it the case all year long or only during the holidays/summer time? Is it linked to shorter sleep time, or to later out bed time? Without developing a long paragraph on the features of sleep patterns in Spain, it could be relevant to make a case of potential cultural specificities regarding sleep, by providing some data about usual in bed and out bed time in Spanish kids, compared to those from other countries.

Methods, study design:

- As reference #12 is in Spanish language, it could be informative to detail a bit further the sample procedure of the 2017 Spanish National Health Survey. Please explain briefly the three steps of the stratified sampling.

- Could you give more information on the informant? Mothers? Fathers? One of the parents? Others?

Methods, screen time assessment:

- Please make clearer whether the questionnaire differentiated weekdays from weekend days, and how the weighted mean was calculated.

- Considering the sample size with >2 hours per day (n=2,440), it would be informative to split it up into further categories (e.g. 2-3 hours, 3 hours or more).

- Also, make clearer the boundaries of screen time categories; e.g. whether children with 60 minutes of screen time where categorized in the first or the second group. Same for 120 minutes.

Results, last paragraph:

- I do not understand why the authors write "Weak evidence suggests that …". The evidence is rather convincing, not weak.

- The analysis stratified by education level is not commented in the text, while there are interesting findings. Especially, the aPR are larger among families of lower education level than among those of middle and higher education levels; at the exception of the 6-11 years group, where it seems the contrary. Any comment and interpretation of this finding?

Table 1

- Please provide the % in the column ‘n’, e.g. n (%)

Discussion

- Strengths and limitations of the study would sound better coming after the interpretation paragraph.

- Limitations: another limitation of the study is its cross-sectional design, not allowing to determine the temporal sequence of the association between sleep and screen time.

- I see more study strengths than the authors would like to report. The sample size is large, yes. This is also a representative sample with nation-wide implications. As compared to cohort studies usually led in large cities, this sample includes children for more rural areas, where one could assume both screen use and sleep patterns differ from the cities. It also allows deriving (adjusted) prevalence ratios at the national level. The study also reports some factors related to screen time in the Spanish context. These are important data to publish, and not solely confounders of the specific research question on screen use and sleep.

- With regard to reference #19, their findings are not so different from those of the present study. aPR’s from Table 3 depart from the null: 1.30 (1.05, 1.61) and 1.23 (0.98, 1.56). The effect size remains smaller than others from the same table, but this still suggests some negative association between screen time and sleep in this age group.
No further comments

Referee: 2

Major

Under methods, by providing only 3 possible options for reported screen time, it became impossible to specify exactly how much screen time each participant experienced each day. Additionally, the answer choice of 2-24 hours is very broad and thus a more limited time duration (i.e. 2-3 hours, 3-4 hours, 4-5 hours, 5-6 hours, 6+ hours) could have provided additional, more specific answers to the authors’ study question of daily screen time use.

The study is looking for an association between screen use and sleep duration but does not specifically assess when the participants are using screens. Could the children who spend <1 hour immediately before bed have a worse quality of sleep than those who use screens for 3-4 hours in the middle of the day and none before going to bed? This is a limitation that should be mentioned in the discussion section.

Minor

Page 6, paragraph 1, line 5: more specifically should state the age of what event that has changed from 4 years to 4 months; first screen use? First tablet use specifically?
Page 6, paragraph 2, line 11: specify if the studies used in the systematic reviews included studies conducted in Spain.

Page 7, paragraph 2, line 5: provide more detail about the “informant.” Is this the equivalence of a research assistant?

Page 7, paragraph 2, line 7: provide an example or two of the more popular health issues that resulted in exclusion from the study.

Page 8, paragraph 2, line 2: provide rational for sex as a potential confounder.

Page 11, paragraph 1, lines 1-4: reword, expand upon, and reference the the limitation of the informant and parents reporting the data.

Page 11, paragraph 1, line 10: expand upon why discrete numeric variables were a limitation in your study.

Page 12, paragraph 1, lines 2-12: you may want to consider omitting this example as your analysis did not include participants less than a year old.

Page 14, paragraph 2, lines 1-7: you may want to consider moving this paragraph after the paragraph that ends with "invest monetary resources in others entertainment activities" as they both are discussing parent education and socioeconomic background.

Page 14, paragraph 4, lines 3-7: find and provide references for your statements regarding national surveys being poor and inaccurate as well as the surveys lacking important information.

Grammatical

Page 6, paragraph 1, line 1: "screen's use" should be changed to "the use of screens."

Page 6, paragraph 2, line 3: omit "Short sleep duration among children may be an important public health issue."

Page 6, paragraph 2, line 4: change "obesity and poorer, emotional regulation" to "obesity, poorer emotional regulation."

Page 6, paragraph 2, line 6: change "statistically significant decreased" to "experienced a statistically significant decrease."

Page 6, paragraph 2, line 9: replace "good night time sleep quality" with " higher quality sleep."

Page 7, paragraph 2, line 2: omit "a" prior to "stratified sampling."

Page 7, paragraph 2, line 3: change "municipality, conducted in three steps." to "municipality." Omit "conducted in three steps."

Page 7, paragraph 3, line 5: change "or/and" to "and/or."

Page 8, paragraph 1, line 7: change "sleep the lower boundary or more" to "slept for a duration of time equal or greater to the lower boundary."

Page 8, paragraph 2, line 4: change "children" to "children's."

Page 8, paragraph 2, line 5: change "parents and others: including legal guardians" to "parents, legal guardians." Add "s" to the end of "relationship."

Page 8, paragraph 2, line 9: change "(Class I: directors and managers, university professionals, Class II: intermediate occupations and freelancers, and Class III: manual workers" to "Class I (directors, managers, university professionals), Class II (intermediate occupations and freelancers), and Class III (manual workers)."

Page 9, paragraph 1, line 4: change "duration, PR and adjusted prevalence ratios (aPR), and their 95% CI" to "duration, PR, and adjusted prevalence ratios (aPR)."

Page 9, paragraph 1, line 6: change "we stratified these analyses by age of the children and ge by age of the children and education level of the parents jointly" to "we stratified these analyses by (1) child age and (2) child age and parent education."

Page 9, paragraph 3, line 2: omit "strong evidence supports that."

Page 9, paragraph 3, line 3: omit "otherwise, some evidence indicates that."

Page 9, paragraph 3, line 5: change "were kept" to "remained."

Page 9, paragraph 4, line 2: omit "some evidence suggests that."

Page 10, paragraph 1, line 1: change "were kept" to "remained."

Page 10, paragraph 1, line 3: omit “some evidence supports that.”

Page 10, paragraph 1, line 5: change “were kept” to “remained.”

Page 10, paragraph 2, line 2: omit “weak evidence supports that.”

Page 10, paragraph 3, line 1: change “of daily screen time” to “of time in front of a screen.”

Page 10, paragraph 3, line 3: change “spending” to “who spent” and omit the “,” following “daily.”

Page 10, paragraph 3, line 4: omit “Next.”

Page 10, paragraph 4, line 2: omit “besides, it,” change “then” to “that,” and change “going in depth to difference among them” to “compare.”

Page 11, paragraph 1, line 6: change “besides we repeated the analyses stratified by informant,” to “when the analyses were stratified by informant”

Page 11, paragraph 1, line 7: change “the signification” to “a statistically significant difference.”

Page 11, paragraph 1, line 7: omit “besides...limitations” and change “First” to “Additionally.”

Page 11, paragraph 1, line 10: omit the “,” after “screen” and the “,” after “variable.” Omit “that.”

Page 11, paragraph 1, line 10: omit “in” and change “there were not” to “did not.”

Page 11, paragraph 1, line 11: change “the use of” to “the study utilized” and change “which are” to which is.”

Page 11, paragraph 2, line 2: omit the “,” after “studies” and change “evaluates” to “evaluated.”

Page 11, paragraph 2, line 7: change “this” to “that,” omit “those,” and add “a” prior to “shorter sleep duration.”

Page 12, paragraph 2, line 1: change “when we stratifying by age and parents’ education level jointly we find” to “when stratified by both age and parents’ education level, we found.”

Page 12, paragraph 2, line 2: change the “.” after “duration” to “,”, removed the “,” after “although,” change “are” to “were,” and change “statistical significance” to “statistically significant difference.”

Page 12, paragraph 3, line 9-10: omit this sentence.

Page 13, paragraph 1, line 1: omit “we describe that” and change “prevalent” to “likely.”

Page 13, paragraph 1, line 6: omit “besides.”

Page 13, paragraph 1, line 8: omit “being those” and change “lower education parents were more prevalent of exceeding” to “less education parents were more likely to exceed.”

Page 13, paragraph 1, line 11: change “do not” to “may not” and change “are not able” to “may not be able.”

Page 13, paragraph 2, line 1: omit “otherwise.”

Page 13, paragraph 2, line 3: change “Barcelona” to “that.”

Page 13, paragraph 2, line 5: change “in this sense” to “similarly.”

Page 13, paragraph 3, line 1: change “which is not consistent with a Spanish study which provides the” to “inconsistent with a Spanish study that found.”

Page 13, paragraph 3, line 7: delete “besides.”

Page 14, paragraph 3, line 1: change “the recommendation of” to “recommended” and change “are controversial” to “is controversial.”

Page 14, paragraph 3, line 6: change “prevalent” to “likely.”

Page 14, paragraph 4, line 1: delete the “,” after both “needed” and “tablets.” Change “focus the screen exposure” to “focus on screen exposure.”

Page 15, paragraph 1, line 2: change “raise awareness in the population, of the negative impact that might have an excessive daily screen time for the sleep duration” to “raise awareness of the negative impact that excessive daily screen time may have on sleep duration.”

Page 15, paragraph 2, line 2: omit “Next” and change “according to higher children age” to “in adolescents and early teenagers” and omit “a” before “responsible” and omit “a” before “good.”

Date Sent: 23-Feb-2020

File 1: * 2019-PPE-instructions-to-authors.pdf

File 2: - Sanchez et al. Association of Screen Time and Sleep Duration among Spanish paediatric population (1 - 14 years old).pdf

Primera respuesta a los comentarios de los revisores de Paediatric and Perinatal Epidemiology

Editors comments

The editors were concerned that this manuscript appears to represent only an incremental advance to the existing literature and may be more appropriate for a journal with a more regional scope. However, one of the reviewers wondered if there was something unique about the Spanish cultural context regarding sleep habits that might make it a distinctive setting for addressing this question. If so and if the results offer some unique insight into how the cultural context might affect the associations of interest, we invite the authors to revise the manuscript accordingly to integrate more interpretation of those issues. At the time, the editors will consider whether the study offers enough new knowledge to the field to warrant further consideration for the journal.

We would like to thank the Editor and Reviewers for the useful comment and the possibility to revise and improve the quality of our work. We agree that in Spain there are some unique cultural aspects that can affect the sleep habits of the children that we have to take into account. In this sense, following the recommendation of the Editor and the Referee #1, we have added a new paragraph in the background section contextualizing the Spanish features that might differentiate Spain from other European countries as follows:

> "Additionally, evidence suggests that other environmental aspects such as the region of living[11–13] and culture[14] are related with sleep patterns. A previous study[15] showed that Mediterranean countries, including Spain, and Eastern countries children between 2 and 9 years have less nocturnal sleep duration than those of Northern countries[15]. Focusing on Spain, some non-scientific articles argued that this difference might be due to, in Spain, school finishes later than schools from Northern countries, parents have longer working hours and Spaniards have dinner later, consequently going to bed later, despite the waking time being almost the same in all the European countries[16,17]."

In addition, in the discussion section we have added a paragraph providing results of Spain compared to results of other European countries providing more evidence to the results obtained in this study and the unique cultural and differential aspect of Spain as follows:

> "In this sense, a study[15] conducted in 2011, which compares the nocturnal sleep duration in children between 2 and 9 years old from 8 European countries including Spain, shows that those children from Northern countries sleep longer than those children from Southern and Eastern countries even after adjusting for screen time and other potential confounders, such as season and daylight hours[15]."

And

> "In addition, this study[34] shows that in 2014 teenagers from Spain were less likely to exceed 2 hours of screen time than Northern countries, such as Sweden, Norway, Finland and Denmark. In this sense, a study[15] conducted in 2011 which compares the nocturnal sleep duration between 2 and 9 years old from 8 European countries including Spain also shows that those children between 2 and 9 years old from Spain were less likely to exceed 2 hours of daily screen time in comparison to Northern, Eastern and other Mediterranean countries including in that study[15]. Moreover, this study[15], also shows that Spain has the largest prevalence of children playing outdoor and the second largest prevalence of children spending 1 hour or more in a sports

club. Therefore, these results might suggest that Spaniards children replace the screen time for other activities."

<u>Referee 1:</u>

(i) Critique of study design (where applicable)

This analysis uses recent data from a national representative survey from Spain to examine the association between screen use and sleep duration in children aged 1 to 14 years old. The analysis is cross-sectional, but the sample size is large (>5,000) and nation-wide. As most surveys, the study collected key sociodemographic variables to adjust for, but lacks other individual-level or family-level behavioural data to adjust the models adequately.

Thank you very much for the comments and the assessment of our work. As the reviewer suggested we include in analysis some features of behavioural children, such as BMI-for-age z-score and physical activity, in order to adjust the models properly. Nonetheless, due to we use secondary data we can not include others variables, such as, when children use the electronic device, whether children use the electronic device just before going to bed, which is the electronic device that children use the most (smartphone, tablet) among others. (please see the response to the comments and the updated results)

(ii) Methodology

Screen time and sleep duration were assessed by questionnaire and declared by the parents. There are hardly better methods to assess screen time in a more objective manner in young children. In older children and adolescents, this method may misestimate real screen time since the children are more independent from their parents. The authors state this as a limitation. Assessment of sleep duration has the similar issue. There are more objective and accurate ways to measure sleep duration, but these are hardly possible in a national survey study. Unfortunately, sampling and examining large samples always come along with a loss in terms of data quality. As part of this reflexion, the potential confounders accounted for are rather limited in number, although key sociodemographic variables were collected and used. The statistical analysis method is adequate and well executed. The authors stratified their analysis by child age, and by education level of the family.

Thank you very much for the interesting comments. We agree with the referee, and hence, we have extended the explanation of the limitations of our study as follows:

> "However, an informant reported the data, it might be a limitation when the children are older or mature enough to self-report, might providing underestimated values. Additionally, the parents in most cases, but sometimes by legal guardians or brothers/sisters, grandparents or other family members reported the data, and therefore those who were not the parents might provide some biased information providing recall bias and observer bias in the study[30,31]. Nevertheless, when we adjusting for potential confounders we did not find statistically significant differences between who answered the questionnaire, and when the analyses were stratified by informant, for the parent the overview did not change and for the others we lost a statistically significant difference due to its small sample size (n=313) (data not shown). Next, we cannot disregard the common method bias (self-reported exposure and outcomes measured at one point of time). Our study also has some limitations. Additionally, the overall 'sleep duration' and 'screen time' among those who spend

more than 1 hour in front of a screen, were reported as a discrete numeric variable in hours, apart from it is a very inaccurate value, this might provide classification bias, because we do not know if those who sleep 9 hours and 45 minutes are properly classified in the group of less than 10 hours or are classified in the group of more than 10 hours. Second, our study did not represent children under 1 year old due to missing information regarding screen time question. Third, the study utilized questionnaire, which is susceptible to social desirability and recall bias. Fourth, given that this is a secondary analysis of the data, we did not have information regarding relevant questions, such as, if the children used media devices just before going to sleep, therefore, we can not assess if the association exists due to the total screen time or because the children were exposed to screens just before going to the bed[32,33]. In Addition, other relevant information that we can not taking into account are the type of device they used most or the content that they used to watch. Future research should take into account this information. Finally, due to the cross-sectionality of this study we can not assess causality and determine the temporal sequence of the association between short sleep duration and screen time

We have compared our results with other European countries to provide evidence about the differences of Spain, and we have performed new specific analyses following the recommendation of the reviewers (please see the response to the comments of both referees below)."

(iii) Interpretation

The findings are clear and correctly interpreted. Findings stratified by education level shown in Table 3 may necessitate further comment and interpretation.

Thank you very much for your comment. As the reviewer have suggested, we provide further comment and interpretation of the results of the table 3 (please see the response to the comment of both reviewers below)

(iv) Style

The paper is very well structured. The results are presented in a clear manner. Language is of quality although few grammar and language mistakes were spotted.

Thank you very much for the kind comments. Moreover, we have carefully revised the manuscript to improve the quality of English.

(v) Originality

Per se, the study is not of a high originality, but this topic is a hot one with the recent spread of digital devices such as tablets and smartphones and the increased use by young children. Current studies examining the association of screen time with sleep duration (or quality) are usually led in much smaller sample sizes. Although the present study remains cross-sectional in nature, it benefits from a large sample representative of a large European country. The authors were also able to examine the association by age group from 1 to 14 years, which is quite interesting.

Thank you very much for the kind comments to our work. We have also included some novel and unique aspects of our study in the introduction section and we have compared our results with other European countries (please see response to the comments of the Editor and both referees below).

Further comments below

Introduction, first paragraph

- Screen time also consisted in the exposure to computer screen, for office workers. Perhaps precise that you mean leisure screen time. Or that you refer to children's screen use, therefore excluding computer screens and occupational purposes.

Thank you for your comment. As the reviewer commented, the screen time that we refer in this article includes computer screens and videogames. Therefore, we have highlighted throughout the text that the screen time is the leisure screen time as follows:

> "Over the last decades, the use of screens has considerably changed. At the end of the XX century and beginning of the XXI century, leisure screen time consisted mainly in the exposure to TV and videogames."

- Smartphones appeared in 2007 (iPhone), tablets in 2010 (iPad).

Thank you for your comment. We have corrected it as the reviewer commented as follows:

> "However, when smartphones and tablets appeared, in 2007 and 2010 respectively, screen time moved to these new devices, decreasing the time of people watching TV and increasing the time of use of smartphones and tablets[1]."

- I am not clear to what shift from 4 years to 4 months the authors are referring too. Where are those data from? And what is the alpha generation?

We make reference to the age shifting of the first contact with digital media. The data are from USA. The term alpha generation refers to those children born since 2010's. Following the comment of the referee, we have re-written the sentence in order to clarify it, as follows:

> "Other important change related to use screen devices is the age of the first contact with digital media, which shifted from 4 years to 4 months, among children born since 2010's[1]."

- WHO recommends children below 2 years of age not to use screens (not below 1 year). And the 1-hour daily limit is between 2 and 5 years (not 1 to 4).

Thank you for your comment. As the reviewer comment, the recommendations were wrong in the first version. We have corrected it as follows:

> "In this sense, the World Health Organization (WHO) has recently recommended that children below 2 years of age should not be exposed to screens and those who are between 2 and 5 years old are not recommended to spend more than 1 hour daily in front of a screen[2]."

Introduction, second paragraph

- Please give more global and/or national statistics about the evolution of sleep duration in children, by precising the age groups. E.g. In Spain, it has decreased by 30 min: for which age range? Also precise what were the durations in 1987 and in 2011, on top of the 30-min difference.

Thank you for your comment. As the reviewer recommended, we have specified the national statistics of the evolution of sleep duration as follows:

> "In Spain, the sleep duration has decreased by 20 minutes in children between 2 and 14 years old[8]. Focusing on the different groups of age, the sleep duration for those children between 2 and 5 years old decreased by 24 minutes, from 10 hours and 40 minutes in 1987 to 10 hours and 16 minutes in 2011[8]. In reference to those children between 6 and 9 years, the total sleep duration decreased by 20 minutes during 1987 to 2011, from 9 hours and 51 minutes in 1987 to 9 hours and 31 minutes in 2011[8]. Finally, the sleep duration for those children between 10 and 14 years old decreased by 27 minutes, from 9 hours and 19 minutes in 1987 to 8 hours and 52 minutes in 2011[8]."

- Stereotypes seem to say Spanish people tend to have later diner and bed time than people from Northern Europe. Is it a stereotype or is it supported by facts and data? Is it the case in adults only, or also in children? Is it the case all year long or only during the holidays/summer time? Is it linked to shorter sleep time, or to later out bed time? Without developing a long paragraph on the features of sleep patterns in Spain, it could be relevant to make a case of potential cultural specificities regarding sleep, by providing some data about usual in bed and out bed time in Spanish kids, compared to those from other countries.

We agree with the referee. As the reviewer suggested, we have provided more information about that at the end of the second paragraph of the introduction section, exposing all of these features of the Spanish culture that make different the sleep habits in comparison with the sleep habits from other European countries as follows:

> "Additionally, evidence suggests that other environmental aspects such as the region of living[11–13] and culture[14] are related with sleep patterns. A previous study[15] showed that Mediterranean countries, including Spain, and Eastern countries children between 2 and 9 years have less nocturnal sleep duration than those of Northern countries[15]. Focusing on Spain, some non-scientific articles argued that this difference might be due to, in Spain, school finishes later than schools from Northern countries, parents have longer working hours and Spaniards have dinner later, consequently going to bed later, despite the waking time being almost the same in all the European countries[16,17]."

Despite the references are not from scientific articles, therefore, it continues being a stereotype and a hypothesis that Spaniards tend to have later dinner and bed time than people from other European countries. Having other type of study design it might study these stereotypes and hypothesis.

Methods, study design:

- As reference #12 is in Spanish language, it could be informative to detail a bit further the sample procedure of the 2017 Spanish National Health Survey. Please explain briefly the three steps of the stratified sampling.

Thank you for your comment. As the reviewer commented, we have provided more details of the sampling, including the three steps of the sampling as follows:

> "We used data from the 2017 Spanish National Health Survey, conducted on a representative sample of Spanish population. All the participants were included in the sample through stratified sampling, according to the size of the municipality, conducted in three steps, being the first census tracts, the second homes and the third individuals. The data were collected through a face-to-face questionnaire from October 2016 to October 2017[19]."

- Could you give more information on the informant? Mothers? Fathers? One of the parents? Others?

Thank you for your comment. We defined "parents" category if the mother or the father of the child answer the questionnaire. We have clarified it in the section methods of the manuscript as follows:

> "Moreover, features of the children's family; relationship of who answer the questionnaire (informant) with the child (fathers/mothers, legal guardians, brothers/sisters, grandparents, other family members and other relationship);"

Methods, screen time assessment:

- Please make clearer whether the questionnaire differentiated weekdays from weekend days, and how the weighted mean was calculated.

Thank you for your comment. The questionnaire defines as weekdays from Monday to Friday and as weekend days Saturday and Sunday. We have made it clearer in the methods section as follows:

> "The questionnaire collected the duration of leisure screen time exposure through the question: "How long does the child spend in front of the screen, including laptop, tablet, TV, videos, videogames or smartphones?", differentiating between weekday (from Monday to Friday) and weekend day (Saturday and Sunday), with 3 possible responses (Never or almost never, less than 1 hour and 1 hour or more)"

The weighted mean was calculated through the next formula:

$$\text{Daily screen time (h)} = \frac{5 * \text{screen time weekday (h)} + 2 * \text{ screen time weekend day (h)}}{7}$$

In addition, we explain this formula in the methods section, as follows:

> "We recalculated the average number of hours in front of a screen daily through a weighted mean (we multiplied the reported hours from weekdays by 5 and the reported hours from weekend days by 2, then we divide the sum of previous for 7) only for those who responded spending 1 hour or more in a weekday and in a weekend day."

- Considering the sample size with >2 hours per day (n=2,440), it would be informative to split it up into further categories (e.g. 2-3 hours, 3 hours or more).

Thank you for your comment. As the reviewer suggested, we have split up the category 2 hours or more in two categories [120 hours - 179 hours] and ≥ 180 minutes (please see the new tables in the main text of the manuscript.

- Also, make clearer the boundaries of screen time categories; e.g. whether children with 60 minutes of screen time where categorized in the first or the second group. Same for 120 minutes.

Thank you for your comment. As the reviewer suggested, in order to avoid confusion, we change all the categories in minutes as follows:

> "Using both questions, we created a daily screen time variable with four categories: (1) [0 min – 59 min], (2) [60 min – 119 min], (3) [120 min – 179 min] and (4) ≥ 180 min."

Results, last paragraph:

- I do not understand why the authors write "Weak evidence suggests that …". The evidence is rather convincing, not weak.

Thank you for your comment. As the reviewer suggested, we have exchanged "Weak evidence" for "Rather convincing evidence".

- The analysis stratified by education level is not commented in the text, while there are interesting findings. Especially, the aPR are larger among families of lower education level than among those of middle and higher education levels; at the exception of the 6-11 years group, where it seems the contrary. Any comment and interpretation of this finding?

Thank you for your comment. In this sense we added more information about results of the table 3 in the last paragraph of the results section, as follows:

> "Moreover, these patterns remained even after stratifying by age and education level of parents jointly, for those children between 1 and 2 years old with parents with low education level (reference [0 min – 59 min]) $aPR_{\geq 180\ min}$ = 3.66 (1.13,11.91), for those children between 3 and 5 years old with parents with medium education level (reference [0 min – 59 min]) $aPR_{\geq 180\ min}$ = 1.57 (0.95,2.58), and for those children between 6 and 11 years old with parents with medium education level (reference [0 min – 59 min]) $aPR_{\geq 180\ min}$ = 1.83 (1.22,2.76) and high education level (reference [0 min – 59 min]) $aPR_{\geq 180\ min}$ = 3.14 (1.56,6.31)."

In addition, we comment these results in the discussion section as follows:

> "In addition, when stratified by both age and parents' education level, we found similar patterns of the association between screen time and short sleep duration, although we only found statistically significant differences for those between 1 and 2 years old with parents with low education level and between 6 and 11 years old and their parents had medium and high educational level. Therefore, our results suggest that within those families with the same education level children with higher patterns of screen time are more likely to have short sleep duration."

Our interpretation regarding to, why children between 6 and 11 years old is the unique group of age that aPR are larger among families of medium and higher education in comparison to low-education families is might there is a confounding factor that is not measured in this study. Nevertheless, our results show positive association between short duration prevalence and screen time in the all of education level groups in the group of age between 6 and 11 years old.

Table 1

- Please provide the % in the column 'n', e.g. n (%)

Done.

Discussion

- Strengths and limitations of the study would sound better coming after the interpretation paragraph.

Thank you for your comment. However, we followed the author guidelines of the journal. If the Editor considers appropriate to do it, we will move the strengths and limitations as recommend the referee.

- Limitations: another limitation of the study is its cross-sectional design, not allowing to determine the temporal sequence of the association between sleep and screen time.

Thank you for your comment. As the reviewer suggested we have added this limitation in the limitation sections, as follows:

> "Finally, due to the cross-sectionality of this study we can not assess causality and determine the temporal sequence of the association between short sleep duration and screen time."

- I see more study strengths than the authors would like to report. The sample size is large, yes. This is also a representative sample with nation-wide implications. As compared to cohort studies usually led in large cities, this sample includes children for more rural areas, where one could assume both screen use and sleep patterns differ from the cities. It also allows deriving (adjusted) prevalence ratios at the national level. The study also reports some factors related to screen time in the Spanish context. These are important data to publish, and not solely confounders of the specific research question on screen use and sleep.

Thank you for your comment. As the reviewer suggested, we have added these strengths in the discussion, as follows:

> "Moreover, this survey is representative at national level, therefore every area of Spain is represented, including those more rural and more urban, and we may assume that differences exist according to the patterns of screen time and sleep between these areas. Finally, this study reports some factors of the screen time according to the Spanish context."

- With regard to reference #19, their findings are not so different from those of the present study. aPR's from Table 3 depart from the null: 1.30 (1.05, 1.61) and 1.23 (0.98, 1.56). The effect size remains smaller than others from the same table, but this still suggests some negative association between screen time and sleep in this age group.

Thank you for your comment. On one hand, we agree with the reviewer that despite the confidence intervals are not statistically significant these results suggest that in the youngest group of age the prevalence of short sleep duration increase according to the increase of screen time daily, and hence, the loss of statistically significance might be due to the youngest group are the least exposed to screens and the most likely of having short sleep duration. On the other hand, we also agree with the reviewer #2 that the comparison of our study with the study conducted in Singapore is not the more correct, because our study does not include the group of age between 0 months and 11 months and the Singaporean study does.

Therefore, we have decided to comment these results without comparing our results with the Singaporean study, as follows:

> "However, the association of screen time and short sleep duration is not statistically significant for the youngest children (1-2 years old), which might be due to this group of age is the least exposed to screens and the most likely of having short sleep duration. Our results suggest that there exists a positive association between the prevalence of short sleep duration and the screen time."

No further comments

Referee 2:

Major

1. Under methods, by providing only 3 possible options for reported screen time, it became impossible to specify exactly how much screen time each participant experienced each day. Additionally, the answer choice of 2-24 hours is very broad and thus a more limited time duration (i.e. 2-3 hours, 3-4 hours, 4-5 hours, 5-6 hours, 6+ hours) could have provided additional, more specific answers to the authors' study question of daily screen time use.

Thank you for your comment. As the reviewer suggested, we have split the 2 hours or more category up into two categories, [120 min – 179 min) and ≥ 180 min. We have not split this category up into more categories as the reviewer purposed due to the small sample size of children having a screen time of 120 minutes or more. Please see the second comment regarding to "Methods, screen time assessment" of the reviewer #1.

2. The study is looking for an association between screen use and sleep duration but does not specifically assess *when* the participants are using screens. Could the children who spend <1 hour immediately before bed have a worse quality of sleep than those who use screens for 3-4 hours in the middle of the day and none before going to bed? This is a limitation that should be mentioned in the discussion section.

Thank you for your comment. In the limitations section we have commented that one of the main limitations of this study is that is not taking into account important information about screen time behaviour as if the children are exposed to the screen just before to going to sleep or the type of device that used most as follows:

"Fourth, given that this is a secondary analysis of the data, we did not have information regarding relevant questions, such as, if the children used media devices just before going to sleep, the type of device they used most or the content that they used to watch. Future research should take into account this information."

Nevertheless, as suggested the reviewer we have rewritten this limitation, making it clearer in the limitations section. As follows:

"Fourth, given that this is a secondary analysis of the data, we did not have information regarding relevant questions, such as, if the children used media devices just before going to sleep, therefore, we can not assess if the association exists due to the total screen time or because the children were exposed to screens just before going to the bed[32,33]."

Minor

1. Page 6, paragraph 1, line 5: more specifically should state the age of what event that has changed from 4 years to 4 months; first screen use? First tablet use specifically?

Thank you for your comment. Please see the response to the reviewer #1 first comment of the introduction section.

2. Page 6, paragraph 2, line 11: specify if the studies used in the systematic reviews included studies conducted in Spain.

Thank you for your comment. As the reviewer suggested, we have added in the introduction section that these systematic reviews include studies conducted in Spain, as follows:

"Previous systematic reviews, which included both cross-sectional[18] and longitudinal[9] studies, showed a negative association between screen time and sleep duration in children from 4 to 15 years old[9,18]. Both systematic reviews[9,18] included studies conducted in Spain."

3. Page 7, paragraph 2, line 5: provide more detail about the "informant." Is this the equivalence of a research assistant?

Thank you for your comment. The informant is the person who answer the questionnaire in the place of the children. Those are in most of cases one of the parents and the rest of the cases grandparents or brothers/sisters or legal guardians. We have clarified it in the methods section when we define the potential confounders, as follows:

"Moreover, features of the children's family; relationship of who answer the questionnaire (informant) with the child (fathers/mothers, legal guardians, brothers/sisters, grandparents, other family members and other relationship);"

4. Page 7, paragraph 2, line 7: provide an example or two of the more popular health issues that resulted in exclusion from the study.

Thank you for your comment. This exclusion criterion was obtained through the question "During the last 6 months, what extent the child has been limited due to a health issue in order to do the activities that children usually use to do?" with three possible responses: (1) seriously limited (2) limited, but not seriously and (3) Not limited. We use in this study those children that answer "not limited" as a proxy of to be healthy as follows.

> "The exclusion criteria for the purposes of our study were: (1) to have a limitation to do any children activity due to health issues. Due to the nature of the questionnaire we can not exclude any specific issue, only those children who declared having a limitation due to health issues in the last 6 months, (n=332)"

5. Page 8, paragraph 2, line 2: provide rational for sex as a potential confounder.

Thank you for your comment. We added sex as potential confounder because previous research conducted in a sample of teenagers from Barcelona, ref #22, showed that there are statistically significant differences in the screen time behaviour according to sex. Therefore, as our study includes teenagers, we considered that sex might be a potential confounder. We have included one sentence providing the justification, as follows:

> "Based on literature, we selected the following variables as potential confounders. Sociodemographic features of the children: sex, because evidence at national level[17] shows differences of screen time behaviour according to sex"

6. Page 11, paragraph 1, lines 1-4: reword, expand upon, and reference the limitation of the informant and parents reporting the data.

Thank you for your comment. As the reviewer suggested, we have rewritten this sentence as follows:

> "However, an informant reported the data, it might be a limitation when the children are older or mature enough to self-report, might providing underestimated values. Additionally, the parents in most cases, but sometimes by legal guardians or brothers/sisters, grandparents or other family members reported the data, and therefore those who were not the parents might provide some biased information providing recall bias and observer bias in the study[18,19]."

7. Page 11, paragraph 1, line 10: expand upon why discrete numeric variables were a limitation in your study.

Thank you for your comment. As the reviewer suggested, we have rewritten this limitation as follows:

> "Additionally, the overall 'sleep duration' and 'screen time' among those who spend more than 1 hour in front of a screen, were reported as a discrete numeric variable in hours, apart from it is a very inaccurate value, this might provide classification bias, because we do not know if those who sleep 9 hours and 45 minutes are properly classified in the group of less than 10 hours or are classified in the group of more than 10 hours."

8. Page 12, paragraph 1, lines 2-12: you may want to consider omitting this example as your analysis did not include participants less than a year old.

Thank you for your comment. As the reviewer suggested, the comparison of our results with those obtained for Singaporean study might not be correct, because our study does not include the group of age between 0 months and 11 months. Nonetheless, we believe that might be relevant to comment that our results suggest that there is a positive association between screen time and the prevalence of having short sleep duration for those children between 1 year old and 2 years old, despite the fact there are not statistically significant differences might be due to this group of age are the least exposed to screens and the most likely of short sleep duration.

Please see the comment #4 in the discussion section of the reviewer #1.

9. Page 14, paragraph 2, lines 1-7: you may want to consider moving this paragraph after the paragraph that ends with "invest monetary resources in others entertainment activities" as they both are discussing parent education and socioeconomic background.

Thank you for your comment. As suggested the reviewer we have moved this paragraph.

10. Page 14, paragraph 4, lines 3-7: find and provide references for your statements regarding national surveys being poor and inaccurate as well as the surveys lacking important information.

Thank you for your comment. As the reviewer recommended, we have added some references and make clearer why some answers of the national health survey are poor, inaccurate and lacking important information, as follows:

> "Moreover, in this sense, the potential answers referring to times of screen time only allows hours instead of hours and/or minutes, consequently losing information and adding some source of classification bias[30]. In addition, these surveys lack important information related with screen time, such as when the children use the devices, whether they use the devices just before going to sleep, in order to asses if it is the total screen time which affects the sleep duration or it is only the screen time before going to bed. Furthermore, the features of the devices in order to specify what affects sleep, either the blue light that give off the screens or, the size of the screens, or the type of electronic device, or which kind of content they watch (e.g. reading, play videos or watching series)."

Grammatical

1. Page 6, paragraph 1, line 1: "screen's use" should be changed to "the use of screens."

Done.

2. Page 6, paragraph 2, line 3: omit "Short sleep duration among children may be an important public health issue."

Done.

3. Page 6, paragraph 2, line 4: change "obesity and poorer, emotional regulation" to "obesity, poorer emotional regulation."

Done.

4. Page 6, paragraph 2, line 6: change "statistically significant decreased" to "experienced a statistically significant decrease."

We removed this sentence.

5. Page 6, paragraph 2, line 9: replace “good night time sleep quality” with “ higher quality sleep.”

Done.

6. Page 7, paragraph 2, line 2: omit “a” prior to “stratified sampling.”

Done.

7. Page 7, paragraph 2, line 3: change “municipality, conducted in three steps.” to “municipality.” Omit “conducted in three steps.”

Thank you for your comment. However, the reviewer #1 suggested us to provide more detailed information about sampling. Therefore, we have decided to keep this information. But, if the Editor finds it better to remove the information on the sampling steps, we would agree with the decision and we will remove it. (please see de comment #1 of the methods section of the reviewer #1)

8. Page 7, paragraph 3, line 5: change “or/and” to “and/or.”

Done.

9. Page 8, paragraph 1, line 7: change “sleep the lower boundary or more” to “slept for a duration of time equal or greater to the lower boundary.”

Done.

10. Page 8, paragraph 2, line 4: change “children” to “children’s.”

Done.

11. Page 8, paragraph 2, line 5: change “parents and others: including legal guardians” to “parents, legal guardians.” Add “s” to the end of “relationship.”

Done.

12. Page 8, paragraph 2, line 9: change “(Class I: directors and managers, university professionals, Class II: intermediate occupations and freelancers, and Class III: manual workers” to “Class I (directors, managers, university professionals), Class II (intermediate occupations and freelancers), and Class III (manual workers).”

Done.

13. Page 9, paragraph 1, line 4: change “duration, PR and adjusted prevalence ratios (aPR), and their 95% CI” to “duration, PR, and adjusted prevalence ratios (aPR).”

Done.

14. Page 9, paragraph 1, line 6: change “we stratified these analyses by age of the children and ge by age of the children and education level of the parents jointly” to “we stratified these analyses by (1) child age and (2) child age and parent education.”

Done.

15. Page 9, paragraph 3, line 2: omit “strong evidence supports that.”

Done.

16. Page 9, paragraph 3, line 3: omit “otherwise, some evidence indicates that.”

Done.

17. Page 9, paragraph 3, line 5: change “were kept” to “remained.”

Done.

18. Page 9, paragraph 4, line 2: omit “some evidence suggests that.”

Done.

19. Page 10, paragraph 1, line 1: change “were kept” to “remained.”

Done.

20. Page 10, paragraph 1, line 3: omit “some evidence supports that.”

Done.

21. Page 10, paragraph 1, line 5: change “were kept” to “remained.”

Done.

22. Page 10, paragraph 2, line 2: omit “weak evidence supports that.”

Thank you for your comment. However, we have not changed it because the reviewer #1 suggested us to change “weak evidence” for “rather convincing evidence”. However, if the Editor finds it better to remove it, we would agree with the decision and we will remove it. (please see the comment #1 of the results section of the reviewer #1)

23. Page 10, paragraph 3, line 1: change “of daily screen time” to “of time in front of a screen.”

Done.

24. Page 10, paragraph 3, line 3: change “spending” to “who spent” and omit the “,” following “daily.”

Done.

25. Page 10, paragraph 3, line 4: omit “Next.”

Done.

26. Page 10, paragraph 4, line 2: omit “besides, it,” change “then” to “that,” and change “going in depth to difference among them” to “compare.”

Done.

27. Page 11, paragraph 1, line 6: change “besides we repeated the analyses stratified by informant,” to “when the analyses were stratified by informant”

Done.

28. Page 11, paragraph 1, line 7: change “the signification” to “a statistically significant difference.”

Done.

29. Page 11, paragraph 1, line 7: omit “besides...limitations” and change “First” to “Additionally.”

Done.

30. Page 11, paragraph 1, line 10: omit the “,” after “screen” and the “,” after “variable.” Omit “that.”

Done.

31. Page 11, paragraph 1, line 10: omit “in” and change “there were not” to “did not.”

Done.

32. Page 11, paragraph 1, line 11: change “the use of” to “the study utilized” and change “which are” to which is.”

Done.

33. Page 11, paragraph 2, line 2: omit the “,” after “studies” and change “evaluates” to “evaluated.”

Done.

34. Page 11, paragraph 2, line 7: change “this” to “that,” omit “those,” and add “a” prior to “shorter sleep duration.”

Done.

35. Page 12, paragraph 2, line 1: change “when we stratifying by age and parents’ education level jointly we find” to “when stratified by both age and parents’ education level, we found.”

Done.

36. Page 12, paragraph 2, line 2: change the "." after "duration" to ",", removed the "," after "although," change "are" to "were," and change "statistical significance" to "statistically significant difference."
Done.

37. Page 12, paragraph 3, line 9-10: omit this sentence.

Done.

38. Page 13, paragraph 1, line 1: omit "we describe that" and change "prevalent" to "likely."

Done.

39. Page 13, paragraph 1, line 6: omit "besides."

Done.

40. Page 13, paragraph 1, line 8: omit "being those" and change "lower education parents were more prevalent of exceeding" to "less education parents were more likely to exceed."

Done.

41. Page 13, paragraph 1, line 11: change "do not" to "may not" and change "are not able" to "may not be able."

Done.

42. Page 13, paragraph 2, line 1: omit "otherwise."

Done.

43. Page 13, paragraph 2, line 3: change "Barcelona" to "that."

Done.

44. Page 13, paragraph 2, line 5: change "in this sense" to "similarly."

Done.

45. Page 13, paragraph 3, line 1: change "which is not consistent with a Spanish study which provides the" to "inconsistent with a Spanish study that found."

Done.

46. Page 13, paragraph 3, line 7: delete "besides."

Done.

47. Page 14, paragraph 3, line 1: change "the recommendation of" to "recommended" and change "are controversial" to "is controversial."

Done.

48. Page 14, paragraph 3, line 6: change “prevalent” to “likely.”

Done.

49. Page 14, paragraph 4, line 1: delete the “,” after both “needed” and “tablets.” Change “focus the screen exposure” to “focus on screen exposure.”

Done.

50. Page 15, paragraph 1, line 2: change “raise awareness in the population, of the negative impact that might have an excessive daily screen time for the sleep duration” to “raise awareness of the negative impact that excessive daily screen time may have on sleep duration.”

Done.

51. Page 15, paragraph 2, line 2: omit “Next” and change “according to higher children age” to “in adolescents and early teenagers” and omit “a” before “responsible” and omit “a” before “good.”

Done.

New references added:

11. Kuula L, Gradisar M, Martinmäki K, Richardson C, Bonnar D, Bartel K, et al. Using big data to explore worldwide trends in objective sleep in the transition to adulthood. *Sleep Medicine* 2019;62:69–76.

12. Gradisar M, Gardner G, Dohnt H. Recent worldwide sleep patterns and problems during adolescence: A review and meta-analysis of age, region, and sleep. *Sleep Medicine* 2011;12:110–118.

13. Olds T, Blunden S, Petkov J, Forchino F. The relationships between sex, age, geography and time in bed in adolescents: A meta-analysis of data from 23 countries. *Sleep Medicine Reviews* 2010;14:371–378.

14. Jenni OG, O’Connor BB. Children’s Sleep: An Interplay Between Culture and Biology. *Pediatrics* 2005;115:204 LP – 216.

15. Hense S, Barba G, Pohlabeln H, De Henauw S, Marild S, Molnar D, et al. Factors that influence weekday sleep duration in European children. *Sleep* 2011;34:633–639.

16. El país. ¿Duermes como el español medio? https://verne.elpais.com/verne/2016/06/06/articulo/1465209209_937892.html (last accessed March 2020).

17. The Guardian. Spaniards’ lack of sleep isn’t a cultural thing – they’re in the wrong time zone. https://www.theguardian.com/commentisfree/2017/feb/22/spaniards-sleep-time-zone-spain (last accessed March 2020).

25. WHO Multicentre Growth Reference Study Group. *WHO child growth standards : length/height-for-age, weight-for-age, weight-for-length, weight-forheight and body mass index-for-age : methods and development.* Geneva; 2006.

26. Freedman DS, Lawman HG, Pan L, Skinner AC, Allison DB, McGuire LC, et al. The prevalence and validity of high, biologically implausible values of weight, height, and BMI among 8.8 million children. *Obesity* 2016;24:1132–1139.

27. Freedman DS, Lawman HG, Skinner AC, McGuire LC, Allison DB, Ogden CL. Validity of the WHO cutoffs for biologically implausible values of weight, height, and BMI in children and adolescents in NHANES from 1999 through 2012. *The American journal of clinical nutrition* 2015;102:1000–1006.

28. Centers for Disease Control and Prevention (CDC). A SAS Program for the 2000 CDC Growth Charts (ages 0 to <20 years).
https://www.cdc.gov/nccdphp/dnpao/growthcharts/resources/sas.htm (last accessed January 2020).
30. Tripepi G, Jager KJ, Dekker FW, Zoccali C. Selection Bias and Information Bias in Clinical Research. *Nephron Clinical Practice* 2010;115:c94–c99.

31. Mahtani K, Spencer EA, Brassey J, Heneghan C. Catalogue of bias: observer bias. *BMJ Evidence-Based Medicine* 2018;23:23 LP – 24.

32. Hysing M, Pallesen S, Stormark KM, Jakobsen R, Lundervold AJ, Sivertsen B. Sleep and use of electronic devices in adolescence: Results from a large population-based study. *BMJ Open* 2015;5:1–7.

33. Lemola S, Perkinson-Gloor N, Brand S, Dewald-Kaufmann JF, Grob A. Adolescents' Electronic Media Use at Night, Sleep Disturbance, and Depressive Symptoms in the Smartphone Age. *Journal of Youth and Adolescence* 2015;44:405–418.

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Comentarios del Editor de Paediatrics and Perinatal Epidemiology

From: ananthcv@rwjms.rutgers.edu

To: jmmartinez@uic.es

CC: Sarah.Keim@nationwidechildrens.org

Subject: Paediatric and Perinatal Epidemiology - Decision on Manuscript PPE-2020-4512.R1

Body: 12-Apr-2020

'We recognise that the impact of the COVID-19 pandemic may affect your ability to return your revised manuscript to us within the requested timeframe. If this is the case, please let us know.'

Dear Dr. Martínez-Sánchez:

Your manuscript (PPE-2020-4512.R1) entitled "Association of screen time and sleep duration among Spanish paediatric population (1-14 years old)", which you submitted to Paediatric and Perinatal Epidemiology, has been reviewed. The comments of the editors are included at the bottom of this letter.

We have recommended some major revisions to your manuscript, after which it will be re-reviewed. Therefore, we invite you to respond to the comments and revise your manuscript. The Editors cannot guarantee acceptance of manuscripts following major revisions, and we do occasionally reject a small fraction of manuscripts at this stage.

Click the following link to create your revision:
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Because we are trying to facilitate timely publication of manuscripts submitted to Paediatric and Perinatal Epidemiology, your revised manuscript should be submitted within 30 days of the date of this letter. If it is not possible for you to submit your revision in a reasonable amount of time, we may have to consider your paper as a new submission.

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Once again, thank you for submitting your manuscript to Paediatric and Perinatal Epidemiology and we look forward to receiving your revision.

With best wishes,

Sarah Keim
Associate Editor

Cande V. Ananth
Editor-in-Chief
Paediatric and Perinatal Epidemiology

Editors comments

Take a close look at the author guidelines for desired approaches to handle missing data.

Abstract – please condense the Methods section to offer more room for additional results in the Results section

Page 9 (bottom) – "thorough" should be "through"

The aPR for 1-2 years and low education level looks like it is based on very sparse data. Please check these values and consider not reporting it if the model is not running properly.

Page 12 – you indicate the way the screen time was measured was relatively crude and describe is "inaccurate." Please check this. Do you mean "imprecise" instead?

We have made additional copy-edits to the manuscript (attached). Please address all of the queries.

Up on reading the paper, we believe that there are a number of grammatical errors in the presentation, and the English writing style leaves room for improvement. While we appreciate your efforts to address the writing style in the resubmission, please take a closer look to improve the manuscript further.

Please ensure that the revised manuscript conforms to the manuscript formatting guidelines (attached). It is important that very aspect of the formatting requirement be fully addressed.

Date Sent: 12-Apr-2020

File 1: PPE-2020-4512.R1-PPE-EiC-12april2020.docx

File 2: * 2019-PPE-instructions-to-authors.pdf

Respuesta a los comentarios del Editor de Paediatric and Perinatal Epidemiology

EDITORS COMMENTS

Take a close look at the author guidelines for desired approaches to handle missing data.

Thank you very much for your comment. As Editor commented we have review exhaustingly the author guidelines and we have prepared the manuscript following the guidelines of the journal as follows:

> "Missing data
>
> Variables such as sleep duration, sex, and age of the child, relationship of who answer the questionnaire with the child, and model family have not missing data. Daily screen time has 21 (0.4%), education level has 197 (3.6%), social class has 397 (7.2%), physical activity has 26 (0.5%), and BMI-for-age z-score has 911 (16.5%) missing data respectively. Therefore, for those variables that have more than 5% of missing data, social class, and BMI-for-age z-score, we fitted the models with multiple imputation through predictive mean matching method."

And,

> "Ethics approval
>
> In the case of the National Health Survey, the MSCBS and the National Statistics Institute adopt the necessary logical, physical and administrative measures to ensure that confidential data are effectively protected, from the collection of data to their anonymization.
>
> Even for statistical or research purposes, its use does not require the approval of an accredited ethics committee."

Abstract – please condense the Methods section to offer more room for additional results in the Results section.

Thank you very much for your comment. As editor suggested we have sum up the Methods section in the abstract in order to extend the Results section and provide more results, as follows:

> "Methods: We used data from the 2017 Spanish National Health survey, conducted on a representative sample of Spanish population. We classified daily screen time as 0–59, 60–119, 120–179 and ≥180 min. We classified sleep duration depending on the age as proper sleep duration and short sleep duration. We calculated unadjusted, and adjusted prevalence ratio (PR) and 95% confidence interval (CI) of daily screen time and short sleep duration after

> adjusting for potential confounders. PR’s were derived from fitting generalised linear models with Poisson distribution and robust variance.”

And,

> “Results: Of the 5517 Spanish children aged 1-14 years, 44.3% of children spent 120 minutes or more of screen time and 23.6% had short sleep duration. 24.5%, and 28.2% of children between 120, and 179 minutes, and exceeding 180 minutes of screen time suffered short sleep duration. Higher patterns of daily screen time are associated with short sleep duration adjusted $PR_{120-170}$ = 1.31 (1.13,1.53), and adjusted $PR_{\geq 180}$ = 1.38 (1.16,1.64).”

Page 9 (bottom) – “thorough” should be “through”

Thank you very much for your kind comment. As the editor commented, we have corrected this spelling mistake, and besides, we have check the spelling, grammar, and style of the manuscript.

The aPR for 1-2 years and low education level looks like it is based on very sparse data. Please check these values and consider not reporting it if the model is not running properly.

Thank you very much for your comment. We agree with the comment of the Editor, however, once we have imputed those variables having more than 5% of missing data, the confidence intervals referring to this group of the sample are narrower, therefore we have considered to keep these results in the manuscript (please see table #3). Nonetheless, if the Editor consider that they have to be omitted, we are open to remove these results of the manuscript.

Page 12 – you indicate the way the screen time was measured was relatively crude and describe is “inaccurate.” Please check this. Do you mean “imprecise” instead?

Thank you very much for your comment. We agree with the Editor, when we refer to the measurement of the screen time we want to say that it is imprecise, therefore as the Editor suggested, we have change “inaccurate” for “imprecise”, as follows.

> “Additionally, the overall ’sleep duration’ and ‘screen time’ among those who spend more than 1 hour in front of a screen, were reported as a discrete numeric variable in hours, apart from it is a very imprecise value, this might provide classification bias, because we do not know if those who sleep 9 hours and 45 minutes were properly classified in the group of less than 10 hours or were classified in the group of 10 hours or more.”

We have made additional copy-edits to the manuscript (attached). Please address all of the queries.

Thank you very much for your comment. We agree with the all copy-edits that the Editor suggested.

Up on reading the paper, we believe that there are a number of grammatical errors in the presentation, and the English writing style leaves room for improvement. While we appreciate your efforts to address the writing style in the resubmission, please take a closer look to improve the manuscript further.

Thank you for your comment and for appreciating our effort. As the Editor suggested we have reviewed exhaustingly the manuscript in order to correct the spelling, and grammar mistakes, and improve the writing style of the manuscript.

Please ensure that the revised manuscript conforms to the manuscript formatting guidelines (attached). It is important that every aspect of the formatting requirement be fully addressed.

Thank you very much for your kind comment. As the Editor suggested, we have check the author guidelines and we prepared the manuscript strictly following them.

Carta de aceptación del artículo en Paediatric and Perinatal Epidemiology

From: ananthcv@rwjms.rutgers.edu

To: jmmartinez@uic.es

CC:

Subject: Paediatric and Perinatal Epidemiology - Decision on Manuscript PPE-2020-4512.R2

Body: 12-May-2020

Dear Dr. Martínez-Sánchez:

It is a pleasure to accept your manuscript entitled "Association of screen time and sleep duration among Spanish 1-14 years old children" for publication in Paediatric and Perinatal Epidemiology.

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Thank you for your fine contribution to the Journal. On behalf of the Editors of Paediatric and Perinatal Epidemiology, we look forward to your continued contributions to the Journal.

With best wishes,

Cande V. Ananth
Editor-in-Chief
Paediatric and Perinatal Epidemiology

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Date Sent: 12-May-2020

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Anexo B

Correspondencia con los editores y revisores de la carta al editor

Carta de presentación de la carta al editor a Sleep Medicine

Barcelona, November 25th, 2019.

Dear Editor-in-Chief Dr. S. Chokroverty,

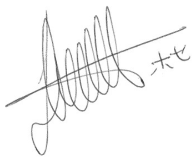
Please find enclosed our Letter to the Editor “Screen time use and sleep in children: Are there differences among social classes?” for your consideration in Sleep Medicine.

All the authors carefully read the letter and fully approve of it. In their name I also declare that the letter is original and it is not submitted anywhere other than your journal. The authors declare there are no conflicts of interest.

We would of course be ready to provide further information about our data and methods you desire. Correspondence about the letter should be addressed to me as indicated in the first page of the letter.

Thank you very much for your kind attention.

Yours faithfully,



Jose M Martínez-Sánchez, PhD, MPH, BSc

E-mail: jmmartinez@uic.es

Comentarios de la Editora asistente de Sleep Medicine

De: "Reimer, Chelsea" <Chelsea.Reimer@hackensackmeridian.org>
Asunto: Suggested editorial revisions: SLEEP-D-19-00888
Fecha: 11 de diciembre de 2019, 23:03:00 CET
Para: "jmmartinez@uic.es" <jmmartinez@uic.es>
Cc: "chokroverty123@gmail.com" <chokroverty123@gmail.com>,
"Chokroverty, Sudhansu" <Sudhansu.Chokroverty@hackensackmeridian.org>

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Dear Dr. Martínez-Sánchez,

Several minor revisions have been made to your Letter (see attached). We ask that you read through the revisions and send back an email with either your approval of our changes or your comments, so that your Letter may be moved into the next stage of production.

Thank you for your time and contribution to this Journal. We look forward to receiving your reply.

With kind regards,

Chelsea Reimer
Editorial Assistant, *Sleep Medicine*
Neuroscience Institute- Hackensack Meridian *Health* JFK Medical Center Edison, NJ

Documento adjunto de la editora asistente de Sleep Medicine con las revisiones

Screen time use and sleep in children: Are there differences among social classes?

Àurea Cartanyà-Hueso, BSc, MSc (1), Cristina Lidón-Moyano, MSc, PhD (1); Adrián González-Marrón DVM, MPH (1); Juan Carlos Martín-Sánchez BSc, PhD (1); and Jose M. Martínez-Sánchez, MPH, PhD (1)*

[1]*Group of Evaluation of Health Determinants and Health Policies, Department of Basic Sciences, Universitat Internacional de Catalunya, Sant Cugat del Vallès, Spain*

***Corresponding author:**

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Dear editor,

There is evidence that longer periods of screen time are related to shorter periods of sleep among children [1]~~[1]~~. A previous study concluded that parental lifestyle plays a great role in ~~screen time of children~~children's screen time [2]~~[2]~~. Moreover, Paudel et al., concluded that children (between 4 and 8 years) whose parents have higher use of screen devices are more likely to have higher screen media use as well [3]~~[3]~~. The objective of this letter is to describe the screen time use and the percentage of short sleep duration [4][4] among children according to household socioeconomic position [5]~~[5]~~.

A secondary analysis of the last National Health Survey in Spain, done in 2017 (n=5,850) [6][6] showed that more than 70% of Spanish children (between 1 and 14 years old) during their free time from Monday to Friday exceeded 1 hour of screen time daily [6][6]. The households with lower social class had a higher percentage of children exceeding 1 hour screen time daily (from 68.6% in the highest class to 78.2% in the lowest class) [6][6]. Additionally, those children belonging to household in lower social class had higher prevalence of having short sleep duration (ranging from 19.6% in the highest class to 28.2% in the lowest class).

Based on these results, we hypothesize that in Spain, those households belonging to higher social class might have more resources to invest in extracurricular activities and have better work-life balance in order to follow a good sleep hygiene.

For this reason, future studies assessing the relation between screen time and sleep duration in children should take into account the underlying cause of social class of the household and provide stratified analysis according to social class of the household. Moreover, institutions should promote extracurricular activities, provide accessible extracurricular activities for all the households and facilitate a better work-life balance.

REFERENCES

1. Belmon, L. S., van Stralen, M. M., Busch, V., Harmsen, I. A. & Chinapaw, M. J. M. What are the determinants of children's sleep behavior? A systematic review of longitudinal studies. *Sleep Med. Rev.* **43,** 60–70 (2019).
2. Xu, H., Wen, L. M. & Rissel, C. Associations of parental influences with physical activity and screen time among young children: a systematic review. *J. Obes.* **2015,** (2015).
3. Paudel, S., Jancey, J., Subedi, N. & Leavy, J. Correlates of mobile screen media use among children aged 0–8: a systematic review. *BMJ Open* **7,** e014585 (2017).
4. Hirshkowitz, M. *et al.* National Sleep Foundation's updated sleep duration recommendations: final report. *Sleep Heal.* **1,** 233–243 (2015).
5. Domingo-Salvany, A. *et al.* Propuestas de clase social neoweberiana y neomarxista a partir de la Clasificación Nacional de Ocupaciones 2011. *Gac. Sanit.* **27,** 263–272 (2013).
6. Ministerio de Sanidad, C. y B. S. Encuesta Nacional de Salud ENSE, España 2017. Serie informes monográficos #2 -ACTIVIDAD FÍSICA, DESCANSO Y OCIO. *Madrid: Ministerio de Sanidad, Consumo y Bienestar Social* (2019).

<u>Respuesta a los comentarios de la editora asistente de Sleep Medicine</u>

De: Jose María Martínez Sánchez <jmmartinez@uic.es>

Asunto: Re: Suggested editorial revisions: SLEEP-D-19-00888

Fecha: 12 de diciembre de 2019, 3:56:37 CET

Para: "Reimer, Chelsea" <Chelsea.Reimer@hackensackmeridian.org>

Cc: "chokroverty123@gmail.com" <chokroverty123@gmail.com>, "Chokroverty, Sudhansu" <Sudhansu.Chokroverty@hackensackmeridian.org>

Dear Chelsea

Thank you very much for the revision of our letter. We have carefully read the revision and we approval all changes and comments.

Best Regards,

JM

Jose M Martinez-Sanchez, PhD, MPH, BSc

Head, Group of Evaluation of Health Determinants and Health Policies
Universitat Internacional de Catalunya

Carta de aceptación de la carta al editor en Sleep Medicine

De: Sleep Medicine <eesserver@eesmail.elsevier.com>
Fecha: 12 de diciembre de 2019, 14:52:12 CET
Para: jmmartinez@uic.es
Asunto: SLEEP-D-19-00888 accepted for publication
Responder a: "Sleep Medicine" <sleep@elsevier.com>

Ref.: Ms. No. SLEEP-D-19-00888
Screen time use and sleep in children: Are there differences among social classes?

Dear Dr. Martínez-Sánchez,

I am pleased to confirm that your paper Screen time use and sleep in children: Are there differences among social classes? has been accepted for publication in Sleep Medicine or Sleep Medicine X, depending on which journal you chose during the submission process. We will ensure that we process your paper in the correct journal that you have chosen.

Here at Elsevier we offer The Christian Guilleminault WASM Award for Sleep Research and The Elio Lugaresi WASM Award for Sleep Medicine. Any papers accepted by May 1 2019 will be eligible for consideration. Please note that the application period begins June 1 2017, with an application deadline of May 1 2019. Papers that qualify are those published or accepted for publication in Sleep Medicine between June 1, 2017 to May 1, 2019. The awards will be presented at the World Sleep 2019 congress in Vancouver, Canada from September 20-25.

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With kind regards,
Sudhansu Chokroverty, MD
Editor-in-Chief
Sleep Medicine

Carta de aceptación del uso del material en la presente tesis

uic barcelona

Àurea Cartanyà Hueso <acartanya@uic.es>

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Regards,

Kaveri
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From: Administrator
Date: Tuesday, April 13, 2021 10:15 AM GMT

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Regards,
Permission Granting Team

From:
Date: Tuesday, April 13, 2021 10:15 AM GMT

Submission ID: 1157901
Date: 13 Apr 2021 11:15am

Name: Mrs Àurea Cartanyà-Hueso
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Type of Publication: Journal

Title: Sleep Medicine
Auhtors: Àurea Cartanyà-Hueso, Cristina Lidón-Moyano, Adrián González-Marrón, Juan Carlos Martín-Sánchez, Jose M. Martínez-Sánchez
Year: 2020
From page: 153
To page: 153
ISSN: 1389-9457
Volume: 68
Issue: April
Article title: Screen time use and sleep in children: are there differences among social classes?

I would like to use: Full article / chapter

I am the author of the Elsevier material: Yes
Involvement: First author of the article and author of the thesis

In what format will you use the material: Print and Electronic
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Material can be extracted: No

Additional Comments / Information:

Anexo C

Correspondencia con los editores y revisores del artículo III

Carta de presentación del artículo en Healthcare mdpi

Dear Editor,

Please find enclosed our manuscript titled "Association between leisure screen time and energy-dense food intake in a nationwide representative sample of Spanish children (1-14 years): a cross-sectional study" to consider its publication in the Special Issue “Current Health Challenges for Child and Adolescent”, in which I have the pleasure to be Guest Editor.

We believe that in this specific moment, when screen time in children is increasing, even more now with the COVID-19 pandemic, the conclusions arising from this manuscript may add more evidence to guide the decision-making process to implement interventions and policies guided to limit screen time exposure and outcomes associated, such as junk food consumption.

All of the authors have read and approved the paper and I confirm it has not been published previously nor is it being considered by any other peer-reviewed journal.

Thank you for your attention,

Adrián González-Marrón
E-mail: agonzalezm@uic.es

Respuesta de la Editora asistente de Healthcare mdpi

Healthcare Editorial Office <healthcare@mdpi.com> 13 de enero de 2021, a les 11:08
Respon: shiny.wu@mdpi.com
Per a: Adrián González-Marrón <agonzalezm@uic.es>
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Dear Dr. González-Marrón,

Thank you for submitting the following manuscript to Healthcare:

Manuscript ID: healthcare-1067376
Type of manuscript: Article
Title: Association between leisure screen time and energy-dense food intake in a nationwide representative sample of Spanish children (1-14 years): a cross-sectional study
Authors: Àurea Cartanyà-Hueso, Adrián González-Marrón *, Cristina Lidón-Moyano, Esteve Garcia-Palomo, Juan Carlos Martín-Sánchez, Jose M Martínez-Sánchez
Received: 22 December 2020
E-mails: acartanya@uic.es, agonzalezm@uic.es, clidon@uic.es, estevegarcia@uic.es, jcmartin@uic.es, jmmartinez@uic.es
Submitted to section: School Health,
https://www.mdpi.com/journal/healthcare/sections/School_Health
Current Health Challenges for Child and Adolescent
https://www.mdpi.com/journal/healthcare/special_issues/current_health_challenges_for_child_and_adolescent

It has been reviewed by experts in the field and we request that you make major revisions before it is processed further. Please find your manuscript and the review reports at the following link:
https://susy.mdpi.com/user/manuscripts/resubmit/c0497658253fa3467d419e5324ef467d

Your co-authors can also view this link if they have an account in our submission system using the e-mail address in this message.

Please revise the manuscript according to the reviewers' comments and upload the revised file by 22 January.

Use the version of your manuscript found at the above link for your revisions, as the editorial office may have made formatting changes to your original submission. Any revisions should be clearly highlighted, for example using the "Track Changes" function in Microsoft Word, so that changes are easily visible to the editors and reviewers. Please provide a cover letter to explain point-by-point the details of the revisions in the manuscript and your responses to the reviewers' comments. Please include in your rebuttal if you found it impossible to address certain comments. The revised version will be inspected by the editors and reviewers. Please detail the revisions that have been made, citing the line number and exact change, so that the editor can check the changes expeditiously. Simple statements like 'done' or 'revised as requested' will not be accepted unless the change is simply a typographical error.

Since the reviews we collected contain substantial revision comments, we would like to inform you that this might be the last chance to revise your paper. Therefore, please take this opportunity to address the reviewers' comments point-by-point and explain the details of the revisions in your responses to their comments. The revised version will be inspected by the editors and reviewers again.

Please carefully read the guidelines outlined in the 'Instructions for Authors' on the journal website https://www.mdpi.com/journal/healthcare/instructions and ensure that your manuscript resubmission adheres to these guidelines. In particular, please ensure that abbreviations have been defined in parentheses the first time they appear in the abstract, main text, and in figure or table captions; citations within the text are in the correct format; references at the end of the text are in the correct format; figures and/or tables are placed at appropriate positions within the text and are of suitable quality; tables are prepared in MS Word table format, not as images; and permission has been obtained and there are no copyright issues.

If the reviewers have suggested that your manuscript should undergo extensive English editing, please have the English in the manuscript thoroughly checked and edited for language and form.

Do not hesitate to contact us if you have any questions regarding the revision of your manuscript or if you need more time. We look forward to hearing from you soon.

Kind regards,
Shiny Wu
Assistant Editor
Email: shiny.wu@mdpi.com

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Comentarios de los revisores de Healthcare mdpi

Reviewer I

English language and style
( ) Extensive editing of English language and style required
( ) Moderate English changes required
( ) English language and style are fine/minor spell check required
(x) I don't feel qualified to judge about the English language and style

	Yes	Can be improved	Must be improved	Not applicable
Does the introduction provide sufficient background and include all relevant references?	(x)	( )	( )	( )
Is the research design appropriate?	(x)	( )	( )	( )
Are the methods adequately described?	(x)	( )	( )	( )
Are the results clearly presented?	(x)	( )	( )	( )
Are the conclusions supported by the results?	(x)	( )	( )	( )

Comments and Suggestions for Authors

The authors present the results of a cross sectional study on the association between leisure screen time and unhealthy eating behaviors in a large and representative sample of Spanish children and adolescents aged 1-14 years considering all types of devices (e.g. TV, laptop, tablet, smartphone). Due to the progress of the digital transformation and a lack of studies examining the association between tablet/smartphone use and dietary patterns in youth, this study addresses an important up-to-date research question with high public health relevance. Altogether, I have some minor comments for the authors.

General comments: The manuscript is well written and easy to read and follow. Although the paper focuses on the association between screen time and dietary pattern, I want to ask the authors to discuss the role of physical activity in a little more detail.

Specific comments:

Page 3, line 91-92: How was physical activity defined, e.g. occasional exercise? How many minutes of physical activity each time? Which intensity? Did gym lessons in school also count?

Page 3, lines 105-106: Why was sweet intake not included in one of the combinations? I would like to ask the authors to report also on combinations including sweet intake.

Page 3-4, Results on association between daily leisure screen time and energy-dense food intake, and Tables: Table 1 should be Table 2 and vice versa according to the description in the text.

Page 4, Discussion, lines 153-158: I would like to ask the authors to briefly discuss also the association between physical exercise and screen time. In line 157-158 you say, that the association between physical activity and consumption of fast food and soft drinks might be mediated by screen exposure. It could also be the other way around: association between screen exposure and fast food and soft drink consumption may be mediated by physical activity.

Page 6, line 181: hightlight should be highlights

Submission Date: 22 December 2020
Date of this review: 26 Dec 2020 18:20:45

Reviewer II

English language and style
( ) Extensive editing of English language and style required
( ) Moderate English changes required
(x) English language and style are fine/minor spell check required
( ) I don't feel qualified to judge about the English language and style

	Yes	Can be improved	Must be improved	Not applicable
Does the introduction provide sufficient background and include all relevant references?	( )	(x)	( )	( )
Is the research design appropriate?	(x)	( )	( )	( )
Are the methods adequately described?	( )	(x)	( )	( )
Are the results clearly presented?	( )	(x)	( )	( )
Are the conclusions supported by the results?	( )	(x)	( )	( )

Comments and Suggestions for Authors

Thank you for the opportunity to review the manuscript, "Association between leisure screen time and energy-dense food intake in a nationwide representative sample of Spanish children (1-14 years): a cross sectional study." In this study, authors examined cross-sectional associations between screen time and intake frequency of energy-dense food in children. It appears that by including more updated screen time usage formats, this is a novel analysis of Spanish surveillance data in youth.

GENERAL COMMENTS

- In the introduction, I would recommend focusing on screen time in its own paragraph (combining with the recommendations in the following paragraph, which is currently a stand-alone sentence). First, discuss the outcome: energy dense foods and implications beyond just an obesity risk factor. Then, discuss the exposure: screen time. The authors could present a little more here about previous literature - in fact I think it is necessary to motivate an additional analysis of an association that has been reported in numerous articles before. There is sufficient information to provide more than one sentence for this paragraph. Highlight what is known and the limitations here. For example, in these two reviews, how many studies were included, and what were the study designs, what were the highlighted limitations of our understanding of these relation (e.g., highlight how screen time was measured)? Many recent papers have adopted more inclusive screen time questions - has no one examined this outcome with such measures yet or has it not been done in Spain? Why should it be done in Spain – are these associations expected to be different than in youth of similar countries? (To be clear, I think it can be justified, but the motivation for this analysis could be made a little stronger.)
- The presentation of results is currently very minimal. I think it would be helpful to have a general sample descriptive characteristics table that includes the breakdown of the exposure and outcome variables, included covariates, and any other interesting demographic variables. A little more

description of prevalence statistics may be helpful as well - did screen time and diet measures vary by the age groups?

- The discussion section could benefit from some additional consideration to why these two are associated. Although this study cannot assess causality, biological or behavioral pathways should be discussed.

SPECIFIC COMMENTS

Abstract

- Line 2: But this doesn't sufficiently motivate the purpose
- Lines 4-6: This sentence is incomplete. It would also be good to include variables of interest and their measurement method
- Line 9: were

Introduction

- Line 46: Agreed. The authors could expand on this argument a little more, justify it with citation(s) about media/screen usage statistics, and emphasize how previous reports have asked about television/computer use only. Is there evidence that given the increase/advances in technology, screen time accessibility and/or usage among youth has increased since previous reports?
- Line 46: I assume that academic-related screen time is excluded from this? Recommend explaining the term "leisure" at some point in intro for clarity.

Methods

- Line 54: Was it interview style or just completed by parent/caregiver in presence of research staff?
- Line 71: Was this question derived from another scale/survey? Does the Spanish Health Survey have any reliability/validity information for this measure?
- Line 73: In this sentence, only one question is presented.
- Line 81: Interesting - did any families actually indicate 0 minutes of screen time?
- Line 91: Did the questionnaire ask about physical activity (PA) or exercise? Given that exercise is a subtype/category of physical activity, asking about exercise frequency is not a measure of overall weekly PA. Recommend staying consistent with term as these two should not be used interchangeably, particularly with children.
- Line 93: Comma?
- Line 99: Variables?

Results

- Line 115: Following up to previous comment, should this be PA or exercise? If so, many actually said no exercise, so it seems as if the authors were measuring exercise, not PA.

Discussion

- Line 135: Suggest rewording this sentence for clarity
- Agreed - but here the discussion should be focused on screen time and diet, correct? This section could benefit from a more focused discussion on these.

- This section could also benefit from more comparison/reference to how it compares to other studies, in addition to the “Food, Physical Activity, Child development and Obesity” study
- Line 160: Recommend adding of the United Nations for clarity
- Lines 160-165: Agree, but this seems like a big jump from this cross-sectional study. What specific implications can be made from this analysis and what are the recommended next steps?
- Line 165: Is this a fair conclusion from current analysis? There appears to be adverse associations between screen time and diet, but is all leisure use harmful? Need to fully explore risks and benefits and do so longitudinally as well. Harmful seems like a strong term for a cross-sectional analysis (without additional factors considered, mediation analysis, etc.)
- Line 173: "Additionally"?
- Line 175: This could warrant some further discussion above
- Line 177: And potentially risk of response bias
- Line 182: "to continue" rather than "of continuing"
- Line 183: Is it not already considered a health determinant

Submission Date: 22 December 2020
Date of this review: 09 Jan 2021 20:08:06

Reviewer III

English language and style
( ) Extensive editing of English language and style required
( ) Moderate English changes required
( ) English language and style are fine/minor spell check required
(x) I don't feel qualified to judge about the English language and style

	Yes	Can be improved	Must be improved	Not applicable
Does the introduction provide sufficient background and include all relevant references?	( )	(x)	( )	( )
Is the research design appropriate?	( )	( )	(x)	( )
Are the methods adequately described?	( )	( )	(x)	( )
Are the results clearly presented?	( )	(x)	( )	( )
Are the conclusions supported by the results?	( )	(x)	( )	( )

Comments and Suggestions for Authors

In this paper the authors analyse the relationship between the time spent using electronic devices, as passive leisure, and the intake of unhealthy food groups, in a representative sample of Spanish children.

-The use of the term dietary patterns is not correct as only a few food groups are examined and not the pattern the child carries. If it were possible to add information to define the overall diet in this child sample, work would gain interest.
-The number of subjects in the abstract should be that of the final sample analysed and not the potential sample initially recruited.

-Throughout the text there are many typographical errors and in the placement of references (pasted/removed from the text). It is also recommended to add the reference assigned by the ethics committee for the study.
-The methodology used for the quantification of the intake of the different food groups is very weak. In order to be able to relate screen exposure time to intake it would be desirable to have more quantitative intake data.
-More methodological information could be provided on the area where the children have been recruited, the questionnaire used. All the work is oriented to the prevention of obesity which makes some data such as the measured or reported BMI missing.
-When measuring screen time, has the use of mobile devices been considered as an educational tool at school? When looking for factors related to an unhealthy lifestyle it is possible that time spent at school on mobile devices is associated with factors other than screen time.

Submission Date: 22 December 2020
Date of this review: 06 Jan 2021 15:06:34

Respuesta a los comentarios de los revisores de Healthcare mdpi

RESPONSE TO REVIEWER 1: MANUSCRIPT ID healthcare-1067376

We would like to thank the reviewer for their comments, which has improved the manuscript throughout.

We provide below a point-by-point response:

General comments: The manuscript is well written and easy to read and follow. Although the paper focuses on the association between screen time and dietary pattern, I want to ask the authors to discuss the role of physical activity in a little more detail.

We would like to thank the reviewer for their kind comments.
Please see the response below addressing the association between screen time and physical activity.

Specific comments:

Page 3, line 91-92: How was physical activity defined, e.g. occasional exercise? How many minutes of physical activity each time? Which intensity? Did gym lessons in school also count?

Thank you for your comment. We have retrieved data on physical activity from question number 61 in the 2017 Spanish National Health Survey, which says "Which of the following options describe best the frequency with which (name of the child) does physical activity in their leisure time?" with the options:

1. They do not do exercise. They spend almost all their leisure time in a sedentary way (reading, watching TV, going to the cinema, etc.).
2. They do any physical or sports activity occasionally (walking or going cycling, light gymnastics, leisure activities requiring light efforts, etc.).
3. They do physical activity several times per month (sports, gymnastics, running, swimming, cycling, team sports, etc.).
4. They do sports or physical training several times per week.
5. Does not know.
6. Does not answer.

We have clarified in the text that only physical activity done during the leisure time is taken into account. Unfortunately, specific quantitative information (i.e. minutes or hours) is not provided on the time spent during physical activity. Regarding the inclusion of the categories in the manuscript, we have decided not to include them since we have not modified the categories found in the Spanish National Health Survey, which can be found in reference 31.

Page 3, lines 105-106: Why was sweet intake not included in one of the combinations? I would like to ask the authors to report also on combinations including sweet intake.

Thank you for your question. We decided not to include sweet intake into the composite variables since we considered only those combinations which are more common (e.g. combining a soft drink with fast food or snacks). Besides, we performed a correspondence analysis and found that sweet intake was in a different dimension than the variables used in the composite.

Page 3-4, Results on association between daily leisure screen time and energy-dense food intake, and Tables: Table 1 should be Table 2 and vice versa according to the description in the text.

Amended.

Page 4, Discussion, lines 153-158: I would like to ask the authors to briefly discuss also the association between physical exercise and screen time. In line 157-158 you say, that the association between physical activity and consumption of fast food and soft drinks might be mediated by screen exposure. It could also be the other way around: association between screen exposure and fast food and soft drink consumption may be mediated by physical activity.

Thank you for your recommendations and for your interesting approach. We have modified this excerpt in the text as follows:

In this first part, we comment the results found in our study assessing the effect of physical activity as potential confounder.

> "In this sense, and although it is not the main aim of the study, we have also found that children exercising several times per week have lower adjusted prevalence of soft drink (aPR: 0.63, 95% CI: 0.52,0.77) and fast food intake (aPR: 0.64, 95% CI: 0.47,0.88) than children who do not do exercise."

Below, we comment on the possible effect of physical activity as a mediator in the main association analyzed in the manuscript:

> "Physical activity has been proposed to be a stress-induced eating repressor, which may eventually limit junk food consumption (47). Also, greater screen time exposure has been found to be associated with lower levels of physical activity in Spanish children (48), meaning that physical activity could mediate in the association between screen-time exposure and fast food-consumption."

Since the direction of causation is not clear, we also comment on the possible effect of screen time as a mediator:

> "The effect of increased levels of physical activity on the reduction of fast food consumption could also be explained by the displacement of screen time exposure, which results in a reduced junk food consumption (main association explored in this paper). In this case, screen time exposure could act as a mediator in the association between physical activity and junk food consumption."

Page 6, line 181: hightlight should be highlights

Amended.

RESPONSE TO REVIEWER 2: MANUSCRIPT ID healthcare-1067376

We would like to thank the reviewer for their comments, which has improved the manuscript throughout.

We provide below a point-by-point response:

GENERAL COMMENTS

- **In the introduction, I would recommend focusing on screen time in its own paragraph (combining with the recommendations in the following paragraph, which is currently a stand-alone sentence).**

Thank you for this recommendation. We agree. We have restructured the Introduction section as the reviewer suggests.

First, discuss the outcome: energy dense foods and implications beyond just an obesity risk factor.

Thank you for this comment. An excerpt has been added to broaden the implications of junk food consumption, as follows:

> "Although childhood overweight and obesity are currently a pandemic, consequences of junk food consumption go beyond. Junk food consumption at an early age has been associated with other physical conditions, such as metabolic syndrome (16), and also with behavioural problems, including hyperactivity (17), psychiatric distress or violence (18)."

Then, discuss the exposure: screen time. The authors could present a little more here about previous literature – in fact I think it is necessary to motivate an additional analysis of an association that has been reported in numerous articles before. There is sufficient information to provide more than one sentence for this paragraph. Highlight what is known and the limitations here. For example, in these two reviews, how many

studies were included, and what were the study designs, what were the highlighted limitations of our understanding of these relation (e.g., highlight how screen time was measured)?

Thank you for your comment on screen time. Firstly, following your recommendation above, we have created a single paragraph:

> "Different systematic reviews (19,20) show a positive relationship between screen time, based on TV viewing, and unhealthier dietary patterns. Further, there is increasing evidence that screen time is related to a great variety of physiological and psychological issues (21). A recent systematic review of reviews on the association between screen time and health outcomes in children and adolescents concluded that there is strong evidence on the association between screen time and adiposity, unhealthy diet, depressive symptoms, and quality of life, while evidence for other outcomes (e.g. cardiovascular risk, fitness) is weak (21). Data on other forms of screen time different from television (e.g. computer, video, mobile phones) were very sparse in this systematic review, reflecting the lack of evidence on the effects that new screen time patterns have on children's health. Currently there is, however, a constant increase in screen time exposure in children, which has prompted a number of worldwide and national health institutions to provide guidelines following the same definition of proper daily screen time: to avoid screen exposure for children under 2 years, to limit screen time to 1 hour for children between 2 and 4 years and to limit leisure screen time (i.e. screen time spent on non-educational issues) up to 2 hours for children and adolescents between 5 and 17 years (22-24)."

Many recent papers have adopted more inclusive screen time questions - has no one examined this outcome with such measures yet or has it not been done in Spain? Why should it be done in Spain – are these associations expected to be different than in youth of similar countries? (To be clear, I think it can be justified, but the motivation for this analysis could be made a little stronger.)

Thank you for this commentary. As far as we know, the association between screen time and junk food consumption in children has been explored so far at the national level in Spain in the ALADINO study only (years 2011 and 2013). In the ALADINO study, the screen time variable took into account the exposure to TV, computers or video games only (leaving out tablets and smartphones, for instance).

Information on screen time during leisure time in the Spanish National Health Survey is collected through the question included in our manuscript. As the reviewer points out, more refined questions have been used to assess screen time in Spanish adolescents. For example, Mielgo-Ayuso et al. (2017) used the sedentary behavior questionnaire used in the HELENA study, which uses narrower categories of screen time and different screen exposures (e.g. surfing the Internet for non-study reasons, surfing the Internet due to study-reasons), to describe screen time on the youngest participants in the ANIBES study, but did not explore the association with any outcome. Other studies exploring food patterns (not junk food, exclusively) with more refined questions on screen time have been carried out at the regional level only (Tapia Serrano et al., 2020).

In summary, we have modified the last paragraph in the Introduction to justify the study in the Spanish context as follows:

> "As mentioned above, the great amount of evidence regarding the association between health outcomes and lifestyle choices, including dietary patterns, and leisure screen time in children is not representative of the current screen time usage. In Spain concretely, this limitation is also found in the ALADINO study (25), the largest study carried out, as far as we know, at the national level assessing the association between screen time and food and drink consumption, which took into account the exposure to TV, computers and video games only, leaving out tablets and smartphones, since this study was carried out in 2011. For the last five years, however, the prevalence of owning a mobile phone in Spain in children aged from 10 to 15 is higher than 65 % (26-30)."

We believe that it is important to assess this association in Spain because, as we mention at the beginning of the Introduction, Spain presents one of the highest prevalence of childhood obesity/overweight among European countries (around 30% in 2017) and we think it is of interest to update results obtained in the ALADINO study. For this reason, we have added the previous explanation in the Introduction section before the aim of the study.

- **The presentation of results is currently very minimal. I think it would be helpful to have a general sample descriptive characteristics table that includes the breakdown of the exposure and outcome variables, included covariates, and any other interesting demographic variables. A little more description of prevalence statistics may be helpful as well - did screen time and diet measures vary by the age groups?**

  Thank you very much for your comment. As the reviewer suggested, we have included a descriptive table of the sample (please see tables section in the new version of the manuscript). In addition, we have included an excerpt on bivariate descriptive between age groups and exposure and outcome variables, as follows:

> " An estimated 29.0% of children between 12-14 years have at least 180 minutes of leisure screen time daily. Percentages decrease to 14.3%, 9.1% and 4.9% for children between 6-11, 3-5 and 1-2 years, respectively. The highest percentage of high frequency of sweet intake, the group of junk food with a highest prevalence of consumption, corresponds to children between 3-5 years, with an estimated 78.1% "

Also, we include in this response a descriptive bivariate table between outcomes / exposure and age of the child (please see the table below).

- **The discussion section could benefit from some additional consideration to why these two are associated. Although this study cannot assess causality, biological or behavioral pathways should be discussed.**

  Thank you for this comment. We have added an excerpt on limitations, just after mentioning the impossibility of assessing causality, and now it reads:

  > "Additionally, due to the cross-sectional design of the survey, a causal effect of leisure screen time on the frequency of junk food consumption cannot be established and reverse causality should not be discarded. However, we hypothesize that screen time may be associated with junk food consumption in our study through different pathways. Firstly, evidence shows that children belonging to low-income families are more likely to spend longer periods using screens and follow worse dietary patterns (10) since parents have longer working hours, less time to look after their children, and are less informed on the harmful effects of low-quality diets. In this sense, parents having longer working hours may offer their children more readily available options requiring less of their time, such as mobile devices to entertain them and junk food to feed them. Also, children may be more exposed to junk food advertisements while on screen time, triggering its consumption. Finally, screen time may be associated with increased levels of stress, which may turn into stress-induced eating and subsequent junk food consumption."

SPECIFIC COMMENTS

Abstract

- **Line 2: But this doesn't sufficiently motivate the purpose**

  Thank you for this comment. We have changed this sentence and now it reads as follows:

  > "Evidence on the association between new patterns of leisure screen time and junk food consumption in Spanish children at the national level is scarce."

- **Lines 4-6: This sentence is incomplete. It would also be good to include variables of interest and their measurement method**

  We agree that information on the variables of interest should be added. We have added a sentence which now reads as follows:

  > "We dichotomized sweet, soft drink, fast food, and snack intake (high/low) and categorized daily leisure screen time (0-59, 60-119, 120-179, and ≥180)."

  We have not included the measurement methods since we lack of space in the Abstract. If the Editors deem it appropriate, we could expand this explanation.

- **Line 9: were**

Amended

Introduction

- **Line 46: Agreed. The authors could expand on this argument a little more, justify it with citation(s) about media/screen usage statistics, and emphasize how previous reports have asked about television/computer use only. Is there evidence that given the increase/advances in technology, screen time accessibility and/or usage among youth has increased since previous reports?**

  Thank you for this comment. As mentioned above, we have added information on the gap of evidence in the Spanish context as follows.

  > "As mentioned above, the great amount of evidence regarding the association between health outcomes and lifestyle choices, including dietary patterns, and leisure screen time in children is not representative of the current screen time usage. In Spain concretely, this limitation is also found in the ALADINO study (25), the largest study carried out, as far as we know, at the national level assessing the association between screen time and food and drink consumption, which took into account the exposure to TV, computers and video games only, leaving out tablets and smartphones, since this study was carried out in 2011. For the last five years, however, the prevalence of owning a mobile phone in Spain in children aged from 10 to 15 is higher than 65 % (26-30)."

- **Line 46: I assume that academic-related screen time is excluded from this? Recommend explaining the term "leisure" at some point in intro for clarity.**

  Thank you for comment and recommendation.

  Firstly, we are focused on non-educational screen time. We have added "leisure" where necessary throughout the text to make this situation clear.

  Besides, we have added the definition of leisure screen time at first appearance in the Introduction, as follows:

  > "...to limit screen time to 1 hour for children between 2 and 4 years and to limit leisure screen time (i.e. screen time spent on non-educational issues) up to 2 hours for children..."

Methods

- **Line 54: Was it interview style or just completed by parent/caregiver in presence of research staff?**

  This is a computer-assisted personal interview. We have added this information to the excerpt, reading as follows:

  > "All the information was obtained through a computer-assisted personal interviewing answered by any of the parents..."

- **Line 71: Was this question derived from another scale/survey? Does the Spanish Health Survey have any reliability/validity information for this measure?**

This information is not available in the methodology of the survey. Food consumption in the Spanish National Health Survey is asked through a food frequency questionnaire taking into account different groups of foods, including sweets, soft drinks, fast food and snacks. Further, this questionnaire is focused on fruit consumption. To the best of our knowledge, the Spanish National Health Survey does not have any reliability/validity information for this measure.

- **Line 73: In this sentence, only one question is presented.**

  We really appreciate the time you took for revising the manuscript so in depth. This is absolutely true. The same wording is used for both from Monday to Friday (question number 62) and at the weekend (question number 63). We have modified this excerpt, and now it reads:

  > "The questionnaire collected the leisure screen time through the question: "Approximately, during the leisure time of the child in a day, how much time does the child spend in front of the screen, including laptop, tablet, TV, videos, videogames, or smartphones?", differentiating between two periods of time: from Monday to Friday and from Saturday to Sunday (an independent question for each of the two periods). Respondents answered among three possible responses (never or almost never, less than 1 hour, and at least 1 hour). Then, those respondents that answered at least 1 hour in any period of time, also reported the daily number of hours of leisure screen time, ranging from 1 hour to 12 hours, in the corresponding period of time."

- **Line 81: Interesting - did any families actually indicate 0 minutes of screen time?**

  We are really thankful for your comment.

  We do not have access to this information. Due to the nature of the categories referring to daily leisure screen time, we cannot discard that there are children that are not exposed to screens daily. We cannot distinguish them because the category of exposure is "never or almost never".

  In this sense, in limitations, we have included that we may be having an information bias, as follows:

  > "Finally, inaccurate estimates of junk food consumption and daily leisure screen time may have been reported, leading to information bias. This may be more relevant for older children due to their more independent lives (i.e. respondents could be unaware of certain intakes) and associated with a response bias from parents and could be reduced in future investigations with the use of dietary records and real-time monitoring."

- **Line 91: Did the questionnaire ask about physical activity (PA) or exercise? Given that exercise is a subtype/category of physical activity, asking about exercise frequency is not a measure of overall weekly PA. Recommend staying consistent with term as these two should not be used interchangeably, particularly with children.**

Thank you again for your insight. Question number 61 in the questionnaire says "Which of the following options describe best the frequency with which (name of the child) does any physical activity in their leisure time?" with the options:

7. They do not do exercise. They spend almost all their leisure time in a sedentary way (reading, watching TV, going to the cinema, etc.).
8. They do any physical or sports activity occasionally (walking or going cycling, light gymnastics, leisure activities requiring light efforts, etc.).
9. They do physical activity several times per month (sports, gymnastics, running, swimming, cycling, team sports, etc.).
10. They do sports or physical training several times per week.
11. Does not know.
12. Does not answer.

To better describe these options, we have spelled them out almost in full in the manuscript, as follows:

> "7) physical activity in their leisure time (no exercise, physical or sports activity occasionally, physical activity several times a month, sports or physical training several times a week)"

- **Line 93: Comma?**

  Amended
- **Line 99: Variables?**

  Amended

Results

- **Line 115: Following up to previous comment, should this be PA or exercise? If so, many actually said no exercise, so it seems as if the authors were measuring exercise, not PA.**

  Please see the response above.

Discussion

- **Line 135: Suggest rewording this sentence for clarity**

  Thank you. We have modified this sentence and now it reads as follows:

  > "Further, the prevalence of high frequency of junk food consumption significantly increased for every hour of daily leisure screen time after the first hour of exposure."
- **Agreed - but here the discussion should be focused on screen time and diet, correct? This section could benefit from a more focused discussion on these.**

We have extended the discussion section focused on this association and the observations of the ALADINO study.

- **This section could also benefit from more comparison/reference to how it compares to other studies, in addition to the "Food, Physical Activity, Child development and Obesity" study**

  Thank you for your comment. We have added an excerpt including three more references in which the association between screen exposure and diet were assessed in Spanish children, as follows:

  > "Other studies in which the association between Mediterranean Diet and screen exposure were assessed in Spanish children (41-43), longer periods of screen time were associated with a lower adherence to the Mediterranean Diet. This is consistent with our results, since it is characterized by a low intake of junk food."

- **Line 160: Recommend adding of the United Nations for clarity**

  Amended.

- **Lines 160-165: Agree, but this seems like a big jump from this cross-sectional study. What specific implications can be made from this analysis and what are the recommended next steps?**

  Thank you very much for your comments. We agree with you. Thus, we have modified the paragraph and now it reads as follows:

  > "One of the seventeen United Nations Sustainable Development Goals consists in ensuring good health and promoting well-being, with a special focus on children (46). In this sense, further prospective studies should be carried out to confirm our results in order for governments to consider implementing comprehensive policies directed not only to reduce leisure screen time…"

- **Line 165: Is this a fair conclusion from current analysis? There appears to be adverse associations between screen time and diet, but is all leisure use harmful? Need to fully explore risks and benefits and do so longitudinally as well. Harmful seems like a strong term for a cross-sectional analysis (without additional factors considered, mediation analysis, etc.)**

  Thank you for your insight. We have added the word "potential" before harmful to be more conservative on the implications of our analysis.

- **Line 173: "Additionally"?**

  Agree. We have amended this adverb.

- **Line 175: This could warrant some further discussion above**

  Thank you for your comment. We have broadened discussion on this issue above, in the paragraph reading as follows:

  > "In this sense, and although it is not the main aim of the study, we have also found that children exercising several times per week have lower adjusted prevalence of soft drink (aPR: 0.63, 95% CI: 0.52,0.77) and fast-food intake (aPR: 0.64, 95% CI: 0.47,0.88) than children who do not do exercise. Physical activity has been

proposed to be a stress-induced eating repressor, which may eventually limit junk food consumption (PMC5852752). The effect of increased levels of physical activity on the reduction of fast-food consumption could also be explained by the displacement of screen time exposure, which results in a reduced junk food consumption (main association explored in this paper). In this case, screen time exposure could act as a mediator in the association between physical activity and junk food consumption. Also, greater screen time exposure has been found to be associated with lower levels of physical activity in Spanish children (PMC3164727), meaning that physical activity could mediate in the association between screen-time exposure and fast food-consumption."

- **Line 177: And potentially risk of response bias**

  We agree. We have added this idea and now it reads:

  > "Finally, inaccurate estimates of junk food consumption and daily leisure screen time may have been reported, leading to information bias. This may be more relevant for older children due to their more independent lives (i.e. respondents could be unaware of certain intakes) or associated with a response bias from parents and could be reduced in future investigations with the use of dietary records and real-time monitoring."

- **Line 182: "to continue" rather than "of continuing"**

  Amended

- **Line 183: Is it not already considered a health determinan**

  This is true. We wanted to emphasize that health institutions, specifically in Spain, should be more aware of the negative consequences of screen exposure. We have modified the sentence to adapt this idea and now it reads:

  > "...the negative effects of excessive screen time in paediatrics population for Spanish health institutions to consider promoting interventions to control its use."

Table: Descriptive, n (%), between Daily leisure screen time/sweet, soft drink, fast food, snack intake and age of the child in years

	Age of the child (years)			
	1-2	3-5	6-11	12-14
Daily leisure screen time (min)				
0-59	430 (59.0)	344 (33.1)	609 (25.9)	222 (16.3)
60-119	162 (22.2)	320 (30.8)	692 (29.5)	270 (19.8)
120-179	101 (13.9)	280 (27.0)	713 (30.4)	476 (34.9)
>=180	36 (4.9)	94 (9.1)	335 (14.3)	396 (29.0)
Sweet intake				
Low	265 (36.4)	227 (21.9)	550 (23.4)	330 (24.2)
High	464 (63.6)	810 (78.1)	1798 (76.6)	1034 (75.8)
Soft drink intake				
Low	710 (97.8)	931 (89.9)	2041 (87.1)	1077 (79.1)
High	16 (2.2)	105 (10.1)	302 (12.9)	285 (20.9)
Fast food intake				
Low	707 (97.2)	948 (91.4)	2106 (89.8)	1197 (87.8)
High	20 (2.8)	89 (8.6)	240 (10.2)	166 (12.2)
Snack intake				
Low	647 (89.0)	917 (88.3)	2093 (89.3)	1212 (88.9)
High	80 (11.0)	121 (11.7)	252 (10.7)	151 (11.1)

RESPONSE TO REVIEWER 3: **MANUSCRIPT ID healthcare-1067376**

We would like to thank the author for their comments, which has improved the manuscript throughout.

In this paper the authors analyses the relationship between the time spent using electronic devices, as passive leisure, and the intake of unhealthy food groups, in a representative sample of Spanish children.

-The use of the term dietary patterns is not correct as only a few food groups are examined and not the pattern the child carries. If it were possible to add information to define the overall diet in this child sample, work would gain interest.

Thank you for your comment. We have modified the wording "dietary patterns" throughout the manuscript to "junk food".

Also, we have added further bivariate descriptive results on daily leisure screen time, sweet, soft drink, fast food, snack intake versus age of the child in groups, as follows:

> " An estimated 29.0% of children between 12-14 years have at least 180 minutes of leisure screen time daily. Percentages decrease to 14.3%, 9.1% and 4.9% for children between 6-11, 3-5 and 1-2 years, respectively. The highest percentage of high frequency of sweet intake, the group of junk food with a highest prevalence of consumption, corresponds to children between 3-5 years, with an estimated 78.1% "

-The number of subjects in the abstract should be that of the final sample analysed and not the potential sample initially recruited.

We agree with the reviewer. We have amended this figure.

-Throughout the text there are many typographical errors and in the placement of references (pasted/removed from the text). It is also recommended to add the reference assigned by the ethics committee for the study.

Thank you. We have carefully revised the manuscript and we have improved the style throughout it.

Also, since this is a secondary analysis to existing data in the Spanish National Health Survey, no ethics committee was required. Besides, this manuscript is part of a PhD thesis approved by an Ethics Committee.

-The methodology used for the quantification of the intake of the different food groups is very weak. In order to be able to relate screen exposure time to intake it would be desirable to have more quantitative intake data.

Thank you for your comment. We absolutely agree with you. However, data available come from the Spanish National Health Survey, in which intakes were collected as described in the manuscript. This limitation has been incorporated in the manuscript, as follows:

> "Finally, inaccurate estimates of junk food consumption and daily leisure screen time may have been reported, leading to information bias. This may be more relevant for older children due to their more independent lives (i.e. respondents could be unaware of certain intakes) and associated with a response bias from parents and could be reduced in future investigations with the use of dietary records and real-time monitoring."

-More methodological information could be provided on the area where the children have been recruited, the questionnaire used.

Thank you for your comment. We agree with you. For this reason, reference number 25 broadens all the methodological aspects of the Spanish National Health Survey, including sampling. In this sense, we have not included all this information in this manuscript to avoid duplicate already available information. However, if the Editor deems it necessary, we can expand on the Methodology.

All the work is oriented to the prevention of obesity which makes some data such as the measured or reported BMI missing.

We are really thankful for your comment. We have included the zscore of Body Mass Index for age (BMI-for-age) according to the growth standards of the World Health Organization in the descriptive table (please see the tables section in the new version of the manuscript). Regarding the associations between junk food behavior and daily leisure screen time, we have decided not to include it as potential confounder. Its inclusion does not relevantly modify the results. However, if the Editor deems it necessary, we can add this variable to the models.

-When measuring screen time, has the use of mobile devices been considered as an educational tool at school? When looking for factors related to an unhealthy lifestyle it is possible that time spent at school on mobile devices is associated with factors other than screen time.

Thank you for your pertinent question. The Spanish National Health survey includes questions on leisure screen time only and not for academic purposes. To emphasize this, we have added a definition on leisure screen time in the Introduction as follows:

> "...to limit screen time to 1 hour for children between 2 and 4 years and to limit leisure screen time (i.e. screen time spent on non-educational issues) up to 2 hours for children..."

Segunda respuesta de la Editora asistente de Healthcare mdpi

Healthcare Editorial Office <healthcare@mdpi.com> 3 de febrero de 2021, a les 7:32
Respon: shiny.wu@mdpi.com
Per a: Adrián González-Marrón <agonzalezm@uic.es>
Cc: Àurea Cartanyà-Hueso <acartanya@uic.es>, Cristina Lidón-Moyano <clidon@uic.es>, Esteve Garcia-Palomo <estevegarcia@uic.es>, Juan Carlos Martín-Sánchez <jcmartin@uic.es>, Jose M Martínez-Sánchez <jmmartinez@uic.es>, Healthcare Editorial Office <healthcare@mdpi.com>

Dear Dr. González-Marrón,

Thank you for submitting your manuscript:

Manuscript ID: healthcare-1067376
Type of manuscript: Article
Title: Association between leisure screen time and energy-dense food intake in a nationwide representative sample of Spanish children (1-14 years): a cross-sectional study
Authors: Àurea Cartanyà-Hueso, Adrián González-Marrón *, Cristina Lidón-Moyano, Esteve Garcia-Palomo, Juan Carlos Martín-Sánchez, Jose M Martínez-Sánchez
Received: 22 December 2020
E-mails: acartanya@uic.es, agonzalezm@uic.es, clidon@uic.es, estevegarcia@uic.es, jcmartin@uic.es, jmmartinez@uic.es
Submitted to section: School Health,
https://www.mdpi.com/journal/healthcare/sections/School_Health
Current Health Challenges for Child and Adolescent
https://www.mdpi.com/journal/healthcare/special_issues/current_health_challenges_for_child_and_adolescent

It has been reviewed by experts in the field and we request that you make minor revisions before it is processed further. Please find your manuscript and the review reports at the following link:
https://susy.mdpi.com/user/manuscripts/resubmit/c0497658253fa3467d419e5324ef467d

Your co-authors can also view this link if they have an account in our submission system using the e-mail address in this message.

Please revise the manuscript according to the reviewers' comments and upload the revised file by 5 February.

Use the version of your manuscript found at the above link for your revisions, as the editorial office may have made formatting changes to your original submission. Any revisions should be clearly highlighted, for example using the "Track Changes" function in Microsoft Word, so that they are easily visible to the editors and reviewers. Please provide a short cover letter detailing any changes, for the benefit of the editors and reviewers. Please detail the revisions that have been made, citing the line number and exact change, so that the editor can check the changes expeditiously. Simple statements like 'done' or 'revised as requested' will not be accepted unless the change is simply a typographical error.

If the reviewers have suggested that your manuscript should undergo extensive English editing, please have the English in the manuscript thoroughly checked and edited for language and form.

Do not hesitate to contact us if you have any questions regarding the revision of your manuscript or if you need more time. We look forward to hearing from you soon.

Kind regards,
Shiny Wu
Assistant Editor
Email: shiny.wu@mdpi.com

--
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Comentarios del Segundo revisor de Healthcare mdpi

English language and style
( ) Extensive editing of English language and style required
( ) Moderate English changes required
(x) English language and style are fine/minor spell check required
( ) I don't feel qualified to judge about the English language and style

	Yes	Can be improved	Must be improved	Not applicable
Does the introduction provide sufficient background and include all relevant references?	(x)	( )	( )	( )
Is the research design appropriate?	(x)	( )	( )	( )
Are the methods adequately described?	(x)	( )	( )	( )
Are the results clearly presented?	(x)	( )	( )	( )
Are the conclusions supported by the results?	(x)	( )	( )	( )

Comments and Suggestions for Authors

Thank you for the opportunity to review this revision. I appreciate the receptiveness of the authors and the revisions that were made to this manuscript. I think the additions that they made greatly strengthened the study's motivation and presentation of results.

I only have a few minor suggested edits/comments:

1. The in-text citations are not appearing (at least in my copy).
2. Line 79: Add "was" before "not"
3. Line 133: suggest "was" in place of "is"

Submission Date: 22 December 2020
Date of this review: 26 Jan 2021 16:50:14

Respuesta a los comentarios del revisor 2 de Healthcare mdpi

RESPONSE TO REVIEWER 2: MANUSCRIPT ID healthcare-1067376

Thank you for the opportunity to review this revision. I appreciate the receptiveness of the authors and the revisions that were made to this manuscript. I think the additions that they made greatly strengthened the study's motivation and presentation of results.

Thank you very much for your second review and the positive comments on our revision.

I only have a few minor suggested edits/comments:

1. The in-text citations are not appearing (at least in my copy).

It seems there is a problem with the format. In our PDF we can see the references and the in-text citations.

2. Line 79: Add "was" before "not"

Since we have broadened the Research Ethics this modification has not been applied.

3. Line 133: suggest "was" in place of "is"

Amended. Besides, we have modified other necessary tenses throughout that excerpt.

Carta de aceptación del artículo en Healthcare mdpi

Healthcare Editorial Office <healthcare@mdpi.com> 11 de febrero de 2021, a les 2:08
Respon: Healthcare Editorial Office <healthcare@mdpi.com>
Per a: Adrián González-Marrón <agonzalezm@uic.es>
Cc: Àurea Cartanyà-Hueso <acartanya@uic.es>, Cristina Lidón-Moyano <clidon@uic.es>, Esteve Garcia-Palomo <estevegarcia@uic.es>, Juan Carlos Martín-Sánchez <jcmartin@uic.es>, Jose M Martínez-Sánchez <jmmartinez@uic.es>, Healthcare Editorial Office <healthcare@mdpi.com>

Dear Dr. González-Marrón,

We are pleased to inform you that the following paper has been officially accepted for publication:

Manuscript ID: healthcare-1067376
Type of manuscript: Article
Title: Association between leisure screen time and energy-dense food intake in a nationwide representative sample of Spanish children (1-14 years): a cross-sectional study
Authors: Àurea Cartanyà-Hueso, Adrián González-Marrón *, Cristina Lidón-Moyano, Esteve Garcia-Palomo, Juan Carlos Martín-Sánchez, Jose M Martínez-Sánchez
Received: 22 December 2020
E-mails: acartanya@uic.es, agonzalezm@uic.es, clidon@uic.es, estevegarcia@uic.es, jcmartin@uic.es, jmmartinez@uic.es
Submitted to section: School Health,
https://www.mdpi.com/journal/healthcare/sections/School_Health
Current Health Challenges for Child and Adolescent
https://www.mdpi.com/journal/healthcare/special_issues/current_health_challenges_for_child_and_adolescent
https://susy.mdpi.com/user/manuscripts/review_info/c0497658253fa3467d419e5324ef467d

We will now make the final preparations for publication, then return the manuscript to you for your approval.

If, however, extensive English edits are required to your manuscript, we will need to return the paper requesting improvements throughout.

We encourage you to set up your profile at SciProfiles.com, MDPI’s researcher network platform. Articles you publish with MDPI will be linked to your SciProfiles page, where colleagues and peers will be able to see all of your publications, citations, as well as your other academic contributions.

We also invite you to contribute to Encyclopedia (https://encyclopedia.pub), a scholarly platform providing accurate information about the latest research results. You can adapt parts of your paper to provide valuable reference information for others in the field.

Kind regards,
Ms. Bella Chang
E-Mail: bella.chang@mdpi.com
--
MDPI Tianjin Office 170 North Road, Room 1804, Block A, Lujiazui Financial Plaza, Hongqiao District, China
MDPI Healthcare Editorial Office

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E-Mail: healthcare@mdpi.com
http://www.mdpi.com/journal/healthcare

Anexo D

Correspondencia con los editores y revisores del artículo V

Carta de presentación a Healthcare mdpi

Barcelona, December 15th, 2020.

Dear Editor-in-chief,

Please find enclosed our manuscript “SMARTPHONE AND TABLET USAGE DURING COVID-19 PANDEMIC CONFINEMENT IN CHILDREN UNDER 48 MONTHS IN BARCELONA (SPAIN)” for your consideration in Healthcare MDPI. Our study focuses on the smartphone and tablet usage in children during COVID-19 lockdown in Spain, which is one of the most affected countries, then our study focuses in a sample of young children this work would be a good fit for this journal.

This is one of the manuscripts that Dr. González-Marrón and Dr. Lidón-Moyano purposed to fulfill the quota of free publications.

To carry out the study, approval from the Ethics Committee of the Hospital Universitari General de Catalunya (HUGC) and the Ethics Committee of Research (CER) of the Universitat Internacional de Catalunya (UIC-Barcelona) was obtained. Further, to gain access to completing the survey, participants filled in the informed consent online. In the informed consent document, the voluntariness, confidentiality, and anonymization of personal data were specified.

All the authors carefully read the manuscript and fully approve of it. In their name I also declare that the manuscript is original and it is not submitted anywhere other than your journal. The authors declare there are no conflicts of interest.

We would of course be ready to provide further information about our data and methods you desire.

Thank you very much for your kind attention.

Yours faithfully,

Jose M Martínez-Sánchez, PhD, MPH, BSc

E-mail: jmmartinez@uic.es

Respuesta de la Editora assistente de Helalthcare mdpi

Healthcare Editorial Office <healthcare@mdpi.com> 3 de enero de 2021, a las 6:56
Respon: cherry.pei@mdpi.com
Per a: "Jose M. Martínez-Sánchez" <jmmartinez@uic.es>
Cc: Àurea Cartanyà-Hueso <acartanya@uic.es>, Cristina Lidón-Moyano <clidon@uic.es>, Pia Cassanello <mariapiacassanello@gmail.com>, Ana Díez-Izquierdo <adiez@uic.es>, Juan Carlos Martín-Sánchez <jcmartin@uic.es>, Albert Balaguer <abalaguer@uic.es>, Healthcare Editorial Office <healthcare@mdpi.com>

Dear Dr. Martínez-Sánchez,

Thank you for submitting the following manuscript to Healthcare:

Manuscript ID: healthcare-1057940
Type of manuscript: Article
Title: Smartphone and tablet usage during COVID-19 pandemic confinement in children under 48 months in Barcelona (Spain)
Authors: Àurea Cartanyà-Hueso, Cristina Lidón-Moyano, Pia Cassanello, Ana Díez-Izquierdo, Juan Carlos Martín-Sánchez, Albert Balaguer, Jose M Martínez-Sánchez *
Received: 15 December 2020
E-mails: acartanya@uic.es, clidon@uic.es, mariapiacassanello@gmail.com, adiez@uic.es, jcmartin@uic.es, abalaguer@uic.es, jmmartinez@uic.es
Submitted to section: School Health,
https://www.mdpi.com/journal/healthcare/sections/School_Health
Current Health Challenges for Child and Adolescent
https://www.mdpi.com/journal/healthcare/special_issues/current_health_challenges_for_child_and_adolescent

It has been reviewed by experts in the field and we request that you make major revisions before it is processed further. Please find your manuscript and the review reports at the following link:
https://susy.mdpi.com/user/manuscripts/resubmit/18f9bc7aa4ea52859f9841335ef6b273

Your co-authors can also view this link if they have an account in our submission system using the e-mail address in this message.

Please revise the manuscript according to the reviewers' comments and upload the revised file 13 January 2021. Use the version of your manuscript found at the above link for your revisions, as the editorial office may have made formatting changes to your original submission. Any revisions should be clearly highlighted, for example using the "Track Changes" function in Microsoft Word, so that changes are easily visible to the editors and reviewers. Please provide a cover letter to explain point-by-point the details of the revisions in the manuscript and your responses to the reviewers' comments. Please include in your rebuttal if you found it impossible to address certain comments. The revised version will be inspected by the editors and reviewers. Please detail the revisions that have been made, citing the line number and exact change, so that the editor can check the changes expeditiously. Simple statements like 'done' or 'revised as requested' will not be accepted unless the change is simply a typographical error.

Please carefully read the guidelines outlined in the 'Instructions for Authors' on the journal website
https://www.mdpi.com/journal/healthcare/instructions and ensure that your

manuscript resubmission adheres to these guidelines. In particular, please ensure that abbreviations have been defined in parentheses the first time they appear in the abstract, main text, and in figure or table captions; citations within the text are in the correct format; references at the end of the text are in the correct format; figures and/or tables are placed at appropriate positions within the text and are of suitable quality; tables are prepared in MS Word table format, not as images; and permission has been obtained and there are no copyright issues.

If the reviewers have suggested that your manuscript should undergo extensive English editing, please address this during revision. We suggest that you have your manuscript checked by a native English speaking colleague or use a professional English editing service.

Please note that author names, affiliations and e-mail could not be changed if paper accepted, so please check it carefully when revising your manuscript.

Since the reviews we collected contain substantial revision comments, we would like to inform you that this might be the last chance to revise your paper. Therefore, please take this opportunity to address the reviewers' comments point-by-point and explain the details of the revisions in your responses to their comments. The revised version will be inspected by the editors and reviewers again.

Do not hesitate to contact us if you have any questions regarding the revision of your manuscript or if you need more time. We look forward to hearing from you soon.

Kind regards,
Cherry Pei
Assistant Editor
Email: cherry.pei@mdpi.com
--
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Room 2208, Jincheng Center, No. 21 Cuijingbeili, Tongzhou
District, Beijing
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Comentarios del primer revisor de Healthcare mdpi

English language and style
( ) Extensive editing of English language and style required
( ) Moderate English changes required
( ) English language and style are fine/minor spell check required
(x) I don't feel qualified to judge about the English language and style

	Yes	Can be improved	Must be improved	Not applicable
Does the introduction provide sufficient background and include all relevant references?	(x)	( )	( )	( )
Is the research design appropriate?	( )	(x)	( )	( )
Are the methods adequately described?	( )	(x)	( )	( )
Are the results clearly presented?	(x)	( )	( )	( )
Are the conclusions supported by the results?	( )	( )	(x)	( )

Comments and Suggestions for Authors

Thank you for this important study.

I think that this manuscript gives valuable information.

I think that this type of convenience sample is common, but there is also risk of selection bias.

Was the number of 302 participants sufficient to reach power for the calculations?

The discussion compares the results of using a smartphone in conjunction with the meal situation and in conjunction with sleep. These results are not specifically related to covid-19, but rather to the habit in general. The study tries to describe the situation with covid-19, but fail due to selection bias. Still, the result is important in other perspectives. However, I not know if the aim is answered. This should be written more clearly.

The conclusion has no association with the aim of this study.

A reference is missing on line 172.

Submission Date: 15 December 2020

Date of this review: 16 Dec 2020 11:59:48

Comentarios del segundo revisor de Healthcare mdpi

English language and style
( ) Extensive editing of English language and style required
( ) Moderate English changes required
( ) English language and style are fine/minor spell check required
(x) I don't feel qualified to judge about the English language and style

	Yes	Can be improved	Must be improved	Not applicable
Does the introduction provide sufficient background and include all relevant references?	(x)	( )	( )	( )
Is the research design appropriate?	( )	(x)	( )	( )
Are the methods adequately described?	( )	(x)	( )	( )
Are the results clearly presented?	( )	(x)	( )	( )
Are the conclusions supported by the results?	( )	( )	(x)	( )

Comments and Suggestions for Authors

Revision of the article:

Smartphone and tablet usage during COVID-19 pandemic confinement in children under 48 months in Barcelona (Spain)

This study explores the smartphone and tablet usage in children under 48 months living in Barcelona during the Covid-19 confinement. Although it is an interesting and methodologically correct study, it would be necessary not only to collect data on the use or not (yes or no) of smartphones and tablets, but also the total daily time of use with greater precision, since this data can vary greatly from one child to another. Therefore, it is recommended to expand the data in relation to use if available. Besides, as the authors mention in the limitations of the study, a longitudinal design that collected data from a longer period would have been helpful. In this way, the study results would have been more consistent.

Other aspects to review prior to publication are:

- Check and correct some spelling mistakes as in line 47 that appears written "*exceptionalitknowledg*e".
- On line 172 appears [?], but the bibliographic reference number is missing.
- The conclusions section can be greatly improved, since the conclusions do not derive directly from the results of the study.
- The references section should be reviewed, since there are aspects to correct such as writing the abbreviation of the name of the journals instead of the full name. You can check the recommendations in: https://www.mdpi.com/journal/healthcare/instructions

Kind regards

Submission Date: 15 December 2020
Date of this review: 02 Jan 2021 12:53:51

<u>Carta de presentación a Healthcare mdpi</u>

Barcelona, January 13th, 2021.

Dear Editor-in-chief,

We would like to thank the Editor and the Journal the opportunity to resubmit again our manuscript with reference number healthcare-1057940 entitled "SMARTPHONE AND TABLET USAGE DURING COVID-19 PANDEMIC CONFINEMENT IN CHILDREN UNDER 48 MONTHS IN BARCELONA (SPAIN)". We have fully rewritten our manuscript according to the criticisms raised by the reviewers of both revisions. The manuscript has been substantially modified in line with the useful reviewers' comments. Please find enclosed the manuscript tracked change, where modifications were highlighted in red, and the response to the reviewers.

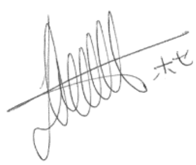
I remind you that this is one of the manuscripts that Dr. González-Marrón and Dra. Lidón-Moyano purposed to fulfill the quota of free publications.

All authors have carefully read and fully approved the manuscript. On behalf of all authors I state that the manuscript is original and is not being submitted anywhere for publication. The authors declare there are no conflicts of interest, as indicated in the first page of the manuscript.

We would of course be ready to provide further information about our data and methods you desire. Correspondence should be addressed to me, as indicated on the title page.

Thank you very much for your kind attention.

Yours faithfully,



Jose M Martínez-Sánchez, PhD, MPH, BSc

<u>Respuesta a los comentarios de los revisores de Healthcare mdpi</u>

<u>REVIEWER 1</u>

Thank you for this important study.

Thank you very much for your kind comment and to let us improve our work.

I think that this manuscript gives valuable information.

Thank you for your considerate comment.

I think that this type of convenience sample is common, but there is also risk of selection bias.

Thank you for your comment. We agree with the reviewer that a limitation of our study is how we obtained the sample, since it might be a source of selection bias. However, due to total confinement was really hard to collect a representative sample. Taking this into account, we mentioned in the strengths and limitations section that our sample is not representative of children living in Barcelona during total lockdown due to COVID-19 pandemic. In this sense, we stated that there is an overrepresentation of children with high-educated parents making that the prevalence of being exposed might be overestimated or the median of smartphone and tablet usage might be underestimated. Further at the end of strengths we state that due to the data was collected through online questionnaires we cannot discard some sources of bias. Nevertheless, as reviewer suggested, the source that most concern is the selection bias, then we state it at the end of strengths and limitations paragraph as follows:

> "Finally, on account of data was obtained through online questionnaire we cannot discard some sources of bias, with most concern the selection bias [27]."

Was the number of 302 participants sufficient to reach power for the calculations?

Thank you very much for your comment. The theoretical sample size was 267 individuals, assuming and expected prevalence of being exposed to smartphones and tablets of 50% (with and alpha error of 5% and a precision of 6%). We used 50% as prevalence of being exposed to smartphones and tablets because it is still uncertain, and therefore, we think in the worst-case scenario. Further, according to a previous study using a representative sample of Spanish population under 15 years in 2017, around 44% of children under 6 years spent less than 1 hour daily during their free time in front of a screen (including smartphones and tablets usage). Sample size used in this study is slightly higher than the theoretical sample size, in this sense our study has the statistical power enough assuming a prevalence of exposure around 40% (from evidence) and an error of ± 4 or 5%. Further we stopped the recruitment due to the end of total lockdown measures.

We state the previous information succinct at the end of the first paragraph in the methods section as follows:

> "The sample was recruited from April to June 2020. Exclusion criteria were (1) not to live in Barcelona (n=8) and (2) to have missing data in smartphone and tablet usage during confinement variables (n=3). Therefore, the final sample included 302 parents with children under 48 months living in Barcelona. Assuming an expected prevalence of being exposed of 50%, an alpha error of 5% and precision of 6% the theoretical sample size was 267 individuals, therefore our sample achieve enough statistical power."

The discussion compares the results of using a smartphone in conjunction with the meal situation and in conjunction with sleep. These results are not specifically related to covid-19, but rather to the habit in general. The study tries to describe the situation with

covid-19, but fail due to selection bias. Still, the result is important in other perspectives. However, I not know if the aim is answered. This should be written more clearly.

Thank you for your comment. We agree with the reviewer that we cannot distinguish if the use of these devices during meals and before going to bed is modified by total lockdown due COVID-19 pandemic or it is a usual habit. For this reason and due to the aim of this work is to describe the smartphone and tablet usage during total lockdown due to COVID-19 pandemic in Spain we think that the results of smartphone and tablet usage during meals and before going to bed provide valuable information about habits during lockdown. Further, as reviewer suggested the objective might not reflect the findings of this study, since we did not mention any of usage during meals and before going to bed, therefore in order to link the aim with the findings obtained we highlight in the aim that we describe the smartphone and tablet usage during total confinement due to COVID-19 including if children used or are exposed to these devices during meals and before going to bed as follows:

> “Due to the exceptionality of the moment and emergent knowledge of the possible adverse effects of excessive screen time on children’s health, the aim of this study is to describe the smartphone and tablet usage, including if they use it during meals and before going to bed, in children under 48 months living in Barcelona during the COVID-19 total lockdown.”

The conclusion has no association with the aim of this study.

Thank you very much for your comment. As reviewer suggested, we rewrite the conclusions of the study linking them with the aim of the study and findings obtained as follows:

> “Two out of three children under 48 months living in Barcelona were exposed to smartphones and tablets during confinement due to COVID-19 pandemic. Considering our findings and evidence shows that excessive screen time may have adverse effects on children’s health. Cohort studies are needed to confirm any change in the screen time patterns due to COVID-19 total confinement in order to allow the Government help families, particularly those more vulnerable, in a possible pandemic resurgence.”

Further, we also rewrite the conclusions of the abstract as follows:

> “Conclusions: Two out of three children under 48 months living in Barcelona were daily exposed to smartphones and tablets during total lockdown due to COVID-19. Taking this findings into account cohort studies are needed to assess any change in the screen time patterns due to total confinement in order to allow the Government help families, particularly those more vulnerable, in a possible pandemic resurgence.”

A reference is missing on line 172.

Thank you for your comment. We have added the proper reference source. Please check page 7 line 176

<u>REVIEWER 2</u>

This study explores the smartphone and tablet usage in children under 48 months living in Barcelona during the Covid-19 confinement. Although it is an interesting and methodologically correct study, it would be necessary not only to collect data on the use or not (yes or no) of smartphones and tablets, but also the total daily time of use with greater precision, since this data can vary greatly from one child to another.

Thank you very much for your comment. We agree with the reviewer that collecting the use or not does not provide enough information, therefore, apart from it we also collected the daily smartphone and tablet usage in minutes (daily time of use). Please check page 2 lines 71-72 and page 3 lines 97-100.

Therefore, it is recommended to expand the data in relation to use if available. Besides, as the authors mention in the limitations of the study, a longitudinal design that collected data from a longer period would have been helpful. In this way, the study results would have been more consistent.

Thank you very much for your kind comment. We agree with the reviewer that results would be more informative if our data was collected through objective measures and longitudinal design, unfortunately it is not available. We are thinking to perform a follow-up after COVID-19 pandemic.

Other aspects to review prior to publication are:

Check and correct some spelling mistakes as in line 47 that appears written "*exceptionalitknowledg*e".

Thank you very much for your comment. As reviewer suggested it was a misspelling, then we correct it as follows:

> "Due to the exceptionality of the moment and emergent knowledge of the possible adversary effects of excessive screen time on children's health, the aim of this study is to describe the smartphone and tablet usage, including if they use it during meals and before going to bed, in children under 48 months living in Barcelona during the COVID-19 total lockdown."

On line 172 appears [?], but the bibliographic reference number is missing.

Thank you for your comment. We add the proper reference source. Please check page 7 line 176

The conclusions section can be greatly improved, since the conclusions do not derive directly from the results of the study.

Thank you very much for your comment. We agree with the reviewer that previous conclusions does not drive directly from the our findings, therefore as reviewer suggested we rewrite the conclusions in the discussion as follows:

> "Two out of three children under 48 months living in Barcelona were exposed to smartphones and tablets during confinement due to COVID-19 pandemic. Considering our findings and evidence shows that excessive screen time may have adverse effects on children's health. Cohort studies are needed to confirm any change in the screen time patterns due to COVID-19 total confinement in order to allow the Government help families, particularly those more vulnerable, in a possible pandemic resurgence."

As well as in the abstract as follows:

> "Conclusions: Two out of three children under 48 months living in Barcelona were daily exposed to smartphones and tablets during total lockdown due to COVID-19. Taking this findings into account cohort studies are needed to assess any change in the screen time patterns due to total confinement in order to allow the Government help families, particularly those more vulnerable, in a possible pandemic resurgence."

The references section should be reviewed, since there are aspects to correct such as writing the abbreviation of the name of the journals instead of the full name. You can check the recommendations in: https://www.mdpi.com/journal/healthcare/instructions

Thank you very much for your considerate comment. As reviewer suggested we review the reference section according to journal guidelines.

Carta de aceptación del artículo en Healthcare mdpi

De: MDPI Billing <billing@mdpi.com>
Asunto: [Healthcare] Manuscript ID: healthcare-1057940 - APC Invoice
Fecha: 15 de enero de 2021, 10:48:26 CET
Para: Jose M Martínez-Sánchez <jmmartinez@uic.es>
Cc: Cherry Pei <cherry.pei@mdpi.com>, Billing Dpt <billing@mdpi.com>, Healthcare Editorial Office <healthcare@mdpi.com>
Responder a: billing@mdpi.com

Dear Dr. Martínez-Sánchez,

Your paper has been accepted for publication in the journal Healthcare. The article processing charge is 0 (zero) CHF. The attached invoice is for information only and does not require any action from your side.

We will publish your paper as soon as the proofreading and editing have been completed.

The invoice is related to the following manuscript:
Manuscript ID: healthcare-1057940
Type of manuscript: Article
Title: Smartphone and tablet usage during COVID-19 pandemic confinement in children under 48 months in Barcelona (Spain)
Authors: Àurea Cartanyà-Hueso, Cristina Lidón-Moyano, Pia Cassanello, Ana Díez-Izquierdo, Juan Carlos Martín-Sánchez, Albert Balaguer, Jose M Martínez-Sánchez *
Received: 15 December 2020

Let me know if you have any questions.

Kind regards,
Aleksandra Cuculovic

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Anexo E

Otros artículos

E.1. Otros artículos I

Comparison of TSNAs concentration in saliva according to type of tobacco smoked

Environmental Research 172 (2019) 73–80

Contents lists available at ScienceDirect

Environmental Research

journal homepage: www.elsevier.com/locate/envres

Comparison of TSNAs concentration in saliva according to type of tobacco smoked

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ARTICLE INFO

Keywords:
Tobacco-specific nitrosamines
TSNAs
NNN
NNK
NNAL
Carcinogen
Roll-your-own tobacco
Manufactured cigarettes
Saliva

ABSTRACT

Objective: To compare tobacco-specific nitrosamines (TSNAs) measured in saliva according to different types of tobacco smoked in a sample of smokers of the city of Barcelona (Spain).
Methods: We used data from a cross-sectional study of a sample of the adult smoking population of Barcelona, Spain in 2013–2014 (n = 165). We classified smokers in five groups according to the type of tobacco smoked: a) manufactured cigarettes only, b) roll-your-own (RYO) cigarettes only, c) dual smokers (both manufactured and RYO cigarettes), d) manufactured plus other types of tobacco products different from RYO and e) other types of tobacco products different from manufactured and RYO cigarettes. We calculated the geometric mean (GM) and geometric standard deviation (GSD) of TSNAs concentration in saliva (pg/mL), including N'-nitroaonornicotine (NNN), 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK) and 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol (NNAL) according to the five tobacco groups. We also described all TSNAs concentration in each tobacco group stratified by the number of cigarettes smoked per day.
Results: Smokers from the RYO cigarette group had higher TSNAs concentration than smokers from the manufactured cigarette group: 13 pg/mL vs 4.9 pg/mL of NNN, 1.9 pg/mL vs 1.7 pg/mL in NNK and 1.1 pg/mL vs 0.9 pg/mL of NNAL. There were significant differences in NNN concentrations between smokers of RYO vs manufactured cigarettes. The higher the number of cigarettes smoked, the higher the TSNAs concentrations. After adjusted by number of cigarettes smoked, there were not statistically significant differences in TSNAs between RYO and manufactured cigarettes.
Conclusions: Our data shows that RYO cigarette is at least as hazardous as manufactured cigarettes. Regulating RYO tobacco prices could be an effective strategy to control tobacco use.

1. Introduction

Currently, roll-your-own (RYO) tobacco is a new threat in the control of the tobacco epidemic. Recent studies around the world have shown a reduction in the prevalence of use of conventional cigarettes, while the consumption of RYO cigarettes has increased in the last decades (Young et al., 2012; Brown et al., 2015; Agaku and Alpert, 2016). According to current evidence, self-reported consumption of manufactured cigarettes in the USA decreased from 86.4% to 85.6% between 2012 and 2014, while, self-reported consumption of RYO

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https://doi.org/10.1016/j.envres.2018.12.006
Received 5 April 2018; Received in revised form 4 December 2018; Accepted 5 December 2018
Available online 06 December 2018

cigarette did not change (5%) on the same period (CDC, 2017). A similar pattern of use in Europe has been observed; self-reported daily consumption of manufactured cigarettes decreased from 76% to 70% between 2014 and 2017; however, self-reported daily consumption of RYO cigarettes increased from 23% to 24% along the same period (European Commission, 2017).

In Barcelona (Catalonia, Spain), self-reported consumption of manufactured cigarettes was 89.1% in 2004–2005 and it declined to 71.8% in 2011–2012, while the self-reported consumption of RYO cigarettes increased from 1.4% to 15.4% along the same period (Sureda et al., 2017). This change in the smoking pattern could be due to the relevant price differences between manufactured cigarettes and RYO tobacco, and also to the belief that RYO tobacco is more natural and healthier and, therefore, less hazardous than manufactured cigarettes (Marcilla et al., 2014; Sureda et al., 2017). Prevalence of RYO tobacco use in Spain is increasing, especially among young people (Fu et al., 2014; Lidón-Moyano et al., 2017; Sureda et al., 2017; Tarrazo et al., 2017). The main reasons that have been referred to use RYO more than manufactured cigarettes are: (1) lower price; (2) better tasting; (3) belief that is healthier (Brown et al., 2015).

Apart from the RYO prevalence increasing, the prevalence of use of other tobacco products; pipe, cigars or little cigars is also increasing (Malhotra et al., 2017). As a result of the rapidly changing tobacco product landscape the pattern of use of more than one type of tobacco product, usually combining manufactured cigarette with smokeless tobacco, is likely increasing (Harrell et al., 2017; Sung et al., 2018).

Cigarette smoking causes over one million cancer deaths annually worldwide, and accounts for 26% of all cancer mortality in developed countries (World Health Organization (WHO), 2017). Carcinogenesis can be developed by over 60 different carcinogens present in cigarette smoke, according to the International Agency for Research on Cancer (IARC)(Alavanja et al., 2004). One of the most prevalent strong carcinogens in unburned tobacco are Tobacco specific N-nitrosamines (TSNAs), including 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol (NNK), its main metabolite, 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol (NNAL) and N′-nitrosonornicotine (NNN) (Hecht, 2011). These nitrosamines have three highly attractive properties with respect to evaluating human exposure and cancer risk due to tobacco exposure: (1) they are present in all tobacco products, (2) they are exclusively found in tobacco products and (3) they are strong carcinogens (Hecht et al., 2016). In fact, NNN has been directly linked with tumours of oesophagus, and with tumours in oral or nasal, while cavities NNK is associated with lung tumours in rodents (Hecht et al., 2016). The biomarkers most extensively used for the study of tobacco smoke exposure are nicotine and its metabolite, cotinine (Fu et al., 2009; Ashley et al., 2010). Cotinine is usually measured in urine, plasma or serum and saliva. On the other hand, exposure to TSNAs has been mainly evaluated by quantifying NNAL in urine, and less frequently in serum. TSNAs has scarcely measured in saliva, getting the samples in saliva instead of urine is preferable because the collection is easier and faster. Besides, previous research from our group (Pérez-Ortuño et al., 2016) proved the relevance of saliva for the monitoring of all three main TSNAs.

The aim of this study was to assess TSNAs concentration (NNN, NNK, NNAL) in saliva samples of smokers according to different type of tobacco used (manufactured cigarettes, RYO cigarettes, other types of tobacco and their combination) with emphasis in manufactured and RYO cigarettes, the types of tobacco most commonly used in Spain.

2. Material and Methods

We used the follow-up data of the "Determinants of Cotinine project-phase 3 (dCOT3 study)", a cohort study of a representative sample of the adult (≥ 16 years old) non-institutionalized general population of the city of Barcelona (Catalonia, Spain). Its purpose was to assess the impact of the Spanish tobacco control legislation on tobacco consumption and exposure to secondhand smoke exposure in the population of Barcelona by means of questionnaire and biomarkers in saliva samples. Participants were recruited during the years 2004–2005. This baseline sample was composed of 1245 subjects, 694 women and 551 men. The follow-up was conducted during the years 2013–2014 including 736 subjects (401 women and 335 men). Data cleansing details conducted to get the final sample can be found elsewhere (Lidón-Moyano et al., 2017).

For the purposes of these analyses, we used data from the follow-up study (2013–14). Since this is a cohort study, the final sample was skewed as slightly older than the general population in Barcelona at the time of the follow-up; therefore, we used inverse probability weights to balance our data according to age distribution of the city of Barcelona to keep its representativeness. From the overall final sample of the dCOT3 study, 690 subjects had available data from saliva samples. From those, 525 were non-smokers and 165 were smokers. For this analysis, we only took into account the smokers. We defined "smokers" as people smoking at least one cigarette/day at the time of the survey (current smokers, n = 136, 82.4% of the sample), as well as, those smoking at least one cigarette in the last 48 h or during the last week (occasional smokers, n = 29, 17.6% of the sample). From those 165 subjects due to technical issues, NNN, NNK and NNAL could be analysed in 165, 164 and 152 of them.

2.1. Variables

2.1.1. Outcomes

We determined TSNAs in saliva samples. Participants were asked to rinse their mouths and then suck a lemon candy to simulate saliva production. They were asked first to spit out a small amount of saliva and then to provide about 8 mL of saliva by spitting into a funnel placed in a test tube. The sample was separated into about 3 mL aliquots and frozen to − 20 ^{0}C for storage. The frozen samples were sent to the Bio analysis Research Group of the Municipal Institute for Medical Research (IMIM-Hospital del Mar) in Barcelona (Fu et al., 2009; Martínez-Sánchez et al., 2009). All TSNAs were measured by alkaline single liquid-liquid extraction with dichloromethane/isopropanol. Analytical details can be found elsewhere (Pérez-Ortuño et al., 2016). We determined the concentration TSNAs (NNN, NNK and NNAL) with limits of quantification of 1.0, 2.0 and 0.50 pg/mL respectively.

2.1.2. Co-variables

The type of tobacco used was obtained from the question: "What type of tobacco product do you usually smoke?" with the possible answers "manufactured cigarettes", "RYO cigarettes", "cigars", "little cigars" and "pipes". We classified the subjects into 5 groups according to the type of tobacco used: (1) Manufactured cigarettes only, (2) Roll-Your-Own cigarettes only, (3) Manufactured and RYO cigarettes (Dual), (4) Manufactured cigarettes and other type of tobacco, namely cigars, little cigars and pipes and (5) Others types of tobacco but not manufactured nor RYO cigarettes.

The number of cigarettes smoked daily for the current smokers as well as for occasional smokers was obtained with the question: "How many cigarettes have you smoked in the last 24 h?". We defined a categorical variable: (1) < 10 cigarettes/day, (2) 10–20 cigarettes/day and (3) > 20 cigarettes/day.

Socio-demographic variables included sex, age in 3 categories, between 25 and 44 years old, between 45 and 64 years old and older than 65 years old, and educational level in 3 categories, low: unschooled, elementary school completed or uncompleted and special education, intermediate: high school and training cycles and high: university education.

Table 1
Comparison of the five tobacco groups according to sociodemographic and smoking-related variables.

	Overall[***] (n = 165)	Manufactured (n = 101)	RYO (n = 28)	Dual[*] (n = 14)	Manufactured + Others[**] (n = 11)	Others[**] (n = 11)	p-value	p-value[c]	p-value[d]	p-value[e]	p-value[f]
Sex (%)											
Men	52.7%	43.6%	53.6%	64.3%	81.8%	90.9%	**0.006**[a]	0.468[a]	0.241[a]	0.036[a]	0.008[a]
Women	47.3%	56.4%	46.4%	35.7%	18.2%	9.1%	**0.006**[a]	0.468[a]	0.241[a]	0.036[a]	0.008[a]
p-value	0.378[a]	0.091[a]	0.789[a]	0.257[a]	0.011[a]	< **0.001**[a]					
Age (%)											
25–44	42.4%	31.7%	60.7%	71.4%	72.7%	27.3%	< **0.001**[a]	0.010[a]	0.009[a]	0.018[a]	1[a]
45–64	41.8%	47.5%	32.2%	28.6%	27.3%	45.4%	0.348[a]	0.217[a]	0.294[a]	0.336[a]	1[a]
≥65	15.8%	20.8%	7.1%	–	–	27.3%	0.192[a]	0.164[a]	–	–	0.912[a]
p-value	< **0.001**[a]	< **0.001**[a]	< **0.001**[a]	< **0.001**[a]	**0.001**[a]	0.580[a]	< **0.001**[b]	**0.004**[b]	**0.003**[c]	0.010[b]	0.945[b]
Age in years $\bar{x}$ (sd)	49.3 (13.9)	52.4 (14.1)	44.1 (10.9)	41 (8.8)	40.9 (12.7)	52.6 (16.4)					
Educational level (%)											
Low	16.4%	19.8%	10.7%	14.3%	9%	9%	0.659[a]	0.405[a]	0.897[a]	0.647[a]	0.647[a]
Intermediate	41.2%	39.6%	39.3%	50%	45.5%	45.5%	0.944[a]	1[a]	0.652[a]	0.959[a]	0.959[a]
High	42.4%	40.6%	50%	35.7%	45.5%	45.5%	0.888[a]	0.500[a]	0.954[a]	1[a]	1[a]
p-value	< **0.001**[a]	**0.002**[a]	**0.006**[a]	0.131[a]	0.113[a]	0.113[a]					
Cigarettes smoked per day (%)											
< 10	53.3%	56.4%	42.8%	7.1%	7.2.7%	90.9%	< **0.001**[a]	0.289[a]	**0.002**[a]	0.473[a]	0.059[a]
10–20	39.4%	38.6%	53.6%	57.2%	18.2%	9.1%	0.032[a]	0.229[a]	0.302[a]	0.314[a]	0.108[a]
> 20	7.3%	5%	3.6%	35.7%	9.1%	–	< **0.001**[a]	1[a]	< **0.001**[a]	1[a]	–
p-value	< **0.001**[a]	< **0.001**[a]	< **0.001**[a]	0.019[a]	**0.003**[a]	< **0.001**[a]					
Cigarettes smoked per day $\bar{x}$ (sd)	10.2 (8.7)	9.6 (8.6)	11.3 (8.4)	18.8 (7.3)	7.5 (7.1)	5 (5.7)	< **0.001**[b]	0.178[b]	< **0.001**[b]	0.420[b]	0.083[b]

Bonferroni correction: statistically significant at the value of 0.008.
[a] Pearson's Chi-squared test.
[b] Kruskal-Wallis test.
[c] Comparison between Manufactured cigarette and RYO cigarette.
[d] Comparison between Manufactured cigarette and Dual.
[e] Comparison between Manufactured cigarette and Manufactured + Others.
[f] Comparison between Manufactured and Others.
* Dual tobacco use: Use manufactured and RYO cigarettes.
** Others: they include cigars, little cigars and pipes.
*** It includes: manufactured cigarettes, RYO cigarettes, dual tobacco use, manufactured cigarettes plus others and others.

Table 2
Geometric mean (and geometric standard deviation) of TSNAs concentrations (pg/mL) in adult smokers by type of tobacco used and number of cigarettes smoked.

	NNN (pg/mL) GM (GSD)	NNK (pg/mL) GM (GSD)	NNAL (pg/mL) GM (GSD)
Type of tobacco used			
Manufactured cigarettes (n = 101)	4.9 (0.21)	1.7 (0.07)	0.9 (0.12)
RYO cigarettes (n = 28)	13.0 (0.43)	1.9 (0.19)	1.1 (0.27)
Dual tobacco use* (n = 14)	15.0 (0.61)	3.5 (0.33)	1.9 (0.25)
Manufactured + Others** (n = 11)	12.0 (0.67)	1.7 (0.23)	1.1 (0.39)
Others** (n = 11)	6.1 (0.76)	2.2 (0.37)	1.8 (0.40)
Number of cigarettes smoked per day			
< 10 (n = 88)	3.5 (0.24)	1.3 (0.05)	0.6 (0.11)
10–20 (n = 65)	15.1 (0.26)	3.0 (0.14)	2.1 (0.11)
> 20 (n = 12)	21.0 (0.64)	2.5 (0.22)	1.7 (0.36)
Comparison among[a]	**p-value**	**p-value**	**p-value**
Type of tobacco***	0.112	0.147	0.049
Number of cigarettes	< **0.001**	< **0.001**	< **0.001**
Comparison between[b]			
Manufactured vs RYO	0.029	0.553	0.580
Manufactured vs Dual*	0.076	0.012	**0.005**
Manufactured vs Manufactured + Others**	0.995	0.834	0.694
Manufactured vs Others**	0.192	0.743	0.112
RYO vs Dual*	0.955	0.073	0.115
RYO vs Manufactured + Others**	0.439	0.649	0.857
RYO vs Others**	0.932	0.988	0.346
Dual* vs Manufactured + Others**	0.336	0.053	0.245
Dual* vs Others**	0.684	0.198	0.608
Manufactured + Others** vs Others**	0.404	0.663	0.342
< 10 vs 10–20	< **0.001**	< **0.001**	< **0.001**
< 10 vs > 20	**0.002**	**0.002**	**0.003**
10–20 vs > 20	0.618	0.687	0.691

TSNAs: tobacco-specific nitrosamines; NNN: N′-nitroaonornicotine; NNK: 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone; NNAL: 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol; GM: geometric mean; GSD: geometric standard deviation.
Bonferroni correction: statistically significant at the value of 0.008.
[a] Kruskal-Wallis test.
[b] Mann-Whitney test.
* Dual tobacco use: Use manufactured and RYO cigarettes.
** Others: they include cigars, little cigars and pipes.
*** It includes: manufactured cigarettes, RYO cigarettes, dual tobacco use, manufactured cigarettes plus others and others.

2.2. Statistical analysis

Due to the skewness in TSNAs concentration distribution, we calculated its geometric mean (GM) and geometric standard deviation (GSD), stratified by the type of tobacco consumed and the number of cigarettes smoked daily. Moreover, we compared TSNAs concentration in each type of tobacco consumed according to number of cigarettes smoked per day. In order to adjust for the false-discovery error rate for multiple comparisons we used the Bonferroni's correction; setting, the significance level was set to 0.05/6 = 0.008. Finally, we fitted a Generalized Linear regression Model (GLM) with logarithmic response to estimate the percentage change in the geometric mean of TSNAs concentration, adjusted for sociodemographic variables (sex, age and educational level) and smoking characteristics (type of tobacco used and number of cigarettes smoked daily). The particularity of this Generalized Linear regression Model is that the response variable is the logarithm of the actual TSNA value; hence, the coefficients estimate the percentage change of the geometric mean of TSNAs concentration instead of TSNAs concentration. The statistical program used was R-3.4.2.

3. Results

Among the 165 smokers, 52.7% (n = 87) were men, the average age was 49.3 (SD: 13.9) years old and 42.4% (n = 70) had high educational level. Besides, 61.2% (n = 101) smoked manufactured cigarettes only, 17.0% (n = 28) smoked RYO cigarettes exclusively, 8.5% (n = 14) combined manufactured and RYO cigarettes, 6.7% (n = 11) smoked manufactured cigarettes plus other tobacco products, and 6.7% (n = 11) smoked other tobacco products different from manufactured and RYO cigarettes. 53.3% (n = 88) of the sample smoked less than 10 cigarettes per day, 39.4% (n = 65) smoked between 10 and 20 cigarettes per day and 7.3% (n = 12) smoked more than 20 cigarettes/day. Smokers of manufactured cigarettes smoked 9.6 cigarettes daily on average (SD: 8.59) and smokers of RYO cigarettes smoked 11.3 cigarettes on average (SD: 8.4) (Table 1).

Table 2 shows the GM concentration of TSNAs according to the type of tobacco used and the number of cigarettes smoked per day. For all TSNAs, the average concentrations were higher in the RYO cigarette group than in the manufactured cigarette group (even though there were not statistically significant): 13.0 pg/mL vs 4.9 pg/mL of NNN, 1.9 pg/mL vs 1.7 pg/mL of NNK and 1.1 pg/mL vs 0.9 pg/mL of NNAL, respectively. Dual users were the group who had the highest GM TSNAs concentration: 15.0 pg/mL of NNN, 3.5 pg/mL of NNK and 1.9 pg/mL of NNAL. There was a significant difference in the concentration of NNN in smokers from the groups of manufactured cigarettes and RYO cigarettes (p-value = 0.029). With respect to NNAL, significant difference was found between the manufactured cigarette group and the dual user group (p-values = 0.005). There were significant differences between the concentrations of TSNAs (NNN, NNK, NNAL) and the number of cigarettes smoked per day (all p-values < 0.001) (Table 2).

Table 3 compares TSNAs concentration according to the 5 types of tobacco groups, stratified by number of cigarettes smoked per day. Significant differences in NNN concentration were found according to the type of tobacco used among smokers of < 10 cigarettes per day and among smokers of 10–20 cigarettes per day. Significant differences were also found in NNK concentration according to the type of tobacco

Table 3
Geometric mean (and geometric standard deviation) for TSNAs concentrations (pg/mL) in adult smokers by type of tobacco used, stratified by number of cigarettes smoked.

	NNN (pg/mL)							NNK (pg/mL)		
	All types	**Manufactured**	**RYO**	**Dual**[a]	**Manufactured + Others**[b]	**Others**[b]	**p-value**[1]	**All types**	**Manufactured**	**RYO**
Number of cigarettes										
< 10	3.5 (0.24)	2.3 (0.25)	8 (0.72)	17 (-)	4 (0.88)	9.3 (0.69)	**< 0.001**	1.3 (0.06)	1.2 (0.05)	1.2 (0.13)
10-20	15.1 (0.26)	13.6 (0.31)	19.2 (0.54)	13 (0.84)	9.5 (1.68)	130 (-)	**< 0.001**	3 (0.14)	2.8 (0.14)	2.5 (0.29)
> 20	21 (0.64)	19.5 (1.08)	16 (-)	18.1 (0.99)	81 (-)	-	0.435[c]	2.5 (0.22)	2.4 (0.40)	7.2 (-)
p-value[1]	**< 0.001**	**< 0.001**	0.405	0.946	0.021	0.009		**< 0.001**	**< 0.001**	**< 0.001**

	NNK (pg/mL)				NNAL (pg/mL)						
	Dual[a]	**Manufactured + Others**[b]	**Others**[ba]	**p-value**[1]	**All types**	**Manufactured**	**RYO**	**Dual**[a]	**Manufactured + Others**[b]	**Others**[b]	**p-value**[1]
Number of cigarettes											
< 10	3.8 (-)	1.4 (0.24)	1.7 (0.28)	**< 0.001**	0.59 (0.11)	0.48 (0.11)	0.58 (0.32)	2.2 (-)	0.69 (0.43)	1.5 (0.35)	**< 0.001**
10-20	4.1 (0.55)	3.7 (0.15)	32 (-)	**< 0.001**	2.1 (0.13)	2.3 (0.13)	1.66 (0.36)	1.8 (0.32)	3.2 (0.14)	20 (-)	**< 0.001**
> 20	2.7 (0.26)	1 (-)	-	**0.002**[c]	1.7 (0.36)	1.4 (0.78)	1.5 (-)	1.9 (0.47)	1.7 (-)	-	0.624[c]
p-value[1]	0.373	**< 0.001**	**< 0.001**		**< 0.001**	**< 0.001**	**0.001**	0.461	0.008	**0.001**	

GM (GSD): geometric mean (geometric standard deviation)
Bonferroni correction: statistically significant at the value of 0.008
[1] p-value: Kruskal-Wallis
[a] Dual tobacco use: Use manufactured and RYO cigarettes
[b] Others: they include cigars, little cigars and pipes
[c] It is not used all the categories for the hypothesis test

Table 4
Percentage change[a] in geometric mean of TSNAs concentration (pg/mL) in adult smokers adjusted for type of tobacco smoked, sex, age, educational level and number of cigarettes smoked per day.

	NNN		NNK		NNAL	
	GM % change (95% CI)	p-value	GM % change (95% CI)	p-value	GM % change (95% CI)	p-value
Intercept	12.9 (−44.0;128.0)	0.734	− 4.4 (−25.3;22.4)	0.712	− 57.5 (−69.3;−41.1)	< **0.001**
Type						
Manufactured cigarettes	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
RYO cigarettes	166.5 (8.2;556.5)	0.033	10.0 (−21.1;53.3)	0.575	3.7 (−34.6;64.5)	0.878
Dual tobacco use*	53.4 (−63.3;540.7)	0.557	71.8 (−19.0;264.5)	0.160	19.2 (−39.3;134.3)	0.611
Manufactured + Others**	109.5 (−56.1;901.1)	0.354	28.8 (−11.1;86.5)	0.183	45.6 (−21.6;170.4)	0.236
Others**	359.9 (38.6;1426.1)	0.013	60.0 (−8.9;181.2)	0.104	194.5 (59.7;443.1)	**0.001**
Sex						
Men	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Women	37.0 (−30.8;171.2)	0.367	− 10.8 (−29.1;12.4)	0.336	− 17.1 (−39.0;12.7)	0.233
Age						
25–44	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
45–64	59.9 (−19.7;218.3)	0.181	52.0 (17.5;96.6)	**0.002**	36.2 (−2.9;91.1)	0.076
≥ 65	117.4 (−35.3;629.8)	0.209	64.9 (9.1;149.3)	0.019	58.6 (−14.4;193.9)	0.145
Educational level						
High	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Intermediate	103.2 (−2.4;322.9)	0.058	10.8 (−16.4;46.9)	0.781	13.7 (−21.3;64.3)	0.495
Low	74.9 (−49.8;510.1)	0.380	6.1 (−30.2;61.4)	0.475	67.0 (4.5;166.6)	0.034
Cigarettes smoked per day						
< 10	Ref.	Ref.	Ref.	Ref	Ref.	Ref.
10–20	323.3 (114.8;734.2)	< **0.001**	126.1 (74.6;192.7)	< **0.001**	278.6 (178.6;414.4)	< **0.001**
> 20	588.8 (62.6;2819.0)	0.009	74.2 (−2.3;210.7)	0.062	197.1 (38.9;535.6)	**0.006**

p-value: Obtained through adjusted a linear regression model with logarithmic response.
Bonferroni correction: statistically significant at the value of 0.008.
[a] Percentage change derived from Generalized Linear regression Models (GLM) with the logarithm of the response, adjusted for type of tobacco smoked, sex, age, educational level and number of cigarettes smoked per day.
* Dual tobacco use: Use manufactured and RYO cigarettes.
** Others: they include cigars, little cigars and pipes.

used in each of the category groups of number of cigarettes smoked per day, with the highest concentrations mostly in dual users. Similarly, significant differences in NNAL concentration were found according to the type of tobacco used, again with the highest concentrations mainly in dual users. It is worth mentioning that those who smoked others types of tobacco and between 10 and 20 cigarettes per day had the highest concentration for all TSNAs, even though only one person belongs to this group (Table 3).

Table 4 shows the percentage change in geometric mean of TSNAs concentration, derived from fitting Generalized Linear regression Models (GLM) with the logarithm of the response variable, adjusted for sociodemographic variables and smoking related variables. NNN concentration in RYO cigarette (only) smokers was 166% higher compared to the concentration in smokers of manufactured cigarettes (only). Although, when controlling for the number of cigarettes daily there were significant differences between those who smoked manufactured cigarettes only and those who smoked RYO cigarettes only, the first ones were more likely to smoke less than 10 cigarettes per day than second ones. Additionally, there were significant differences, in NNN concentration, between those who smoked other types of tobacco products and those who smoked manufactured cigarettes, being higher among smokers of other types of tobacco. Moreover, there were significant differences in GM concentration of all TSNAs when comparing those who smoked less than 10 cigarettes per day and those who smoked between 10 and 20 cigarettes per day (all p-values < 0.001), with increases of 323%, 126% and 279% in NNN, NNK, NNAL respectively, in latter group of smokers. Furthermore, there were also significant increased concentrations of NNAL (p-value = 0.006) in those who smoked more than 20 cigarettes daily compared to those who smoked less than 10 cigarettes per day. There were also increased concentrations of NNAL in those who smoked other types of tobacco such as pipes, cigars and little cigars, compared to those who smoked manufactured cigarettes only (p-value = 0.001) (Table 4).

4. Discussion

There is no difference in TSNAs concentration between smokers of manufactured cigarettes and RYO cigarettes controlled by number of cigarettes per day. Nevertheless if they were not controlled by number of cigarettes per day, our results show that RYO cigarette smokers had a significant higher NNN concentration in saliva compared to manufactured cigarette smokers. In addition, smokers who combined RYO and manufactured cigarettes had significant higher concentrations of NNK and NNAL as compared to exclusive smokers of manufactured cigarettes. These results are consistent with the result of a study conducted in US that shows higher levels of NNAL between those who smoked more than one tobacco product compared to single product users (Choi et al., 2017). This could be partially explained because smokers of both types of tobacco, manufactured and RYO cigarettes, smoked more cigarettes daily (average of 18.8 cigarettes per day) than manufactured cigarettes smokers only (average of 9.6 cigarettes per day) and RYO cigarettes smokers only (average of 11.3 cigarettes per day). Moreover, there were significant differences in the average of number of cigarettes according to the type of tobacco smoked (p-value < 0.001). Besides, this study shows an association between TSNAs concentration and the number of cigarettes smoked daily.

In our study, TSNAs were determined in saliva samples; thus the magnitudes of the concentrations are not comparable with others determined on other matrices such as urine. Nonetheless, we found significant differences in NNAL between those who smoked manufactured cigarettes and those who smoked other types of tobacco products, such as cigars, little cigars and pipes, adjusted for number of cigarettes smoked (Table 4). This result is consistent with the results of a study conducted in US that shows higher levels of NNAL in urine between those who smoked such as pipe or cigars and those who smoked manufactured cigarettes. This could be explained because cigars, little cigars and pipes needs a longer absorption time or because these tobacco products had higher levels of nicotine and TSNAs (Choi et al., 2017). However, this result should be interpreted with caution due to the small sample size of smokers of other types of tobacco products.

A previous study from our group measuring cotinine in saliva (Sureda et al., 2017) showed that RYO cigarettes smokers had higher salivary cotinine concentration than those who smoked manufactured cigarettes, even though their lower average daily cigarette consumption. We found a similar result with concentrations of TSNAs, particularly NNN. Moreover, we found that NNN concentration was always higher among RYO cigarettes smokers compared to manufactured smokers, for those who smoked less than 10 cigarettes daily as well as for those who smoked between 10 and 20 cigarettes daily.

The results of this study show a strong association between TSNAs concentration and number of cigarettes smoked per day. This results is consistent with a study conducted in Shanghai (China) (Yuan et al., 2011) which shows a strong positive association between urinary total NNAL concentration and number of cigarettes smoked per day.

Until now, to the best of our knowledge, there is no previous study that had determined TSNAs concentration in saliva nor has compared saliva TSNAs concentration according to 5 different types of tobacco smoked. Saliva has shown to be a very convenient biological fluid for the monitoring of TSNAs. On one hand, it is known that NNN is produced in significant amounts in the very buccal cavity from other nicotine derived alcaloids (e.g. nornicotine), and NNK itself is a potent carcinogen. On the other hand, sampling saliva for the purpose of monitoring TSNAs or nicotine require strict measures (mouth rinsing procedures) to avoid contamination from smoke, local residues of last cigarette consumed or other environmental source so that measurements reflect concentrations in dynamic equilibrium with blood. For this study we used as a number of cigarettes daily the self-reported number of cigarettes smoked the last 24 h, we compared the average of self-reported number of cigarettes smoked daily to the self-reported number of cigarettes the last 24 h according to type tobacco products and we did not find any significant difference. The main reason to use the number of cigarettes smoked the last 24 h as a proxy of the number of cigarettes smoked daily is that we avoid memory problems.

A limitation of this study is that the baseline sample was representative of the general population in Barcelona in 2004–2005, and the reduced sample followed up corresponds to participants slightly older than the population of the city at the time of the second survey in 2013–2014. For this reason, we used weighted data for all analyses in order to keep the sample representativeness to the Barcelona population in 2013–2014. Another limitation is that filter cigarettes can reduce the amount of TSNAs in biological samples, nevertheless, 92% of our sample used filter cigarettes but we cannot adjust our results for this variable. Moreover, we did not take into account the assessing time, those who were assessed in the morning could present lower TSNAs concentration than those who were assessed in the evening, because usually at the beginning of the day you have smoked less than at the end of the day. Whilst, future studies using large samples of smokers might take into account that variable, our results are in any case underestimating the TSNAs concentrations. We compared TSNAs concentration according to 5 different types of tobacco products. However, we had small sample sizes of those who combined manufactured cigarettes and RYO cigarettes, of those who combined manufactured cigarettes and other types of tobacco and of those who smoke other types of tobacco only; for this reason we have not enough statistical power to draw inferences according to these smoking groups.

In conclusion, this study shows that there is no difference between manufactured cigarettes and RYO cigarettes according to TSNAs concentrations in smokers; therefore, RYO is at least as hazardous as manufactured cigarettes. It is well known that NNAL and NNN are powerful predictors of oral, lung and oesophageal cancer (Stepanov et al., 2014; Yuan et al., 2014); therefore, it is relevant to raise awareness in the population regarding the hazardous nature of all tobacco products including RYO, usually considered less harmful (Edwards, 2014); tailored mass media campaigns may help to raise such awareness. Moreover, it is necessary to equalize prices in these types of tobacco, because some smokers shift from one to the other because RYO is cheaper. Therefore, regulating manufactured and RYO cigarette prices could be an effective strategy to control tobacco use particularly among youth, because they are in the most vulnerable period to start using tobacco products (Lugo et al., 2015).

Acknowledgements

This project was co-funded by the Instituto de Salud Carlos III, Subdirección General de Evaluación, Government of Spain (PI12/01114 and PI12/01119), co-funded by ISCIII-Subdirección General de Evaluación and by FEDER funds/European Regional Development Fund (ERDF)- a way to build Europe-. ACH, CLM, NMS, JCMS, and JMMS is supported by the Ministry of Universities and Research, Government of Catalonia (2017SGR608). MF, MB, and EF are supported by the Ministry of Universities and Research, Government of Catalonia (2017SGR139). RPO and JAP are supported by the Ministry of Universities and Research, Government of Catalonia (2017SGR138). EF is supported by the Instituto de Salud Carlos III, Government of Spain (INT16/00211 and INT17/00103), co-funded by the European Regional Development Fund (FEDER).

References

Agaku, I.T., Alpert, H.R., 2016. 'Trends in annual sales and current use of cigarettes, cigars, roll-your-own tobacco, pipes, and smokeless tobacco among US adults, 2002–2012'. Tob. Control 25 (4), 451–457. https://doi.org/10.1136/tobaccocontrol-2014-052125.

Alavanja, M., et al., 2004. 'Tobacco smoke and involuntary smoking'. IARC Monogr. Eval. Carcinog. Risks Hum. 83, 1–1413. https://doi.org/10.1007/978-1-61737-995-6_3.

Ashley, D.L., et al., 2010. 'Effect of differing levels of tobacco-specific nitrosamines in cigarette smoke on the levels of biomarkers in smokers'. Cancer Epidemiol. Biomark. Prev. 19 (6), 1389–1398. https://doi.org/10.1158/1055-9965.EPI-10-0084.

Brown, A.K., et al., 2015. 'Trends and socioeconomic differences in roll-your-own tobacco use: findings from the ITC Europe surveys'. Tob. Control. https://doi.org/10.1136/tobaccocontrol-2014-051986.

CDC, 2017. National Adult Tobacco Survey 2012–2014. Available at: 〈https://www.cdc.gov/tobacco/data_statistics/surveys/nats/index.htm〉 (Accessed 12 September 2018).

Choi, K., et al., 2017. 'Tobacco product use patterns, and nicotine and tobacco-specific nitrosamine exposure: nhanes 1999–2012'. Cancer Epidemiol. Biomark. Prev. 26 (10), 1525–1530. https://doi.org/10.1158/1055-9965.EPI-17-0338.

Edwards, R., 2014. 'Roll your own cigarettes are less natural and at least as harmful as factory rolled tobacco'. Bmj 348 (February), f7616. https://doi.org/10.1136/bmj.f7616.

European Commission, 2017. Special Eurobarometer 458 Report Attitudes of Europeans towards tobacco and electronic cigarettes Fieldwork March 2017 May 2017 Survey requested by the European Commission, Special Eurobarometer 458 Report Attitudes of Europeans towards tobacco and elect. 〈https://www.doi.org/10.2834/92702〉.

Fu, M., et al., 2009. 'Salivary cotinine concentrations in daily smokers in Barcelona, Spain: a cross-sectional study'. BMC Public Health 9 (1), 320. https://doi.org/10.1186/1471-2458-9-320.

Fu, M., et al., 2014. 'Opposite trends in the consumption of manufactured and roll-your-own cigarettes in Spain (1991–2020)'. BMJ Open 4 (12), e006552. https://doi.org/10.1136/bmjopen-2014-006552.

Harrell, P.T., et al., 2017. 'Patterns of youth tobacco and polytobacco usage: the shift to alternative tobacco products'. Am. J. Drug Alcohol Abuse 43. Taylor & Francis, pp. 694–702. https://doi.org/10.1080/00952990.2016.1225072.

Hecht, S.S., 2011. Tobacco carcinogenesis. In: Schwab, M. (Ed.), Encyclopedia of Cancer. Springer Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-16483-5_5846.

Hecht, S.S., Stepanov, I., Carmella, S.G., 2016. 'Exposure and metabolic activation biomarkers of carcinogenic tobacco-specific nitrosamines'. Acc. Chem. Res. 49 (1), 106–114. https://doi.org/10.1021/acs.accounts.5b00472.

Lidón-Moyano, C., et al., 2017. Impact of the Spanish smoking laws on tobacco consumption and secondhand smoke exposure: a longitudinal population study. Addict. Behav. 30–35. https://doi.org/10.1016/j.addbeh.2017.06.016.

Lugo, A., et al., 2015. 'Smoking in Italy 2013–2014, with a focus on the young'. Tumori 101 (5), 529–534. https://doi.org/10.5301/tj.5000311.

Malhotra, J., et al., 2017. 'Association between cigar or pipe smoking and cancer risk in men: a pooled analysis of five cohort studies'. Cancer Prev. Res. 10 (12), 704–709. https://doi.org/10.1158/1940-6207.CAPR-17-0084.

Marcilla, A., et al., 2014. 'Comparison between the mainstream smoke of eleven RYO tobacco brands and the reference tobacco 3R4F'. Toxicol. Rep. 1, 122–136. https://doi.org/10.1016/j.toxrep.2014.05.004.

Martínez-Sánchez, J.M., et al., 2009. 'Assessment of exposure to secondhand smoke by questionnaire and salivary cotinine in the general population of Barcelona, Spain

(2004–2005)'. Prev. Med. https://doi.org/10.1016/j.ypmed.2008.12.020.
Pérez-Ortuño, R., et al., 2016. 'Assessment of tobacco specific nitrosamines (TSNAs) in oral fluid as biomarkers of cancer risk: a population-based study'. Environ. Res. 151, 635–641. https://doi.org/10.1016/j.envres.2016.08.036.
Stepanov, I., 2014. et al 'Tobacco-specific N-nitrosamine Exposures and Cancer Risk in the Shangai Cohort Study: Remarkable Coherence with Rat Tumor Sites', 134(10), p. 227832283. ⟨https://www.doi.org/10.1002/ijc28575⟩.
Sung, H.-Y., et al., 2018. 'Polytobacco use and nicotine dependence symptoms Among US adults, 2012–2014.'. Nicot. Tob. Res.: Off. J. Soc. Res. Nicot. Tob. 20 (suppl_1), S88–S98. https://doi.org/10.1093/ntr/nty050.
Sureda, X., et al., 2017. Manufactured and roll-your-own cigarettes: a changing pattern of smoking in Barcelona, Spain. Environ. Res. 167–174. https://doi.org/10.1016/j.envres.2017.02.012.
Tarrazo, M., et al., 2017. Cambios en el consumo de tabaco: auge del tabaco de liar e introducción de los cigarrillos electrónicos TT - Changes in tobacco consumption: boom of roll-your-own cigarettes and emergence of e-cigarettes'. Gac. Sanit. 31 (3), 204–209. (Available at). ⟨http://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S0213-91112017000300204&lng=es&nrm=iso⟩.
World Health Organization (WHO), 2017. WHO Report on the Global Tobacco Epidemic, 2017 Monitoring Tobacco Use and Prevention Polices. Available at: ⟨http://www.who.int/tobacco/global_report/2017/en/⟩ (Accessed 21 November 2017).
Young, D., et al., 2012. 'Trends in roll-your-own smoking: findings from the ITC Four-Country Survey (2002–2008)'. J. Environ. Public Health. https://doi.org/10.1155/2012/406283.
Yuan, J., 2011. et al 'Urinary Levels of Cigarette Smoke Constituent Metabolites Are Prospectively Associated with Lung Cancer Development in Smokers', 71(21), pp. 6749–6757. ⟨https://www.doi.org/10.1158/0008-5472.CAN-11-0209.Urinary⟩.
Yuan, J., 2014. et al 'Urinary Tobacco Smoke Constituents Biomarkers for Assesing Risk of Lung Cancer', 74(2), pp. 401–411. ⟨https://www.doi.org/10.1158/0008-5472.CAN-13-3178⟩.

E.2. Otros artículos II

Apoyo a la regulación de fumar en el interior de vehículos privados y espacios públicos al aire libre

ORIGINAL BREVE

Recibido: 16 de mayo de 2019
Aceptado: 22 de julio de 2019
Publicado: 24 de julio de 2019

APOYO A LA REGULACIÓN DE FUMAR EN EL INTERIOR DE VEHÍCULOS PRIVADOS Y ESPACIOS PÚBLICOS AL AIRE LIBRE

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Los autores declaran que no existe conflicto de intereses.

RESUMEN

Fundamentos: Conocer el apoyo a la regulación del consumo de tabaco es una pieza clave para avanzar en las políticas de control del tabaquismo y reducir la exposición pasiva al tabaco. El objetivo de este trabajo fue describir las actitudes hacia la prohibición de fumar en los vehículos privados y espacios públicos al aire libre.

Métodos: Estudio transversal de una muestra representativa (n=736) de la población adulta (mayor de 24 años) de la ciudad de Barcelona, España, realizado en 2013-2014. Se calcularon el porcentaje de individuos que tenían una actitud favorable a la regulación del consumo de tabaco en el interior de vehículos privados y espacios públicos al aire libre, las Odds Ratio ajustadas (ORa) y sus intervalos de confianza al 95% (IC95%) según sexo, edad, nivel de estudios y estatus de consumo de tabaco mediante un modelo de regresión logística. Se utilizaron pesos de probabilidad inversa para mantener la representatividad de la población de Barcelona en 2013-2014.

Resultados: El 61,7% de los participantes estuvo a favor de la prohibición de fumar dentro de los vehículos privados y el 89,5% de prohibirlo sólo en presencia de menores. El apoyo a la regulación del consumo de tabaco en espacios exteriores varió entre 42,5% hasta 84,7% dependiendo del ambiente. Los fumadores mostraron una actitud menos favorable a la ampliación de la regulación a otros espacios: zonas exteriores de los centros universitarios, zonas exteriores de los centros comerciales y playas y piscinas descubiertas.

Conclusiones: Existe un amplio apoyo a la extensión de la regulación del consumo del tabaco en el interior de vehículos privados, especialmente en presencia de menores, y espacios públicos al aire libre. Este amplio apoyo podría favorecer la ampliación de la regulación del consumo de tabaco a estos espacios a fin de mejorar la salud de la población y al mismo tiempo contribuir a la desnormalización del consumo de tabaco entre la población.

Palabras clave: Vehículos privados, Espacios públicos al aire libre, Regulación del consumo de tabaco, Humo Ambiental de Tabaco, Políticas de control del tabaquismo.

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ABSTRACT

Support to smoking regulation in private vehicles and public outdoor spaces

Background: To know the support of tobacco regulation is a very important issue to advance in the tobacco control policies and reduce the passive exposure to tobacco. The aim of this study was to describe the attitudes towards forbidding smoking in private vehicles and public outdoor spaces.

Methods: This is a cross-sectional study of a representative sample (n=736) of the adult population (24+ years old) from Barcelona, Spain in 2013-2014. We calculated the percentages of individuals who had a favourable attitude towards smoking regulation in private vehicles and public outdoor spaces, their adjusted Odds ratios (aOR) and their 95% confidence intervals (95%CI) according to sex, age, educational level and smoking status through logistic regression. We used weighted data for all analyses in order to keep the representativeness of the population of Barcelona in 2013-2014.

Results: 61.7% of participants supported forbidding smoking in private vehicles and 89.5% supported forbidding it only in the presence of minors. The support to smoking regulation in public outdoor spaces varied from 42.5% to 84.7% in different settings. Smokers showed a less favourable attitude towards an extension of the smoking regulation to other settings: outdoor areas of university centres, outdoor areas of shopping centres and beaches and outdoor pools.

Conclusions: A wide support exists to extend the smoking regulation to private vehicles, especially in the presence of children, and public outdoor spaces. This wide support could favour the extension of smoking regulation to these places to improve the population's health and to contribute to denormalise tobacco use among the population.

Key words: Private vehicles, Public outdoor spaces, Smoking regulation, Second-Hand Smoke, Tobacco control policies.

Cita sugerida: Cartanyà-Hueso A, Lidón-Moyano C, Fu M, Ballbè M, Martín-Sánchez JC, González-Marrón A, Matilla-Santander N, Martínez-Sánchez JM. Apoyo a la regulación de fumar en el interior de vehículos privados y espacios públicos al aire libre. Rev Esp Salud Pública.2019;93: 24 de julio e201907056.

INTRODUCCIÓN

En España, la entrada en vigor de la ley 42/2010, de 30 de diciembre, por la que se modifica la Ley 28/2005, de 26 de diciembre, de medidas sanitarias frente al tabaquismo y reguladora de la venta, el suministro, el consumo y la publicidad de los productos del tabaco, supuso la extensión de la prohibición de fumar a todos los espacios públicos y centros de trabajo cerrados, incluyendo los del sector de la hostelería, regulada parcialmente por la legislación previa. Además, esta ley amplió la regulación de fumar a algunos espacios públicos al aire libre, como los recintos de los parques infantiles, áreas o zonas de juego para la infancia y recintos hospitalarios[1]. Este cambio fue un gran avance en el control del tabaquismo en espacios públicos en España. Además, este cambio legislativo no produjo un desplazamiento del consumo de tabaco a los hogares, como vaticinaba la industria del tabaco[2,3]. Sin embargo, todavía existen desafíos importantes en la regulación de espacios libres de humo en España. Entre estos desafíos se incluyen, entre otros, la restricción de fumar en áreas privadas específicas, como el transporte privado. Los vehículos privados representan la segunda mayor fuente de exposición al Humo Ambiental del Tabaco (HAT) en los niños, después del hogar[4]. En España, se ha estimado que el 2,2% de los menores de 14 años están expuestos al HAT en los vehículos privados[5]. Además, la exposición al HAT en los vehículos puede llegar a niveles muy elevados[6,7,8,9], incluso ser superiores a los niveles observados en hogares donde se permite fumar[10]. Es por ello que en algunos países como el Reino Unido o Irlanda está prohibido fumar en el interior de los vehículos privados en presencia de menores desde el 2013[11].

Algunas organizaciones científicas han debatido también la inclusión en la regulación del consumo de tabaco de otros espacios públicos al aire libre ampliamente frecuentados por familias, como pueden ser las playas, los recintos deportivos al aire libre y las zonas exteriores de los centros comerciales[6]. La literatura científica muestra que fumar en áreas al aire libre conduce a la dispersión de emisiones tóxicas, donde, dependiendo de algunas condiciones, las concentraciones del HAT pueden llegar a ser tan elevadas como las observadas en espacios cerrados[10]. En la actualidad, estos espacios no están incluidos en la ley de control del tabaquismo española[1,6], si bien sí que han sido incluidos en regulaciones propias en algunos municipios españoles[6]. En este sentido, un estudio transversal realizado en Barcelona durante el año 2011-2012 sugirió que más del 50% de la población tenía una actitud favorable a la prohibición de fumar en las zonas exteriores de los transportes públicos, los recintos deportivos al aire libre y las zonas exteriores de los campus universitarios[12]. No obstante, este mismo estudio sugirió que, en espacios como las playas y las zonas exteriores de los centros comerciales, el porcentaje favorable a la prohibición de fumar es inferior al 50%[12].

La extensión de la ley a vehículos privados y a espacios públicos al aire libre resulta un tema controvertido. Algunos investigadores y responsables políticos argumentan que este tipo de legislación viola el principio de libertad y autonomía de las personas[6,12]. Además, sostienen que no hay suficientes evidencias para afirmar que el HAT en espacios al aire libre tenga un efecto nocivo para la salud[6]. Sin embargo, en el 2006 el departamento de salud de los EEUU determinó que no hay un nivel de riesgo seguro respecto a la exposición al HAT. Por tanto, el debate sigue abierto[13].

Las políticas de control del tabaquismo reducen la prevalencia de exposición al HAT e incrementan la adopción voluntaria de espacios privados libre de humo[10,14,15]. Nosotros hipotetizamos que, después de la Ley 42/2010, la actitud hacia la restricción de fumar en el transporte privado y en espacios públicos al aire libre ha aumentado. Por ello, el objetivo de nuestro estudio fue describir las actitudes de la población hacia la regulación de fumar en los vehículos privados y en espacios públicos al aire libre.

SUJETOS Y MÉTODOS

Para este estudio se utilizaron los datos de seguimiento del proyecto "Determinantes de la Cotinina en su tercera fase" (dCOT3), un estudio de cohortes sobre una muestra representativa de la población a partir de 16 años de la ciudad de Barcelona, España. Su propósito fue evaluar el impacto de la legislación española de control del tabaquismo (Leyes 28/2005 y 42/2010) sobre la exposición al humo ambiental del tabaco en personas no fumadoras. La muestra basal fue entrevistada durante el 2004-2005 y estuvo compuesta por 1.245 individuos, de los cuales 694 fueron mujeres y 551 fueron hombres. Durante el 2013-2014 se recogieron los datos de seguimiento. Los detalles de cómo se obtuvo la muestra se describieron en otra publicación[16]. Para este estudio se utilizaron los datos del seguimiento de la cohorte, compuesta por 736 individuos, de los cuales 401 eran mujeres y 335 hombres. Al tratarse de un estudio de cohortes, la base de datos de seguimiento se encontró envejecida en comparación con la población general de Barcelona en el momento del estudio basal y no se tuvo representación de la franja más joven (18-24). Por este motivo se utilizaron pesos de probabilidad inversa, con el objetivo de balancear la muestra con la distribución de edad de la población de Barcelona en 2013-2014 y así mantener la representatividad de la muestra en el momento del estudio.

Variables de estudio:

– Actitud hacia la prohibición de fumar en el interior de los vehículos privados. Se estudió la actitud hacia la prohibición de fumar en el interior de los vehículos privados tanto en presencia de menores como independientemente de los ocupantes de los vehículos. Estas variables se recogieron mediante la pregunta, "*¿Fumar debe estar prohibido en el interior de los coches…?*" con cinco posibles respuestas (totalmente de acuerdo, de acuerdo, ni de acuerdo ni en desacuerdo, en desacuerdo, totalmente en desacuerdo). Se dicotomizó esta variable en las siguientes categorías: "*Sí*" aquellos que estuvieron totalmente de acuerdo y de acuerdo, y "*No*" aquellos que no estuvieron ni de acuerdo ni desacuerdo, en desacuerdo y totalmente en desacuerdo.

– Actitud hacia la prohibición de fumar en espacios públicos al aire libre. Se estudió la actitud hacia la prohibición de fumar en algunos espacios públicos al aire libre, incluyendo: zonas exteriores de escuelas e institutos, zonas exteriores de centros universitarios, zonas exteriores de hospitales y centros de salud, zonas al aire libre de transportes públicos (paradas de autobús, andenes), parques infantiles, zonas al aire libre de los centros comerciales, recintos deportivos al aire libre y playas y piscinas descubiertas. Estas variables se recogieron mediante la pregunta para cada una de las zonas exteriores, "*¿Fumar debe estar prohibido en…?*" con cinco posibles respuestas (totalmente de acuerdo, de acuerdo, ni de acuerdo ni en desacuerdo, en desacuerdo, totalmente en desacuerdo). Se dicotomizó esta variable de la misma manera que las variables correspondientes al interior de los vehículos privados.

– Covariables. Como covariables se utilizó información sociodemográfica: sexo (mujer/hombre), edad (25-44 años, 45-64 años y mayores de 65 años), nivel de estudios (bajo: no escolarizado, educación primaria incompleta y completa y educación especial; intermedio: educación secundaria y formación profesional; alto: educación universitaria) y presencia de menores en el hogar (sí/no). Además, también se usó como covariables información relacionada con el comportamiento tabáquico, como el estatus de consumo (fumador, exfumador y no fumador) y el test Fagerström para la dependencia al cigarrillo (FTCD: *Fagerström Test for Cigarette Dependence*) (Baja: ≤4; Media: 5; Alta: >5[17].

Análisis estadístico. Calculamos el porcentaje de individuos que tuvieron una actitud favorable hacia las regulaciones de consumo de tabaco en el interior de vehículos privados y en espacios públicos al aire libre según sexo, edad, nivel de estudios, presencia de menores en el hogar, consumo de tabaco y nivel de dependencia de los fumadores. Además, se calcularon las Odds Ratio ajustadas (ORa) y sus intervalos de confianza al 95% de estar de acuerdo con las regulaciones del consumo de tabaco, obtenidas mediante un modelo de regresión logística ajustando por sexo, edad, nivel educacional y consumo de tabaco. El análisis se realizó con el programa estadístico R-3.4.2.

RESULTADOS

Actitud hacia la prohibición de fumar en el interior de los vehículos privados. El 89,5% de los participantes estuvieron a favor de la prohibición de fumar dentro de vehículos privados en presencia de menores y un 61,7% independientemente de su presencia en el vehículo (tabla 1). Al estratificar el apoyo según el consumo de tabaco, la magnitud de la asociación de estar a favor de prohibir fumar en el interior de los vehículos privados fue significativamente superior en los no fumadores respecto de los fumadores tanto en presencia de menores (ORa: 3,95, IC95%: 1,98; 7,91) como independientemente de los ocupantes del vehículo (ORa: 2,36, IC95%: 1,52; 3,68). Entre los fumadores, la magnitud de asociación de estar a favor de la prohibición de fumar en el interior de los vehículos privados en presencia de menores fue significativamente inferior para aquéllos que tenían una dependencia alta al cigarrillo respecto de los que tenían una dependencia baja (ORa: 0,25, IC95%: 0,08; 0,84). Este patrón se repitió cuando estaban a favor de la prohibición de fumar independientemente de los ocupantes del vehículo (ORa: 0,20, IC95%: 0,07; 0,59) (tabla 1).

Actitud hacia la prohibición de fumar en espacios públicos al aire libre. El 77,5% y el 77,6% de los encuestados estuvieron a favor de prohibir fumar en las zonas exteriores de las escuelas e institutos y en las zonas exteriores de hospitales y centros de salud, respectivamente. En los cuatro espacios públicos al aire libre estudiados (tabla 2), los no fumadores se mostraron más favorables a restringir el consumo de tabaco en comparación con los fumadores (p-valor <0,001). Cabe destacar el caso de las zonas al aire libre de los transportes, donde el apoyo a la regulación fue más de 5 veces superior en no fumadores que en fumadores (ORa: 5,35, IC95%: 3,35; 8,54). Este patrón se repitió en las zonas exteriores de las escuelas e institutos (ORa: 3,30, IC95%: 2,00; 5,45), en las zonas exteriores de los centros universitarios (ORa: 3,82, IC95%: 2,45; 5,94) y en las zonas exteriores de los hospitales y centros de salud (ORa: 4,12, IC95%: 2,51; 6,77). Además, los mayores se mostraron más favorables a apoyar la prohibición de fumar en las zonas exteriores de los centros universitarios que los menores, (ORa: 1,63, IC95%: 1,06; 2,57). Asimismo, los fumadores más dependientes mostraron un menor apoyo a estas restricciones (tabla 2).

El 84,7% de todos los participantes estuvieron a favor de la prohibición de fumar en los parques infantiles. Por el contrario, tan sólo el 42,5% de todos los encuestados estuvieron a favor de la prohibición de fumar en las zonas al aire libre de los centros comerciales. La magnitud de la asociación de estar a favor de la prohibición de fumar en los parques infantiles, zonas exteriores de los centros comerciales, recintos deportivos al aire libre y playas y piscinas descubiertas fue significativamente superior en los no fumadores respecto de los fumadores (tabla 3).

Tabla 1
Porcentaje y ORa+ del apoyo a las restricciones al consumo de tabaco en el interior de los coches en presencia de menores y en general según variables sociodemográficas y características del consumo de tabaco, Barcelona, 2013-2014.

Variables		n	Fumar debe estar prohibido en el interior de los coches en presencia de menores (n=734)			Fumar debe estar prohibido en el interior de los coches, sin excepciones (n=735)		
			%	p-valor(1)	ORa (IC95%)	%	p-valor(1)	ORa (IC95%)
Sexo	Total	736	89,5	0,005	-	61,7	0.011	-
	Hombres	335	85,9		1	56,4		1
	Mujeres	401	92,7		1,76 (1,04;3,00)	66,3		1,39 (0,99; 1,96)
Edad	25-44	198	87,9	0,473	1	50,7	<0,001	1
	45-64	267	90,2		1,22 (0,67; 2,23)	64,5		1,57 (1,06; 2,34)
	65-98	271	91,2		1,22 (0,60; 2,47)	75,2		1,90 (1,20; 3,02)
Nivel de estudios	Bajo	198	89,7	0,909	1	76,1	<0,001	1
	Medio	226	90,2		1,37 (0,63; 3,00)	58,9		0,62 (0,38; 1,03)
	Alto	312	89,0		1,11 (0,54; 2,32)	56,7		0,57 (0,35; 0,93)
Estatus de consumo de tabaco	Fumador	171	82,9	<0,001	1	43,4	<0,001	1
	Exfumador	267	87,7		1,44 (0,78; 2,65)	67,5		2,30 (1,48; 3,57)
	No fumador	298	95,5		3,95 (1,98; 7,91)	68,8		2,36 (1,52; 3,68)
Menores en casa	Sí	193	92,3	0,108	1	61,9	0,986	1
	No	442	87,8		0,54 (0,27; 1,08)	61,9		0,71 (0,46; 1,09)
FTCD(*)	Baja	101	87,4	0,027	1	52,1	<0,001	1
	Media	13	60,2		0,13 (0,03; 0,50)	9,6		0,06 (0,01; 0,37)
	Alta	28	69,8		0,25 (0,08; 0,84)	20,5		0,20 (0,07; 0,59)

+ORa: Odds ratio ajustada por sexo, edad, nivel de estudios y estatus de consumo de tabaco; FTCD: test de Fagerström para la dependencia del cigarrillo; Baja: ≤4; Media: 5; Alta: 6-10; (*) Solo entre fumadores; (1) p-valor obtenido a través del test de Chi^2 de Pearson

Tabla 2
Porcentaje y ORa+ del apoyo a las restricciones al consumo de tabaco en los exteriores de las escuelas o institutos, universidades, centros de salud y andenes o estaciones de transporte público según variables sociodemográficas y características del consumo de tabaco, Barcelona, 2013-2014.

Variables		n	Fumar debe estar prohibido en las zonas exteriores de escuelas e institutos (n=735)			Fumar debe estar prohibido en las zonas exteriores de los centros universitarios (n=732)			Fumar debe estar prohibido en las zonas exteriores de hospitales y centros de salud (n=735)			Fumar debe estar prohibido en las zonas al aire libre de los transportes públicos (n=734)		
			%	p-valor(1)	ORa (IC95%)	%	p-valor(1)	ORa (IC95%)	%	p-valor(1)	ORa (IC95%)	%	p-valor(1)	ORa (IC95%)
Sexo	Total	736	77,5	0,216	-	57,7	0,049	-	77,6	0,548	-	65,7	0,611	-
	Hombres	335	75,4		1	53,5		1	78,7		1	64,7		1
	Mujeres	401	79,4		1,10 (0,74; 1,62)	61,3		1,17 (0,83; 1,64)	76,7		0,73 (0,50; 1,07)	66,6		0,89 (0,62; 1,26)
Edad	25-44	198	78,6	0,380	1	48,5	<0,001	1	79,2	0,076	1	66,9	0,224	1
	45-64	267	74,5		0,74 (0,47; 1,16)	59,1		1,44 (0,97; 2,15)	72,6		0,65 (0,41; 1,02)	61,4		0,67 (0,44; 1,02)
	65-98	271	79,7		0,79 (0,46; 1,35)	70,0		1,63 (1,03; 2,57)	81,2		0,72 (0,42; 1,22)	69,0		0,63 (0,39; 1,01)
Nivel de estudios	Bajo	198	79,1	0,531	1	70,1	0,002	1	82,8	0,141	1	70,8	0,307	1
	Medio	226	74,9		0,92 (0,53; 1,58)	53,2		0,66 (0,41; 1,07)	74,1		0,68 (0,39; 1,19)	63,4		0,81 (0,51; 1,30)
	Alto	312	78,5		1,00 (0,59; 1,69)	54,8		0,68 (0,43; 1,08)	77,4		0,71 (0,41; 1,24)	64,8		0,72 (0,45; 1,13)
Estatus de consumo de tabaco	Fumador	171	64,6	<0,001	1	35,1	<0,001	1	64,3	<0,001	1	43,3	<0,001	1
	Exfumador	267	78,0		2,07 (1,29; 3,30)	60,2		2,43 (1,58; 3,76)	76,5		1,94 (1,22; 3,08)	67,7		3,07 (1,99; 4,75)
	No fumador	298	85,6		3,30 (2,00; 5,45)	70,4		3,82 (2,45; 5,94)	87,2		4,12 (2,51; 6,77)	78,7		5,35 (3,35; 8,54)
Menores en casa	Sí	193	79,4	0,501	1	57,2	0,724	1	78,3	0,799	1	67,7	0,464	1
	No	442	76,9		0,84 (0,52; 1,35)	58,8		0,83 (0,54; 1,26)	77,4		0,89 (0,55; 1,44)	64,6		0,83 (0,54; 1,29)
FTCD(*)	Baja	101	64,2	0,254	1	37,6	0,098	1	68,3	0,066	1	48,6	0,003	1
	Media	13	46,2		0,34 (0,10; 1,20)	27,3		0,43 (0,11; 1,73)	46,2		0,27 (0,08; 0,95)	12,6		0,11 (0,02; 0,54)
	Alta	28	49,4		0,45 (0,18; 1,14)	17,0		0,30 (0,10; 0,90)	46,0		0,33 (0,13; 0,85)	21,1		0,21 (0,07; 0,63)

+ORa: Odds ratio ajustada por sexo, edad, nivel de estudios y estatus de consumo de tabaco; FTCD: test de Fagerström para la dependencia del cigarrillo; Baja: ≤4; Media: 5; Alta: 6-10; (*) Solo entre fumadores; (1) p-valor obtenido a través del test de chi² de Pearson

Tabla 3
Porcentaje y ORa+ del apoyo a las restricciones al consumo de tabaco en parques infantiles, centros comerciales, centros deportivos y playas o piscinas según variables sociodemográficas y características del consumo de tabaco, Barcelona, 2013-2014.

Variables		n	Fumar debe estar prohibido en los parques infantiles (n=735)			Fumar debe estar prohibido en las zonas al aire libre de los centros comerciales (n=734)			Fumar debe estar prohibido en los recintos deportivos al aire libre (n=728)			Fumar debe estar prohibido en las playas y en las piscinas descubiertas (n=730)		
			%	p-valor(1)	ORa (IC95%)	%	p-valor(1)	ORa (IC95%)	%	p-valor(1)	ORa (IC95%)	%	p-valor(1)	ORa (IC95%)
	Total	736	84,7		-	42,5		-	65,0		-	50,3		-
Sexo	Hombres	335	83,3	0,337	1	41,2	0,517	1	64,4	0,771	1	46,4	0,063	1
	Mujeres	401	85,9		0,99 (0,64; 1,53)	43,7		0,92 (0,65; 1,28)	65,5		0,87 (0,61; 1,24)	53,7		1,10 (0,78; 1,55)
Edad	25-44	198	89,6	0,011	1	41,5	0,013	1	66,1	0,871	1	47,9	0,138	1
	45-64	267	81,4		0,50 (0,29; 0,88)	36,8		0,71 (0,47; 1,08)	64,2		0,79 (0,51; 1,21)	48,3		0,89 (0,59; 1,34)
	65-98	271	81,1		0,35 (0,19; 0,65)	51,0		0,89 (0,57; 1,40)	64,2		0,52 (0,32; 0,86)	56,6		0,83 (0,53; 1,31)
Nivel de estudios	Bajo	198	85,7	0,306	1	51,9	0,028	1	68,2	0,379	1	58,4	0,059	1
	Medio	226	81,6		0,66 (0,42; 1,39)	40,5		0,76 (0,49; 1,20)	61,4		0,77 (0,47; 1,24)	45,8		0,74 (0,47; 1,15)
	Alto	312	86,2		0,76 (0,42; 1,39)	39,4		0,64 (0,41; 0,99)	65,7		0,77 (0,48; 1,23)	49,4		0,73 (0,48; 1,13)
Estatus de consumo de tabaco	Fumador	171	79,5	<0,001	1	21,3	<0,001	1	42,0	<0,001	1	22,7	<0,001	1
	Exfumador	267	80,0		1,30 (0,77; 2,18)	43,1		2,89 (1,78; 4,70)	69,6		3,65 (2,33; 5,72)	52,5		3,85 (2,39; 6,22)
	No fumador	298	92,0		3,59 (2,02; 6,40)	56,1		4,76 (2,94; 7,71)	76,2		5,19 (3,23; 8,33)	66,7		6,74 (4,15; 10,96)
Menores en casa	Sí	193	88,5	0,111	1	39,5	0,389	1	64,8	0,787	1	52,3	0,375	1
	No	442	83,6		0,78 (0,44; 1,40)	43,3		1,08 (0,70; 1,66)	66,0		1,28 (0,81; 2,02)	48,3		0,78 (0,50; 1,20)
FTCD(*)	Baja	101	81,2	0,185	1	24,3	0,030	1	44,8	0,274	1	25,1	0,039	1
	Media	13	60,0		0,24 (0,06; 0,91)	10,5		0,23 (0,03; 1,58)	39,8		0,45 (0,12; 1,63)	4,1		0,11 (0,01; 1,08)
	Alta	28	72,0		0,50 (0,18; 1,34)	5,6		0,14 (0,02; 0,86)	26,9		0,27 (0,09; 0,81)	8,3		0,20 (0,03; 1,35)

+ORa: Odds ratio ajustada por sexo, edad, nivel de estudios y estatus de consumo de tabaco; FTCD: test de Fagerström para la dependencia del cigarrillo; Baja: ≤4; Media: 5; Alta: 6-10; (*) Solo entre fumadores; (1) p-valor obtenido a través del test de chi² de Pearson

DISCUSIÓN

Nuestros resultados muestran que nueve de cada diez personas se muestran favorables a prohibir fumar en el interior de los vehículos privados en presencia de menores. Además, tres de cada cuatro personas se muestran a favor de la prohibición de fumar en el exterior de las escuelas e institutos, hospitales y centros de salud, y parques infantiles, algunos de estos espacios ya regulados por la actual ley del tabaco española.

Actitud hacia la prohibición de fumar en el interior de los vehículos privados. Nueve de cada diez personas se muestran a favor de la prohibición de fumar en el interior de los vehículos privados en presencia de niños. Sin embargo, esta proporción disminuye hasta seis de cada diez personas cuando la prohibición es independiente de los ocupantes de vehículo. Estos resultados concuerdan con los resultados obtenidos en un estudio realizado en Italia durante el 2011-2012[18] en el que el 92,5% de individuos en la población general se mostró a favor de este tipo de prohibiciones en presencia de niños. Por otro lado, ese estudio[18] mostró un mayor porcentaje de apoyo a la prohibición de fumar en vehículos, independientemente de los ocupantes del mismo, en comparación con nuestros resultados (79,6% vs 61,7%). Asimismo, en un estudio realizado en Sudáfrica durante el año 2010, se concluyó que 3 de cada 5 habitantes habían adoptado regulaciones libres de humo en su vehículo privado[19]. La prohibición de fumar en el interior de los vehículos privados es crucial para continuar reduciendo la exposición al HAT entre los no fumadores, particularmente entre los niños, ya que las evidencias muestran que fumar dentro de los vehículos privados puede exponer a los pasajeros a niveles muy elevados de exposición al HAT[6,7,8,9]. Además, fumar con la ventanilla bajada y con una ventilación alta disminuye los niveles de exposición al HAT, pero no los elimina[9,20].

Actitud hacia la prohibición de fumar en espacios públicos al aire libre. En términos generales, la actitud de estar a favor de la prohibición de fumar en espacios públicos al aire libre es superior en todos los espacios estudiados respecto de los resultados obtenidos en una fase previa del estudio realizado durante los años 2011-2012[12]. Particularmente, se observa un mayor apoyo a la prohibición de fumar en los recintos deportivos al aire libre siendo, un 11,5% mayor en términos absolutos.

En nuestro estudio, el mayor apoyo a la prohibición de fumar se observó en los parques infantiles, siendo este apoyo 4% superior, en términos absolutos, respecto de los resultados obtenidos en la fase previa del estudio durante los años 2011-2012[12] (84,7% vs 80,8%). Las evidencias muestran que los fumadores y los exfumadores tienen menos percepción del riesgo de exposición al HAT en la salud de los niños que quienes nunca han fumado[21,22], por lo tanto, esta diferencia podría deberse a que la prevalencia de ser fumador en la muestra de 2011-2012[12] era del 29% y en la muestra de 2013-2014 era del 23,3%. Por otra parte, el 57,7% de la población se muestra a favor de la prohibición de fumar en las zonas exteriores de los centros universitarios. Este porcentaje es superior un 5% en términos absolutos respecto de 2011-2012[12]. El apoyo a dicha regulación muestra una asociación directa con la edad, tal y como se observó en otro estudio realizado en una población universitaria de Barcelona[23]. Otro factor que parece influir en el apoyo a la regulación es el nivel de estudios. El porcentaje de estar a favor de prohibir fumar en todos los espacios públicos al aire libre es significativamente inferior en la población con un nivel de estudios bajo. Sin embargo, la mayoría de fumadores, quienes son los que menos apoyan la regulación del consumo de tabaco en estos espacios, tenía un nivel de estudios alto. Por lo tanto, el consumo de tabaco podría actuar como una variable confusora en la asociación observada entre el nivel de estudios y el apoyo a regulación.

Finalmente, el menor apoyo a la prohibición de fumar fue para las zonas al aire libre de los centros comerciales y las playas y piscinas descubiertas. Estos datos concuerdan con los resultados obtenidos en la fase 2 del estudio durante los años 2011-2012[12] siendo dichos espacios los que obtuvieron un menor apoyo. El riesgo de exposición al HAT en las playas puede ser significativo, ya que el nivel de partículas es alto en circunstancias de poco viento. Se ha observado que las concentraciones de $PM_{2.5}$ (material particulado respirable presente en la atmósfera de diámetro aerodimámico inferior o igual a los 2.5 micrómetros) se mantienen presentes en lugares resguardados como pueden ser bajo las sombrillas[24].

Además, cabe destacar que según datos del Barómetro Sanitario del 2014[26] la percepción del cumplimiento de la regulación de fumar en los espacios exteriores ya regulados (alrededores de hospitales y colegios) de la población española no es muy elevado en comparación con el cumplimiento de la regulación en el interior de los bares y restaurantes (puntuación media de 5,09 y 8,10, respectivamente, sobre 10).

Intervenciones en salud pública. Nuestros resultados muestran el apoyo de la población a la regulación de espacios libres de humo en el interior de vehículos privados en presencia de menores, ya en vigor en algunos países[9,11,27]. En España esta medida aún no existe, por lo que su implementación es factible debido al gran apoyo observado incluso entre los fumadores. Por otro lado, el consumo de tabaco mientras se conduce también es un factor de distracción que puede aumentar el riesgo de tener accidentes de tráfico[28,29,30]. Un estudio[31] ha estimado que los conductores fumadores tienen hasta 1,5 más probabilidad de tener un accidente al volante que los no fumadores[31]. La distracción al fumar se asocia, entre otras, a la disminución de la habilidad manual con el volante, a la reducción de la atención en la carretera (al encender y apagar el cigarrillo o a la irritación en los ojos provocada por el monóxido de carbono presente en el HAT), sin mencionar la menor percepción de riesgo que tienen los fumadores al volante versus los no fumadores[22,31]. Además, un estudio observacional realizado en conductores de Gerona[32] mostró que la segunda actividad más prevalente realizada al volante es fumar, después de hablar con un compañero[32]. En este sentido, debido a que las distracciones al volante son una de las mayores causas de los accidentes de trafico[33], la prohibición de fumar en el interior de los vehículos privados podría favorecer también una disminución de las distracciones al volante y por lo tanto una potencial reducción de los accidentes de tráfico. En referencia a la regulación en los espacios públicos al aire libre, que todavía no están incluidos en la ley 42/2010, los lugares donde sería más aceptable aplicar la prohibición de fumar serían las zonas al aire libre de los transportes públicos (paradas de autobús, andenes) y los recintos deportivos al aire libre, ya que son los dos espacios que han obtenido el mayor porcentaje favorable a la prohibición de fumar. En el caso de los recintos deportivos, gracias a la promoción de estadios libres de humo[34] en las ultimas Copas del Mundo y Juegos Olímpicos por la *Fédération Internationale de Football Association* (FIFA), muchos estadios de fútbol de nivel profesional ya han adoptado con éxito una normativa interna de estadios libres de humo. El País Vasco, en su legislación autonómica del 2016, también incluyó la prohibición de fumar en cualquier instalación deportiva, independientemente de que sea cerrada, semicerrada o abierta[35]. Por el contrario, espacios como las playas/piscinas y los recintos comerciales al aire libre serían espacios donde la implementación puede ser más difícil, debido a que el apoyo es menos favorable. Por lo tanto, es necesario concienciar del riesgo a la exposición del HAT en estos espacios, ya que además son espacios normalmente frecuentados por niños. Además, también merece atención el impacto medioambiental que se genera con las colillas en las playas (considerado el humo de cuarta mano[36]). No obstante, independientemente del grado de apoyo a la legislación, extender la ley de control del tabaquismo al interior de los vehículos privados y a todos los espacios exteriores estudiados sería una medida importante de salud pública.

Limitaciones. Una limitación de este estudio es que si bien la muestra basal es representativa de la población general de Barcelona durante el 2004-2005, la muestra de seguimiento corresponde a una población envejecida respecto a la población residente en Barcelona durante el 2013-2014, que es la población de referencia de este estudio. Por este motivo se han utilizado pesos de probabilidad inversa con el fin de mantener la representatividad de la población de Barcelona durante el 2013-2014. Otras limitaciones son aquellas derivadas de los potenciales sesgos de información debidos al uso de un cuestionario. No obstante, este sesgo se minimiza si se tiene en cuenta que las preguntas del cuestionario son cerradas, especificando en cada caso el espacio concreto y con opciones de respuesta en una escala Likert de 5 puntos. Una fortaleza de este estudio es la amplia gama de espacios estudiados, incluyendo espacios públicos al aire libre y espacios privados.

Existe un amplio apoyo a la regulación del consumo del tabaco en el interior de vehículos privados, especialmente en presencia de menores, y en ciertos espacios públicos al aire libre. Por ello, los legisladores encontrarían un ambiente favorable para fomentar la ampliación de la regulación del consumo de tabaco a estos espacios para mejorar la salud de la población y contribuir a la desnormalización del consumo de tabaco.

BIBLIOGRAFÍA

1. Gobierno de España. Ley 42/2010 , de 30 de diciembre , por la que se modifica la Ley 28/2005 , de 26 de diciembre , de medidas sanitarias frente al tabaquismo y reguladora de la venta , el suministro , el consumo y la publicidad de los productos del tabaco. Bol. Of. del Estado (2010).

2. Martínez-Sánchez, J. M. et al. Do smoke-free policies in work and public places increase smoking in private venues? Tob. Control 23, 204–207 (2014).

3. Lidón-Moyano, C. et al. Impact of the Spanish smoking legislations in the adoption of smoke-free rules at home: a longitudinal study in Barcelona (Spain). Tob. Control 26, 557 LP-562 (2017).

4. Lletjós, P. et al. Asociación entre el humo ambiental de tabaco y el estado de salud en la población infantil. Gac. Sanit. (2018). doi:10.1016/J.GACETA.2018.10.006.

5. Curto, A., Martínez-Sánchez, J. M. & Fernández, E. Tobacco consumption and secondhand smoke exposure in vehicles: a cross-sectional study. BMJ Open 1, e000418 (2011).

6. Grupo de Trabajo sobre Tabaquismo de la Sociedad Española de Epidemiología. Evaluación de las políticas de control del tabaquismo en España (Leyes 28/2005 y 42/2010) Revisión de la evidencia. (2017).

7. Northcross, A. L. et al. Particulate mass and polycyclic aromatic hydrocarbons exposure from secondhand smoke in the back seat of a vehicle. Tob. Control 23, 14–20 (2014).

8. Díez-Izquierdo, A. et al. Smoke-free homes and attitudes towards banning smoking in vehicles carrying children in Spain (2016). Environ. Res. 158, 590–597 (2017).

9. Montreuil, A. et al. Social disparities in children's exposure to secondhand smoke in privately owned vehicles. Tob. Control 26, 663–668 (2017).

10. Bartholomew, K. S. Policy options to promote smoke-free environments for children and adolescents. Curr. Probl. Pediatr. Adolesc. Health Care 45, 146–181 (2015).

11. Joossens, L. & Raw, M. The Tobacco Control Scale 2016 in Europe. (2017). Available at: www.tobaccocontrolscale.org. (Accessed: 21st January 2019)

12. Sureda, X. et al. Secondhand smoke in outdoor settings: Smokers' consumption, non-smokers' perceptions, and attitudes towards smoke-free legislation in Spain. BMJ Open 5, 1–9 (2015).

13. U.S. Department of Health and Human Services. The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 709. (2006). doi:10.1088/0953-8984/27/15/154205.

14. Cheng, K. W., Okechukwu, C. A., McMillen, R. & Glantz, S. A. Association between clean indoor air laws and voluntary smokefree rules in homes and cars. Tob. Control 24, 168–174 (2015).

15. Martínez-Sánchez, J. M. et al. Smoking Behaviour, Involuntary Smoking, Attitudes towards Smoke-Free Legislations, and Tobacco Control Activities in the European Union. PLoS One 5, (2010).

16. Lidón-Moyano, C. et al. Impact of the Spanish smoking laws on tobacco consumption and secondhand smoke exposure: A longitudinal population study. Addict. Behav. 75, 30–35 (2017).

17. Fu, M. et al. Stages of change, smoking characteristics, and cotinine concentrations in smokers: Setting priorities for smoking cessation. Prev. Med. (Baltim). 52, 139–145 (2011).

18. Martínez-Sánchez, J. M. et al. Smoking while driving and public support for car smoking bans in Italy. Tob. Control 23, 238–243 (2014).

19. Ayo-Yusuf, O. A., Olufajo, O. & Agaku, I. T. Exposure to secondhand smoke and voluntary adoption of smoke-free home and car rules among non-smoking South African adults. BMC Public Health 14, 1–8 (2014).

20. Raoof, S. A., Agaku, I. T. & Vardavas, C. I. A systematic review of secondhand smoke exposure in a car: Attributable changes in atmospheric and biological markers. Chron. Respir. Dis. 12, 120–131 (2015).

21. Roberts, C., Wagler, G. & Carr, M. M. Environmental Tobacco Smoke: Public Perception of Risks of Exposing Children to Second- and Third-Hand Tobacco Smoke. J. Pediatr. Heal. Care 31, e7–e13 (2017).

22. Lidón-Moyano, C. et al. Secondhand smoke risk perception and smoke-free rules in homes: a cross-sectional study in Barcelona (Spain). BMJ Open 7, e014207 (2017).

23. Martínez, C., Méndez, C., Sánchez, M. & Martínez-Sánchez, J. M. Actitudes de los estudiantes de una universidad de ciencias de la salud sobre la extensión de las políticas de espacios sin humo en los campus universitarios de Barcelona (España). Gac. Sanit. 31, 132–138 (2017).

24. Kungskulniti, N., Charoenca, N., Mock, J. & Hamann, S. L. Secondhand smoke point-source exposures assessed by particulate matter at two popular public beaches in Thailand. J. Public Health (Oxf). 40, 527–532 (2018).

25. Asensio-Montesinos, F., Anfuso, G. & Williams, A. T. Beach litter distribution along the western Mediterranean coast of Spain. Mar. Pollut. Bull. 141, 119–126 (2019).

26. CIS. Barómetro sanitario 2014. (2014). Available at: http://www.cis.es/cis/export/sites/default/-Archivos/Marginales/Globales/8814/es8814mar.pdf. (Accessed: 15th July 2019).

27. Moore, G. F. et al. Prevalence of smoking restrictions and child exposure to secondhand smoke in cars and homes: A repeated crosssectional survey of children aged 10-11 years in Wales. BMJ Open 5, (2015).

28. Sacks, J. J. & Nelson, D. E. Smoking and Injuries: An Overview. Prev. Med. (Baltim). 23, 515–520 (1994).

29. Wen, C. P. et al. Excess injury mortality among smokers: a neglected tobacco hazard. Tob. Control 14, i28 LP-i32 (2005).

30. Granados, J. M. B. et al. Smoking and nonfatal traffic accidents. Aten Primaria 31, 349–355 (2003).

31. Brison, R. J. Risk of automobile accidents in cigarette smokers. in CLINICAL AND INVESTIGATIVE MEDICINE-MEDECINE CLINIQUE ET EXPERIMENTALE 10, B78–B78 (CANADIAN MEDICAL ASSOCIATION 1867 ALTA VISTA DR, OTTAWA ON K1G 3Y6, CANADA, 1987).

32. Prat, F., Planes, M., Gras, M. E. & Sullman, M. J. M. An observational study of driving distractions on urban roads in Spain. Accid. Anal. Prev. 74, 8–16 (2015).

33. Huemer, A. K., Schumacher, M., Mennecke, M. & Vollrath, M. Systematic review of observational studies on secondary task engagement while driving. Accid. Anal. Prev. 119, 225–236 (2018).

34. Gallus, S. et al. Attitudes towards the extension of smoking restrictions to selected outdoor areas in Italy. Tob. Control 21, 59–62 (2011).

35. Gobierno Vasco. Boletín Oficial del País Vasco. (2016). Available at: https://www.euskadi.eus/y22-bopv/es/bopv2/datos/2016/04/1601527a.shtml. (Accessed: 14th July 2019).

36. de Granda-Orive, J. I., Jiménez-Ruiz, C. A. & Solano-Reina, S. Posicionamiento de la Organización Mundial de la Salud. Impacto del tabaco en el medio ambiente: cultivo, curado, manufactura, transporte y tabaquismo de tercera y cuarta mano. Arch. Bronconeumol. 54, 357–358 (2018).

E.3. Otros artículos III

Differences in sleep duration in territory with the same time zone according to the geographic longitude: the spanish case

Sleep Medicine 82 (2021) 151–154

Contents lists available at ScienceDirect

Sleep Medicine

journal homepage: www.elsevier.com/locate/sleep

Brief Communication

Differences in sleep duration in a territory with the same time zone according to the geographic longitude: the Spanish case

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ARTICLE INFO

Article history:
Received 13 October 2020
Received in revised form
26 March 2021
Accepted 28 March 2021
Available online 3 April 2021

Keywords:
Sleep
Short sleep duration
Children
Adolescents
Spain

ABSTRACT

Objective/Background: In some territories, such as Spain, daytime starts with around 1 h of difference between the easternmost and westernmost areas, but the time zone is the same in these areas. This difference might have an effect on children's sleep. The aim of this study is to assess if there are differences in the prevalence of short sleep duration between children under 15 years from easternmost (Catalonia) and westernmost (Galicia) continental territory areas in Spain.
Methods: Cross-sectional study using data from the 2017 Spanish National Health Survey ($n = 6106$). The final sample includes 1004 children under 15 years living in Catalonia and Galicia. We categorized sleep duration according to the National Sleep Foundation recommendations with respect to age in (1) not short sleep duration and (2) short sleep duration. We calculated overall percentages of short sleep duration, and unadjusted and adjusted Prevalence Ratios (PR) with 95% Confidence Intervals (95% CI), according to area and stratified by confounders and covariates. Unadjusted and adjusted PR were obtained through generalized linear models with Poisson family and robust variance. We adjusted the associations for confounders.
Results: Children from Galicia were less likely to have short sleep duration than children from Catalonia, $aPR_{Galicia} = 0.61$ (95% CI: 0.45,0.83).
Conclusions: Children living in the same country, potentially with a similar timetable, could be having shorter sleep durations according to their longitude position. Further studies are needed in order to consider promoting policies to apply timetables based on the sun position instead of on the national time zone.

1. Introduction

Shorter sleep durations are related to a great variety of physiological and psychological conditions [1]. There is evidence showing that children and adolescents have suffered from increased difficulties on sleep-onset [2] and decreased sleep duration [3] during the last decades. Some children's behaviours, such as eating high-calorie food [4,5], excessive screen time [6], and low levels of physical activity [7], might be associated with shorter sleep durations.

Apart from that, previous scientific research shows that environmental and cultural aspects, such as daylight hours or time to have dinner, also might be related to sleep duration [8]. In this sense, a study [8] published in 2011, which compares the sleep duration of children aged between 2 and 9 in 8 European countries, including Spain, concluded that children from southern and eastern European countries sleep less than children from northern European countries. These differences might be due to cultural aspects, such as people living in southern European countries tending to have dinner later than in northern European countries or adults usually integrating children in social evening activities, whereas in northern European countries adults might be stricter referring to sleep routines [8].

Individuals sharing cultural and social features may live at large distance within wide countries. Differences in geographical longitude imply differences in the daytime, which may eventually

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https://doi.org/10.1016/j.sleep.2021.03.038
1389-9457/

impact sleep duration. To the best of our knowledge, there are not studies assessing this association. Therefore, it may be interesting to study these differences between the most occidental and most oriental parts within a territory.

In Spain, between the westernmost (Galicia) and easternmost (Catalonia) areas in the continental territory, there exists more than 1000 km of distance. Consequently, Catalonia begins to get light around one hour earlier than Galicia. The aim of this study is to assess if there are differences in the prevalence of short sleep duration in Spanish children under 15 years between these two areas.

2. Methods

We used data from the 2017 Spanish National Health Survey for children, which included 6106 children under 15 years old. Data cleansing details can be found elsewhere [9]. The inclusion criterion was to live in Catalonia or Galicia (two autonomous communities of Spain). Parents and legal guardians, or other relative aged 15 years or over living with the child, in case of the impossibility of the formers, reported the data. 93.5% of questionnaires were answered by parents. The final sample included 1004 children.

2.1. Study variables

2.1.1. Sleep duration

Sleep duration was obtained through the answers to the question “Could you say, approximately, how much time the child usually sleeps daily, including naps?” We used the National Sleep Foundation (NSF) recommendations about the number of sleep hours according to the age [10,11] to identify children who did not have and who had short sleep duration. For children aged under 4 months, the NSF recommends sleeping 14-to-17-hours. For children between 4 and 11 months, the NSF recommends sleeping 12-to-15-hours. For children aged from 1 to 2 years, NSF recommends sleeping 11-to-14-hours. For children between 3 and 5 years, NSF recommends sleeping 10-to-13-hours. For children aged from 6 to 13 years, the NSF recommends sleeping 9-to-11-hours. For children between 14 and 17 years, the NSF recommends sleeping 8-to-10-hours. We categorized sleep duration in two categories (1) not short sleep duration: children who were reported to sleep more or equal than the NSF recommendations according to age and (2) short sleep duration: children who were not. For children under 1 year, we considered they were compliant with proper sleep duration when they slept 12 or more hours, as we ignored their age in months.

2.1.2. Area

Area was gathered through the variable “autonomous community”. We selected the individuals living in (1) Catalonia (n = 667) and (2) Galicia (n = 334).

2.1.3. Potential confounding variables and covariates

Based on previous literature, we used as potential confounding variables [6,12]: sex (male and female) and age in years grouped according to the Spanish school system (0–2, 3–5, 6–11, and 12–14) of the child, educational level of the parents (high: university education, medium: high school and training cycles, and low: unschooled, elementary school complemented of uncompleted and special education), social class categorized in six categories according to occupational social class (CSO-SEE12) based on the CNO-2011 and a neo-Weberian perspective (Class I: directors and managers of establishments with 10 or more employees and professionals traditionally associated with bachelor's university degrees, Class II: Directors and managers of establishments with fewer than 10 employees, professionals traditionally associated with diploma university degrees and other technical support professionals. Athletes and artists., Class III: intermediate occupations and self-employed workers, Class IV: supervisors and workers in skilled technical occupations, Class V: skilled primary sector workers and other semiskilled workers, and Class VI: unskilled workers) [13], daily leisure screen time in minutes: (0–59, 60–119, 120–179, and ≥180), physical activity in their leisure time (no exercise, physical or sports activity occasionally, physical activity several times a month, and sports or physical training several times a week), size of the municipality in citizens (≥500,000, capital of province not included previously, 100,000–499,999, 50,000–99,999, 20,000–49,999, 10,000–19,999, and <10,000), and country of birth (Spain and other). Since for children aged under 1 year their daily leisure screen time was not available, we created a category in the daily leisure screen time variable, called not applicable (0 years), in order to include them into the model.

2.2. Statistical analysis

We described the variable area overall and stratified by potential confounders and covariates. Moreover, we calculated the median, and interquartile range (IQR: first and third quartiles) of sleep duration in hours overall and stratified by potential confounders and covariates. We used median and IQR due to the non-normality of the data. We tested differences in sleep duration according to area through the Mann–Whitney test. Further, we calculated the prevalence of short sleep duration according to area, overall and stratified by confounding variables and covariates. Moreover, we calculated unadjusted and adjusted prevalence ratio (PR and aPR respectively) with 95% Confidence Intervals (95% CI) of short sleep duration according to area, overall and stratified by confounding variables and covariates. Associations were fitted through generalized linear models with Poisson family and robust variances. We adjusted the associations for confounding variables. We did not adjust models for education level of the parents and social class jointly in order to avoid collinearity. The statistical software used was R-3.6.2.

2.3. Research ethics

The investigation was carried out considering the rules of the Declaration of Helsinki of 1975. We used secondary data which is publicly available in the following repository (https://www.mscbs.gob.es/estadEstudios/estadisticas/encuestaNacional/encuesta2017.htm). Written informed consent was not necessary since anonymous data were used and an ethics committee approval not require.

3. Results

This study included 1004 children under 15 years: 66.7% lived in Catalonia, 51.5% were male, and on average they were 7.6 ± 4.3 years, 56.8% of children's parents had medium education level, 26.5% were exposed to screens during their leisure time between 120 and 179 min, 36.0% did physical activity several times per month, and 96% were born in Spain. We found differences between Catalonia and Galicia according to educational level of the parents, social class, daily leisure screen time, physical activity in their leisure time, and size of municipality. Median of sleep duration was 9 h (IQR: 9,10) for Catalonia area and 10 h (IQR: 9,11) for Galicia area. We found differences of sleep duration between Catalonia and Galicia according to sex and age of the child, education level, social class, daily leisure screen time, physical activity in their leisure time, size of municipality, and country of birth.

Further, children living in Galicia were less likely to have short sleep duration than children living in Catalonia, $PR_{Galicia} = 0.61$ (95% CI: 0.46,0.80). This pattern is maintained after adjusting for

Table 1
Descriptive of area according to potential confounding variables and 95% confidence intervals of percentage difference between Catalonia and Galicia. Median and interquartile range of sleep duration according to area. Percentage, unadjusted and adjusted prevalence ratio, and 95% confidence intervals of short sleep duration according to area overall and stratified by potential confounding variables and covariates.

	Overall n (%)	Area (n = 1004)			Sleep duration (h)			Short sleep duration			
		Catalonia n (%)	Galicia n (%)	95% CI proportion differences (Catalonia-Galicia)	Catalonia median (IQR)	Galicia median (IQR)	p-value	% Catalonia (n = 670)	% Galicia (n = 334)	PR (95% CI)	aPR (95% CI)
Overall	1004 (100)	670 (66.7)	334 (33.3)	(29.2,37.7)	9 (9,10)	10 (9,11)	<0.001	26.7	16.2	0.61 (0.46,0.80)	0.61 (0.45,0.83)
Sex of the child											
Male	517 (51.5)	354 (52.8)	163 (48.8)	(-2.8,10.8)	9 (9,10)	10 (9,11)	<0.001	26.3	18.4	0.70 (0.49,1.01)	0.61 (0.41,0.92)
Female	487 (48.5)	316 (47.2)	171 (51.2)	(-10.8,2.8)	9 (9,10)	10 (9,11)	<0.001	27.2	14.0	0.52 (0.34,0.78)	0.62 (0.38,1.01)
Age of the child (years)											
0–2	175 (17.4)	112 (16.7)	63 (18.9)	(-7.4,3.1)	11.5 (10,12.3)	12 (10,13)	0.375	36.6	30.2	0.75 (0.39,1.45)	0.84 (0.52,1.37)
3–5	166 (16.5)	107 (16.0)	59 (17.7)	(-6.9,3.5)	10 (9,11)	10 (10,11)	0.007	29.9	15.3	0.51 (0.26,0.99)	0.51 (0.20,1.31)
6–11	406 (40.4)	278 (41.5)	128 (38.3)	(-3.5,9.8)	9 (9,10)	10 (9,10)	<0.001	16.9	7.8	0.46 (0.24,0.88)	0.44 (0.20,0.93)
12–14	257 (25.6)	173 (25.8)	84 (25.1)	(-5.3,6.6)	9 (8,9)	9 (8,10)	<0.001	34.1	19.0	0.56 (0.34,0.91)	0.55 (0.32,0.95)
Education level of the parents											
Low	99 (10.3)	54 (8.4)	45 (14.1)	(-9.8,-1.0)	10 (9,10)	10 (9,11)	0.148	24.1	15.6	0.65 (0.28,1.48)	0.46 (0.14,1.50)
Medium	546 (56.8)	371 (57.9)	175 (54.7)	(-3.8,9.7)	9 (9,10)	10 (9,11)	<0.001	27.0	14.3	0.53 (0.36,0.79)	0.57 (0.36,0.88)
High	316 (32.9)	216 (33.7)	100 (31.2)	(-4.0,8.6)	9 (9,10)	10 (9,11)	0.003	25.9	19.0	0.73 (0.46,1.16)	0.83 (0.50,1.37)
Social class											
Class I	150 (16.7)	114 (18.6)	36 (12.7)	(1.6,10.8)	9 (9,10)	10 (9,11)	0.031	27.2	16.7	0.61 (0.28,1.35)	0.46 (0.18,1.20)
Class II	82 (9.1)	55 (9.0)	27 (9.5)	(-3.6,3.8)	9 (9,10)	10 (9,10.5)	0.064	29.1	14.8	0.51 (0.19,1.38)	0.63 (0.20,1.97)
Class III	165 (18.4)	119 (19.4)	46 (16.2)	(-0.9,8.9)	10 (9,10)	10 (9,11)	0.003	23.5	17.4	0.74 (0.36,1.50)	0.97 (0.45,2.06)
Class IV	135 (15.1)	92 (15.0)	43 (15.1)	(-3.8,5.5)	9.5 (9,10)	10 (9,11)	0.124	30.4	18.6	0.61 (0.30,1.23)	0.60 (0.30,1.19)
Class V	276 (30.8)	173 (28.2)	103 (36.3)	(-11.2,1.2)	10 (9,10)	10 (9,10)	0.060	25.4	15.5	0.61 (0.36,1.02)	0.65 (0.37,1.13)
Class VI	89 (9.9)	60 (9.8)	29 (10.2)	(-3.7,4.2)	9 (9,10.25)	10 (9,10)	0.187	28.3	20.7	0.73 (0.32,1.66)	0.84 (0.26,2.72)
Daily leisure screen time (min)											
Not applicable (0 years)	44 (4.4)	25 (3.7)	19 (5.7)	(-5.1,1.1)	14 (12,15)	14 (12,16)	0.746	16.0	10.5	0.66 (0.13,3.22)	0.35 (0.03,4.41)
0–59	323 (32.3)	203 (30.4)	120 (36.0)	(-12.1,0.8)	10 (9,10)	10 (9,11)	0.044	25.6	15.8	0.62 (0.38,0.99)	0.60 (0.36,1.02)
60–119	233 (23.3)	172 (25.8)	61 (18.3)	(1.9,12.9)	9 (9,10)	10 (9,10)	0.021	22.1	14.8	0.67 (0.34,1.30)	0.51 (0.22,1.19)
120–179	253 (25.3)	160 (24.0)	93 (27.9)	(-10.0,2.1.0)	9 (8,10)	10 (9,10)	0.001	31.2	18.3	0.58 (0.36,0.95)	0.66 (0.39,1.12)
≥180	147 (14.7)	107 (16.0)	40 (12.0)	(-0.7,8.7)	9 (8,10)	9 (9,10)	0.010	31.8	17.5	0.55 (0.27,1.14)	0.77 (0.35,1.71)
Physical activity in their leisure time											
No exercise	227 (22.7)	165 (24.7)	62 (18.7)	(0.5,11.6)	10 (9,12)	11 (9,12.8)	0.184	30.9	17.7	0.57 (0.32,1.03)	0.74 (0.40,1.36)
Physical or sports activity occasionally	262 (26.2)	151 (22.6)	111 (33.4)	(-16.9,-4.5)	10 (9,10)	10 (10,11)	0.003	21.2	18.9	0.89 (0.55,1.46)	0.69 (0.37,1.29)
Physical activity several times a month	360 (36.0)	207 (31.0)	153 (46.1)	(-21.5,-8.3)	9 (8,10)	10 (9,10)	<0.001	30.9	13.7	0.44 (0.28,0.69)	0.43 (0.26,0.69)
Sports or physical training several times a week	151 (15.1)	145 (21.7)	6 (1.8)	(16.2,23.5)	9 (8,10)	10 (9,10)	<0.001	21.4	16.7	0.78 (0.13,4.79)	1.02 (0.18,5.75)
Size of the municipality (citizens)											
≥500,000	112 (11.2)	112 (16.7)	0 (0.0)	(13.7,19.8)	10 (9,10)	–	–	33.0	–	–	–
Province capital (excluding previous)	97 (9.7)	37 (5.5)	60 (18)	(-17.1,-7.8)	9 (8,10)	10 (9,10)	0.021	35.1	20.0	0.57 (0.29,1.11)	0.67 (0.31,1.46)
100,000–499,999	139 (13.8)	102 (15.2)	37 (11.1)	(-0.4,8.7)	9 (9,10)	10 (9,10)	0.406	26.5	13.5	0.51 (0.21,1.23)	0.71 (0.28,1.76)
50,000–99,999	110 (11.0)	90 (13.4)	20 (6.0)	(3.6,11.3)	9 (9,10)	10 (9,10)	0.111	21.1	20.0	0.95 (0.36,2.48)	0.74 (0.24,2.26)
20,000–49,999	191 (19.0)	133 (19.9)	58 (17.4)	(-2.8,7.8)	10 (9,10)	10 (9,11)	0.002	27.1	17.2	0.64 (0.34,1.19)	0.58 (0.30,1.15)
10,000–19,999	146 (14.5)	73 (10.9)	73 (21.9)	(-16.2,-5.7)	9 (8,10)	10 (9,11)	0.020	32.9	19.2	0.58 (0.33,1.04)	0.62 (0.31,1.26)
0-9999	209 (20.8)	123 (18.4)	86 (25.7)	(-13.1,-1.6)	9 (9,10)	10 (9,11)	0.011	18.7	10.5	0.56 (0.27,1.15)	0.53 (0.23,1.20)
Country of birth											
Spain	964 (96.0)	642 (95.8)	322 (96.4)	(-3.3,2.1)	9 (9,10)	10 (9,11)	<0.001	25.9	15.8	0.61 (0.46,0.81)	0.63 (0.46,0.86)
Other	40 (4.0)	28 (4.2)	12 (3.6)	(-2.1,3.3)	9 (8,10)	10 (9,11)	0.078	46.4	25.0	0.54 (0.19,1.55)	0.96 (0.39,2.34)

n: absolute frequency; %: percentage; 95% CI: 95% confidence interval; IQR:first and third quartile; PR: Prevalence Ratio; aPR: adjusted prevalence ratio; min: minutes; h: hours.

potential confounding variables, $aPR_{Galicia} = 0.61$ (95% CI: 0.45,0.83). This result is robust after stratifying except for children who were under 3 years $aPR_{Galicia} = 0.84$ (95% CI: 0.52,1.37), children belonging a family with third social class $aPR_{Galicia} = 0.97$ (95% CI: 0.45,2.06), children belonging a family with sixth social class $aPR_{Galicia} = 0.84$ (95% CI: 0.26,2.72), children doing sports or physical training several times per week $aPR_{Galicia} = 1.02$ (95% CI: 0.18,5.75), and children were not born in Spain $aPR_{Galicia} = 0.96$ (95% CI: 0.39,2.34) (Table 1).

4. Discussion

According to our results, children living in Catalonia were more likely to have short sleep duration than children from Galicia. These results are in line with previous results obtained in a study published in 2011 comparing nocturnal sleep duration among 8 European countries, which concluded that children living in northwestern areas sleep more than children living in eastern areas. Nonetheless, this study [8] compared sleep duration among different countries with different cultures and timetables, whereas we compared sleep behaviour within the same country and therefore in a more similar environment. If children's daytime routines in Galicia and Catalonia are similar and in both areas children go to bed at similar hour, but the eastern territory (Catalonia) is in delay according to the sun position, this may mean that children are going to bed later according to solar time, so the children from Galicia go to bed in a better moment.

Furthermore, our results suggest that there are not differences regarding the prevalence of short sleep duration between Catalonia and Galicia for children under 3 years. This might be explained because parents of younger children are more prone to routines and rigorous schedules, less modifiable by factors as environmental light. Besides, children under 3 years are more likely to doing naps than children aged 3 years or older.

In addition, our results also suggest that differences in short sleep duration between Catalonia and Galicia are more prominent in females, children older than 3 years, children whose parents had medium education level, children spending longer periods of screen time for leisure, children doing physical activity for leisure several times per month, and children were born in Spain. In this sense, we tested moderation effect of these factors on the difference between Catalonia and Galicia and we did not find differences (data not shown).

4.1. Strengths and limitations

To the best of our knowledge, this is the first study that compares the sleep patterns between easternmost and westernmost areas within the same country in the same time zone. Further, this survey is representative at the national level. Nevertheless, we cannot take into account some other important individual aspects such as pubertal status or race/ethnicity, cultural aspects such as school start times, time going to bed or time having dinner, as well as environmental aspects such as temperature, daylight hours, or rains. Moreover, data was gathered through a questionnaire that is more susceptible to social desirability and recall bias.

4.2. Conclusions

Children living in the same country, potentially with a similar way of living, could be having different sleep patterns according to the longitude position they live in. Future research should study more deeply this subject, in order for institutions, in wider countries, to consider promoting policies to apply timetables based on the sun position instead of on the national time zone.

Role of funding sources

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. Authors are supported by Secretaria d'Universitats i Recerca, Departament d'Empresa i Coneixement, Generalitat de Catalunya (2017SGR608).

CRediT authorship contribution statement

Àurea Cartanyà-Hueso: Methodology, Formal analysis, Data curation, Writing – original draft, Writing – review & editing. **Juan Carlos Martín-Sánchez:** Conceptualization, Writing – review & editing, Methodology, Writing – original draft, Supervision. **Cristina Lidón-Moyano:** Writing – review & editing. **Adrián González-Marrón:** Writing – review & editing. **Jose M. Martínez-Sánchez:** Conceptualization, Writing – review & editing.

Conflict of interest

The ICMJE Uniform Disclosure Form for Potential Conflicts of Interest associated with this article can be viewed by clicking on the following link: https://doi.org/10.1016/j.sleep.2021.03.038.

References

[1] Carson V, Hunter S, Kuzik N, et al. Systematic review of sedentary behaviour and health indicators in school-aged children and youth: an update. Appl Physiol Nutr Metabol 2016;41:S240–65.
[2] Ghekiere A, Van Cauwenberg J, Vandendriessche A, et al. Trends in sleeping difficulties among European adolescents: are these associated with physical inactivity and excessive screen time? Int J Publ Health 2018. https://doi.org/10.1007/s00038-018-1188-1.
[3] de Ruiter I, Olmedo-Requena R, Sánchez-Cruz J-J, et al. Changes in sleep duration in Spanish children aged 2–14 years from 1987 to 2011. Sleep Med 2016;21:145–50. https://doi.org/10.1016/J.SLEEP.2015.12.021.
[4] Pérez-Farinós N, Villar-Villalba C, López Sobaler AM, et al. The relationship between hours of sleep, screen time and frequency of food and drink consumption in Spain in the 2011 and 2013 ALADINO: a cross-sectional study. BMC Publ Health 2017;17:1–12. https://doi.org/10.1186/s12889-016-3962-4.
[5] Mi SJ, Kelly NR, Brychta RJ, et al. Associations of sleep patterns with metabolic syndrome indices, body composition, and energy intake in children and adolescents. Pediatr Obes 2019;14:e12507. https://doi.org/10.1111/ijpo.12507.
[6] Belmon LS, van Stralen MM, Busch V, et al. What are the determinants of children's sleep behavior? A systematic review of longitudinal studies. Sleep Med Rev 2019;43:60–70. https://doi.org/10.1016/J.SMRV.2018.09.007.
[7] Antczak D, Lonsdale C, Lee J, et al. Physical activity and sleep are inconsistently related in healthy children: a systematic review and meta-analysis. Sleep Med Rev 2020;51:101278. https://doi.org/10.1016/j.smrv.2020.101278.
[8] Hense S, Barba G, Pohlabeln H, et al. Factors that influence weekday sleep duration in European children. Sleep 2011;34:633–9.
[9] Instituto Nacional de Estadística. Spanish national health survey 2017 methodology. 2018. https://www.ine.es/en/metodologia/t15/t153041917_en.pdf. [Accessed 5 November 2020].
[10] Hirshkowitz M, Whiton K, Albert SM, et al. National Sleep Foundation's sleep time duration recommendations: methodology and results summary. Sleep Health 2015;1:40–3. https://doi.org/10.1016/J.SLEH.2014.12.010.
[11] Hirshkowitz M, Whiton K, Albert SM, et al. National Sleep Foundation's updated sleep duration recommendations: final report. Sleep Health 2015;1:233–43. https://doi.org/10.1016/J.SLEH.2015.10.004.
[12] Gradisar M, Gardner G, Dohnt H. Recent worldwide sleep patterns and problems during adolescence: a review and meta-analysis of age, region, and sleep. Sleep Med 2011;12:110–8. https://doi.org/10.1016/j.sleep.2010.11.008.
[13] Domingo-Salvany A, Bacigalupe A, Carrasco JM, et al. Propuestas de clase social neoweberiana y neomarxista a partir de la Clasificación Nacional de Ocupaciones 2011. Gac Sanit 2013;27:263–72. https://doi.org/10.1016/j.gaceta.2012.12.009.

Anexo F

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El lado oscuro de las pantallas

theconversation.com/el-lado-oscuro-de-las-pantallas-147383

Jose M. Martínez-Sánchez, Àurea Cartanyà Hueso, Cristina Lidón-Moyano

En los últimos años hemos aumentado exponencialmente el tiempo que pasamos delante de la pantalla de nuestros teléfonos móviles. Lo peor del asunto es que la población infantil no ha escapado de ese exceso de exposición.

Con demasiada frecuencia vemos a niños con pataletas porque sus padres no les dejan el móvil o a grupos de adolescentes enganchados a sus dispositivos en vez de interactuar entre ellos.

Concretamente en España, el 33 % de los niños ha tenido contacto con las pantallas antes de los 3 años. Asimismo, el 66 % de los niños españoles de entre 10 y 15 años tiene su propio *smartphone*. Por último, se calcula que el 40 % de los menores de 15 años pasa más de dos horas de su tiempo libre frente a un dispositivo.

Quienes consideren estas cifras exageradas, basta con que comprueben las horas de uso en su propio móvil. También pueden hacer lo mismo con los de sus hijos a través de las opciones de ajustes o utilizando alguna aplicación de control parental. Los resultados, normalmente, sorprenden.

Eso sí, hay que reconocer que en gran medida se debe a que las pantallas de los móviles cada día están más presentes en las rutinas cotidianas de la población. Además, su uso está socialmente aceptado, por lo que se tiende a normalizar.

Recomendaciones difusas

Sin duda alguna, una gran parte del tiempo en pantalla en la población adolescente se dedica a redes sociales. En este sentido, recientemente se ha estrenado el documental *El dilema de las redes* en la plataforma Netflix.

Este documental, con gran éxito de audiencia, ha puesto de manifiesto el trasfondo de las mismas. Sin embargo, aún desconocemos qué es exactamente lo que hacen los niños cuando usan los teléfonos móviles, así como el impacto en su desarrollo y salud.

Las recomendaciones óptimas para el uso y exposición a pantallas no están claras. Por un lado, las autoridades sanitarias desalientan el uso de la tecnología digital entre la población infantil, basándose en las evidencias sobre los posibles efectos negativos en el bienestar físico, cognitivo, emocional y social de los niños.

Algunas pautas pediátricas recomiendan reducir el uso de estos dispositivos o incluso evitarlos, particularmente en niños muy pequeños (menores de 2 años). El uso temprano de estos dispositivos puede tener efectos perjudiciales importantes en el desarrollo físico, cognitivo, emocional, neurológico, del lenguaje del niño y sobre su desarrollo social. A lo que se suma que el uso de pantallas es la actividad que más contribuye a un comportamiento sedentario.

La paradoja es que, paralelamente, las autoridades educativas fomentan el uso de la tecnología digital por parte de los niños para prepararlos para vivir (y prosperar) en un mundo digital.

Impacto a largo plazo

De momento, se desconoce el impacto de la exposición a las pantallas en la salud infantil a largo plazo, tanto positivo como negativo. Sin embargo, muchos expertos coinciden en que el tiempo de pantalla sustituye o desplaza el tiempo dedicado a otras rutinas.

Por ejemplo, el tiempo de pantalla justo antes de irse a dormir sustituye a rutinas relajantes como la ducha o el cuento. A lo que se suma que la luz azul de las pantallas hace que estemos más activos y, por lo tanto, que nos cueste más iniciar el sueño.

El tiempo que pasamos frente a las pantallas también hace que se invierta menos en practicar ejercicio físico. Además, parece ser que el tiempo de pantalla es el aliado perfecto de otras conductas poco saludables, como son la comida rápida, los refrescos o los tentempiés.

Por todo ello, podemos decir que nos encontramos ante un gran reto de salud pública. Incluso vaticinar que en los próximos años veremos cómo el uso de pantallas se convierte en un nuevo determinante de la salud infantil.

Pantallas y pandemia

Tampoco podemos olvidar el efecto que ha tenido la pandemia en el tiempo de pantalla en la población más joven. Sobre todo durante el confinamiento, cuando las clases escolares pasaron a ser virtuales.

A eso se añade que la vía de comunicación predominante entre familias y amigos fueron las videollamadas. Tampoco ayudaron las características de las viviendas de hoy en día, demasiado pequeñas, masificadas y sin zonas exteriores.

Con todo ello, el uso de las pantallas es perfectamente compatible con un estilo de vida saludable. Solo hay que tener presente el reto de reducir el tiempo que las utilizamos. Además, es importante no tener demasiada prisa en mostrar los dispositivos de pantalla a los más pequeños.

Basándonos en la evidencia científica deberíamos:

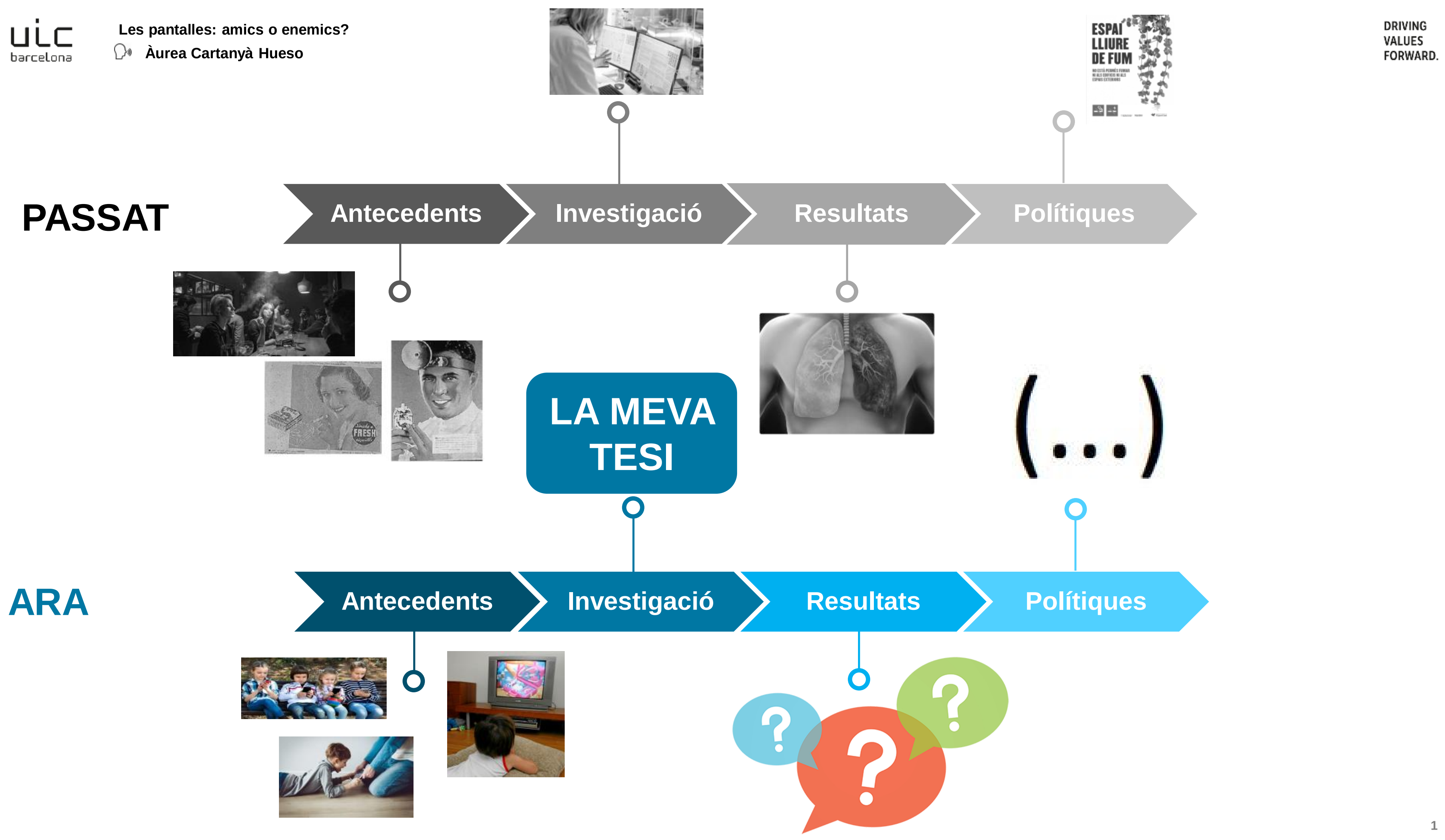
- Evitar exponer a los más pequeños a los dispositivos de pantalla.
- Limitar el número de horas (máximo 1 hora diaria en niños entre 2 y 4 años y 2 horas diarias en niños de entre 5 y 17 años).

- Equilibrar el tiempo libre entre actividades sedentarias, como el uso de dispositivos móviles, y tareas activas.
- Evitar el uso de pantallas 1 hora antes de irse a la cama, así como reducir la disponibilidad de los dispositivos en las habitaciones.
- Esquivar los dispositivos móviles durante las comidas.
- Seleccionar (con ayuda de adultos) contenidos de calidad.

El objetivo, en definitiva, es que las pantallas sumen sin restar salud. Por ello, las autoridades sanitarias y educativas deberían promocionar activamente el uso saludable de las pantallas de los móviles entre la población infantil.

Anexo H

Presentación del concurso "Explica tu tesi en cuatro minutos" organizado por la FCRi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Les pantalles: amics o enemics?
Àurea Cartanyà Hueso
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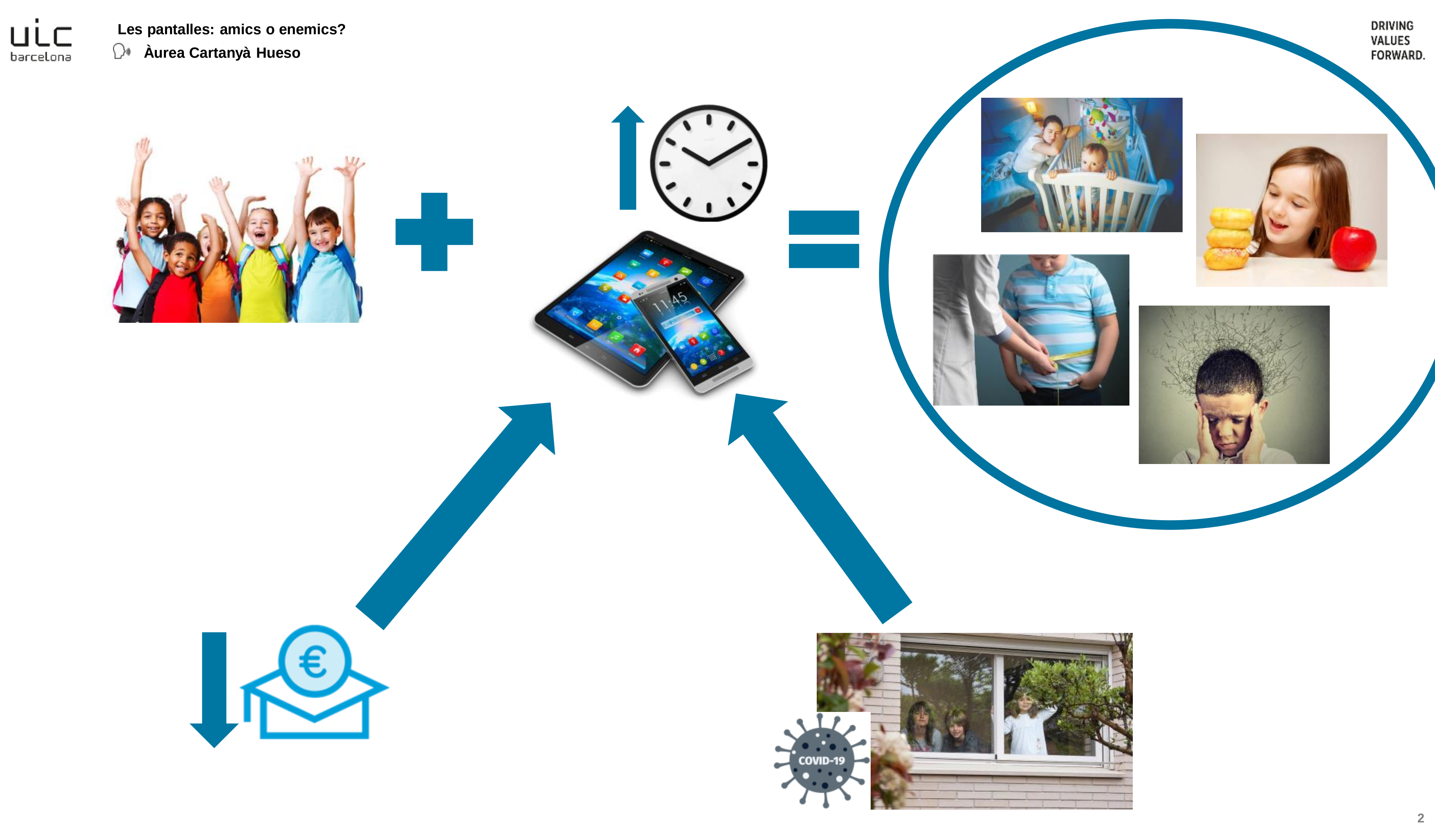
Les pantalles: amics o enemics?
Àurea Cartanyà Hueso



Anexo I

Impacto mediático del artículo I

Pasar más de dos horas al día ante pantallas hace que los niños duerman menos

abc.es/familia/padres-hijos/abci-pasar-mas-horas-ante-pantallas-hace-ninos-duerman-menos-202007240206_noticia.html

24 de julio de 2020

Actualizado:28/07/2020 11:39h Guardar

Uno de cada cuatro niños españoles que pasa más de dos horas diarias frente a la pantalla duerme menos horas de las recomendadas por los especialistas, según un estudio liderado por el Dr. José M. Martínez Sánchez, la Dra. Cristina Lidón-Moyano y Àurea Cartanyà-Hueso, miembros del grupo de investigación sobre Determinantes de Salud y Políticas Sanitarias de UIC Barcelona.

El informe se ha llevado a cabo ante «el incremento considerable» del uso de pantallas durante la última década y la «creencia científica de sus posibles consecuencias negativas en aspectos como el sueño», según ha explicado la Dra. Lidón-Moyano, que ha destacado que hasta el momento «**no se habían realizado estudios de estas características a nivel poblacional en España con una muestra representativa**«.

El estudio, que analiza a más de 5.500 niños de entre 1 y 14 años, señala que **un 44,3% de los niños pasa más de dos horas al día ante una pantalla durante su tiempo libre y, de ellos, un 23,6% duerme poco.**

A medida que aumenta la edad, el porcentaje de menores que usa pantallas durante tres horas diarias es cada vez mayor, según el informe. En este sentido, Àurea Cartanyà-Hueso, primera autora del estudio, ha explicado que el grupo de edad que más las utiliza es el comprendido entre 12 y 14 años, seguido de la franja de edad de 6 a 11 años«, aunque ha recalcado que estas cifras disminuyen cuando la familia tiene mayor formación y recursos.

Los investigadores de UIC Barcelona han dejado claro que **un tiempo insuficiente de sueño «está directamente relacionado con un aumento del riesgo de obesidad, con una regulación emocional reducida, con la calidad de vida y con los resultados académicos**«.

Exposición saludable a las pantallas

Por ello, los autores han instado a las instituciones a «promocionar un **tiempo responsable y saludable de exposición a las pantallas, a realizar una buena higiene de sueño y a promover otras actividades lúdicas y recreativas** en edad infantil como la actividad física«. Además, han insistido en que los gobiernos »trabajen la comunicación de los posibles riesgos de un uso excesivo de pantallas sobre todo en familias con un nivel socio-educativo bajo«.

Pasar más de dos horas al día ante pantallas hace que los niños duerman menos

twnews.es/es-news/pasar-mas-de-dos-horas-al-dia-ante-pantallas-hace-que-los-ninos-duerman-menos

Trusted

24/7/2020 2:06:01

Noticias relacionadas

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sevilla.abc.es/familia/padres-hijos/abci-pasar-mas-horas-ante-pantallas-hace-ninos-duerman-menos-202007240206_noticia.html

24 de julio de 2020

Padres Hijos

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Actualizado:28/07/2020 11:39h Guardar

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lavozdigital.es/familia/padres-hijos/abci-pasar-mas-horas-ante-pantallas-hace-ninos-duerman-menos-202007240206_noticia.html

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Pasar más de dos horas al día frente a las pantallas hace que los niños duerman menos

H **heraldo.es**/noticias/salud/2020/07/23/pasar-mas-de-dos-horas-al-dia-frente-a-las-pantallas-hace-que-los-ninos-duerman-menos-1387547.html

hábitos de sueño

El estudio, llevado a cabo por profesionales de la Universidad Internacional de Cataluña, se ha realizado ante "el incremento considerable" del uso de pantallas durante la última década y la "creencia científica de sus posibles consecuencias negativas en aspectos como el sueño".

NOTICIA
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NOTICIAS RELACIONADAS
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Además, han insistido en que **los gobiernos "trabajen la comunicación de los posibles riesgos de un uso excesivo de pantallas** sobre todo en familias con un nivel socio-educativo bajo".

Pasar más de dos horas al día frente a una pantalla provoca que los niños duerman menos

magisnet.com/2020/07/pasar-mas-de-dos-horas-al-dia-frente-a-una-pantalla-provoca-que-los-ninos-duerman-menos

23 de julio de 2020

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Redacción Jueves, 23 de julio de 2020
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Boletín
Magisterio

Pasar más de dos horas al día ante pantallas hace que los niños duerman menos,según un estudio de UIC Barcelo

ep europapress.es/comunicados/sociedad-00909/noticia-comunicadopasar-mas-dos-horas-dia-pantallas-hace-ninos-duerman-menossegun-estudio-uic-barcelo-20200723115635.html

23 de julio de 2020

El responsable del grupo de Investigación sobre Determinantes de Salud y Políticas Sanitarias de UIC Barcelona, José M. Martínez-Sánchez, afirma que un 44,3% de los niños pasa más de dos horas al día ante una pantalla.

El estudio, que analiza el vínculo entre el uso de pantallas y las horas de sueño, señala que los menores de familias con un nivel socio-educativo más alto están menos expuestos a los aparatos electrónicos.

Se trata del primer estudio de estas características que se lleva a cabo en España con una muestra representativa.

Barcelona, 23 de julio de 2020.- Uno de cada cuatro niños españoles que pasa más de dos horas diarias frente a la pantalla duerme menos horas de las recomendadas por los especialistas, según un estudio liderado por el Dr. José M. Martínez Sánchez, la Dra. Cristina Lidón-Moyano y Àurea Cartanyà-Hueso, miembros del grupo de investigación sobre Determinantes de Salud y Políticas Sanitarias de UIC Barcelona.

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Sobre UIC Barcelona.

La Universitat Internacional de Catalunya (UIC Barcelona) nació el año 1997 con el objetivo de ofrecer una formación universitaria de calidad y promover la investigación para servir a la sociedad. Ligada al mundo empresarial y con un marcado carácter internacional, imparte 16 grados, una treintena de dobles titulaciones internacionales y una amplia oferta de posgrado en los dos campus que tiene, situados en Barcelona y Sant Cugat del Vallès.

En caso de estar interesados en contactar con este especialista:.

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08195 Sant Cugat del Vallès.

“El tiempo de pantalla es un factor de riesgo para la salud infantil”

JOSÉ M. MARTÍNEZ, CRISTINA LIDÓN-MOYANO Y ÀUREA CARTANYÀ-HUESO, responsables de este estudio

GEMA EIZAGUIRRE

Un estudio de la Universidad Internacional de Cataluña (UIC) señala que un 44,3% de los niños pasa más de dos horas al día ante una pantalla durante su tiempo libre y, de ellos, un 23,6% duerme poco. El uso de las pantallas en los nativos digitales no es solo de una cuestión generacional; sino también cultural. Los responsables de este estudio –José M. Martínez Sánchez, responsable del grupo de investigación sobre Determinantes de Salud y Políticas Sanitarias de UIC Barcelona, y Cristina Lidón-Moyano y Àurea Cartanyà-Hueso– explican que al acostarnos tarde aumentamos el uso de las pantallas en los menores, lo que provoca la disminución de horas de sueño; algo esencial para consolidar la memoria y la atención.

Los autores del estudio. Foto: PYC

El estudio señala que 44,3% de los niños pasa más de dos horas al día ante una pantalla. ¿Esto supone un aumento respecto a años anteriores?

-Sí, se ha observado un aumento. Aunque desafortunadamente los datos de las diferentes encuestas nacionales de salud no son comparables, porque en las preguntas utilizadas en el 2011 no se incluía los teléfonos móviles y las tabletas, además los grupos de edad utilizados fueron diferentes.

Con el confinamiento, ¿ha aumentado esta media?

-Actualmente tenemos una investigación sobre el uso de smartphones y tablets durante el confinamiento en niños menores de 4 años. Los resultados preliminares de este nuevo trabajo apoyan nuestra hipótesis de que durante el confinamiento el tiempo de pantalla ha sufrido un aumento, debido a que los niños no podían ir a la escuela ni salir de casa. Además, muchos padres tenían que trabajar desde casa y por lo tanto usaban las pantallas como un método de entretenimiento. Estos dispositivos han sido la forma predominante de conectarse con el exterior, con la escuela, los abuelos, los amigos…

Señala el estudio, cuánto más mayores son, más horas pasan frente a las pantallas. ¿Lo normal no sería lo contrario, al tener ya más recursos para el entretenimiento?

-Totalmente de acuerdo, no obstante, tenemos que pensar que los niños de hoy en día crecen rodeados de tecnología. Por lo tanto, nos tendríamos que plantear si es saludable exponer los niños a las pantallas tan temprano.

Porque, ¿cuál es el número de horas recomendable para los menores?

-Hoy en día existen varías guías del tiempo recomendado, todas ellas en la misma línea. A nivel nacional, el Ministerio de Sanidad, Servicios Sociales e Igualdad propuso em 2015 que los niños menores de 2 años no estuvieran expuestos a las pantallas, que el tiempo no excediera la hora diaria en niños de entre 2 y 4 años, y que el tiempo de pantalla con fines recreativos no superara las dos horas en niños de entre 5 y 17 años.

En este estudio incorporan a niños muy pequeños, a partir de los 3 años. ¿Cuáles son los resultados?

-Nuestro trabajo muestra que el 59,1% de los niños de entre 1 y 2 años estaba expuesto a las pantallas menos de 1 hora diaria, el 22,2% lo estaban entre 1 hora y menos de 2 horas, el 13,8% lo estaban entre 2 y menos de 3 horas y el 4,9% superaban las 3 horas. Siguiendo las guías de la OMS, Asociación Americana de Pediatría y Ministerio de Sanidad para un tiempo de pantalla saludable, todas coinciden que no se debería exponer a los niños a las pantallas durante sus dos primeros años de vida.

¿Qué efecto tienen en su desarrollo y comportamiento el dormir menos horas?

-El sueño y la calidad de este durante la infancia es un importante determinante de la salud, ya que se asocia con la adquisición de aspectos de desarrollo. Aspectos tan fundamentales como son el lenguaje, la consolidación de la memoria, el funcionamiento ejecutivo, la atención y el comportamiento.

> “Debido a las largas jornadas de trabajo de **los padres, los niños cenan más tarde** y utilizan los dispositivos **antes de irse a dormir**”

Este es el primer estudio que se lleva a cabo en España con una muestra representativa.

-En nuestro estudio utilizamos los datos de la Encuesta Nacional de Salud de la Población Infantil del 2017 que tiene información de más de 5.500 niños españoles de entre 1 y 14 años. Otro aspecto novedoso es que incluye en el tiempo de pantalla los dispositivos que son predominantes hoy, como móviles y tablets.

Con estos nuevos datos ¿qué han observado?

-Que estamos viviendo un cambio de patrón de uso de pantallas y del tipo, aumentando el uso de teléfonos y tablets.

¿Qué datos les han sorprendido o llamado más la atención?

-Un aspecto a destacar son las diferencias encontradas según la clase social. El grupo de edad que más utiliza las pantallas es el comprendido entre 12 y 14 años, seguido de la franja de 6 a 11 años, aunque estas cifras disminuyen cuando la familia tiene mayor formación y recursos. Esto nos hace pensar que también existe un componente social en el uso saludable de las pantallas entre la población infantil.

España es uno de los países europeos en el que los menores se acuestan más tarde. ¿Esto pasa factura?

-Totalmente, nuestra hipótesis va en el sentido de que, debido a las largas jornadas de trabajo de los padres, los niños españoles cenan más tarde que los del resto de Europa, utilizan los dispositivos antes de irse a la cama desplazando el tiempo de acostarse y, en consecuencia, teniendo menos tiempo para dormir ya que la hora de levantarse no varía con el resto Europa.

¿Qué conclusiones sacan de este estudio?

-Las instituciones deberían trabajar en la comunicación de los posibles efectos adversos de un uso excesivo de pantallas para que lleguen a todos los colectivos, así como garantizar que la población, particularmente los más vulnerables, pueda seguir estas directrices de un uso responsable del tiempo de pantalla. También es necesaria más evidencia científica para que las instituciones consideren incluir el tiempo de pantalla como un nuevo factor de riesgo para la salud infantil.

Anexo J

Impacto mediático del artículo III

La Brúixola 24/03/2021

ondacero.es/emisoras/catalunya/audios-podcast/bruixola/bruixola-24032021_20210324605ba2954041140001886d81.html

24 de marzo de 2021

LES HISTÒRIES DE LA VIDA

Podcast del programa complet de La Brúixola amb Robert Calvo. Avui hem berenat amb el periodista Javier Pérez Campos, que presenta l'assaig 'Los intrusos'. En actualitat, parlem amb el professor del Departament de Ciències Bàsiques de la UIC, que presenta un estudi que relaciona les hores que passen els nens davant de pantalles amb una mala salut alimentària. També parlem de com ha afectat la pandèmia als Drets Humans amb David Bondia, president de l'Institut de Drets Humans de Catalunya. I parlem amb en Víctor Ruiz sobre la figura de Juli Cèsar.

La Brúixola 24/03/2021

Els infants que passen més d’una hora al dia amb pantalles mengen pitjor

rac1.cat/societat/20210324/492907902334/pantalles-infants-canalla-menjar-porqueria-nutricio-aliments-pitjor-tele-hores-tauleta-mobil.html

24 de marzo de 2021

Els **infants que passen més d’una hora al dia al davant d’una pantalla** mengen **més menjar porqueria**. És el que conclou un **estudi de la Universitat Internacional de Catalunya** , publicat a la revista ***Healthcare*** , que assegura que la canalla d’entre 1 i 14 anys que passa més d’una hora d’oci davant d’una pantalla acaba ingerint més menjar porqueria, com ara **dolços o aperitius,** que la resta d’infants. L’estudi analitza per primer cop la relació entre l’ús recreatiu de les pantalles i el consum d’aliments poc saludables.

Els investigadors han constatat que **a mesura que augmenten les hores d’exposició a les pantalles s’incrementa el consum de dolços, begudes ensucrades, menjar ràpid** i aperitius. “El treball aporta proves a la hipòtesi que passar moltes hores al davant d’una pantalla va associat a uns hàbits pitjors d’alimentació infantil”, explica l’equip investigador, la **doctoranda Àurea Cartanya-Hueso i el doctor Adrián González Marrón**.

Passar moltes hores al davant d’una pantalla va associat a uns hàbits pitjors d’alimentació

Àurea Cartanya-Hueso i Adrián González Marrón

De 12 a 14, edat crítica

L’informe també destaca que **en el grup de 12 a 14 anys és on hi ha més nens que passen un mínim de dues hores al dia** mirant una pantalla amb finalitats recreatives, amb una xifra que gairebé arriba **al 64%**. Aquest col·lectiu també és el que més consumeix **begudes ensucrades (20,9%) i menjar ràpid (12,2%),** dins del grup analitzat.

Una altra de les dades rellevants és que el percentatge de nens que **consumeixen dolços i menjar porqueria és més baix en aquells que fan esport** diversos dies per setmana que en els que no fan mai exercici. Els autors del treball han explicat que **“l’ús de pantalles pot generar una certa ansietat entre la població infantil** que s’acaba traduint en el consum de menjar porqueria”. A més, diuen, “el fet d’estar més hores exposats a la publicitat de menjar porqueria pot augmentar també el seu consum”.

L’ús de pantalles pot generar una certa ansietat entre la població infantil

Àurea Cartanya-Hueso i Adrián González Marrón

Nens de 4 anys menjant amb pantalles

El grup d’investigadors de UIC Barcelona ha recordat que **dos de cada tres nens menors de 4 anys** van estar exposats a telèfons intel·ligents i tauletes durant el confinament de la primera onada del coronavirus i **un 30% d’ells van utilitzar aquests aparells fins i tot durant els àpats.** Però al marge de la pandèmia, l’ús de pantalles s’ha incrementat en els últims anys. “Si el 2011 el percentatge de nens exposats a pantalles **dues hores o més al dia** era d’entre el 10 i 30%, el **2017 se situava en el 44,7%”, han afegit els autors del treball.**

Davant aquestes xifres, que continuen augmentant, el **professor José M. Martínez-Sánchez** responsable del grup de recerca s'ha mostrat convençut que l'exposició a pantalles, especialment als telèfons intel·ligents i tauletes, en la població infantil serà "un nou determinant de la salut en els pròxims anys", ja que també han detectat que **"està relacionada amb un nombre insuficient d'hores de somni, obesitat, i amb més risc de desenvolupar problemes emocionals i de comportament".**

L'exposició a pantalles en la població infantil serà un nou determinant de salut els pròxims anys

José M. Martínez-Sánchez responsable del grup de recerca de la UIC

L'exposició a pantalles està relacionada amb més problemes emocionals i de comportament

José M. Martínez-Sánchez responsable del grup de recerca de la UIC

RECOMANACIONS D'ÚS DE PANTALLES A LA INFÀNCIA

- Evitar l'ús de pantalles en menors de 2 anys

- Màxim una hora al dia entre els 2 i els 4 anys

- Màxim dues hores al dia entre els 5 i els 17 anys

Martínez-Sánchez ha afirmat que traslladaran els resultats de l'estudi a les autoritats sanitàries perquè prenguin mesures i **ha recordat a les famílies la importància de seguir les recomanacions de les institucions sanitàries: evitant l'ús de pantalles en nens més petits de 2 anys**, limitar a una hora diària el temps en infants d'entre 2 i 4 anys i a dues hores l'ús recreatiu de pantalles en nens d'entre 5 i 17 anys. A més, ha insistit en la necessitat que les institucions sanitàries "revisin i regulin la publicitat de menjar porqueria".

Los niños que pasan más de una hora al día delante de una pantalla comen peor.

els nens que ha passat més d'una hora el dia davant d'una pantalla mengen pitjor és el que conclou un estudi fet per la Universitat Internacional de Catalunya assegura que la canalla dintre un i 15 anys Inverteix més d'una hora dos i davant d'una pantalla ingereix més menjar porqueria com dolços aperitius que la resta d'infants l'informe taca que no 15 anys i són més nens que passen un mínim de dues hores diàries mirant una pantalla amb finalitats recreatives ho fan més del 60% d'aquests menús

Los niños que pasan más de una hora al día ante una pantalla comen más comida basura

abc.es/familia/educacion/abci-ninos-pasan-mas-hora-ante-pantalla-comen-mas-comida-basura-202103241721_noticia.html

24 de marzo de 2021

Educación

Según señala este estudio de la UIC Barcelona el porcentaje de niños que consume este tipo de alimentos es menor en aquellos que hacen deporte varios días por semana que en los que no hacen nunca ejercicio

MADRID Actualizado:25/03/2021 09:15h Guardar

Los niños de entre 1 y 14 años que pasan más de una hora al día de su tiempo de ocio frente a una pantalla comen más comida basura, como dulces y «snacks», que el resto de menores, según un estudio elaborado por el Grupo de Evaluación de Determinantes de Salud y Políticas Sanitarias de UIC Barcelona.

El estudio, liderado por la doctoranda Àurea Cartanya-Hueso y el doctor Adrián González Marrón y publicado en la revista Healthcare, analiza por primera vez la relación entre el uso recreativo de pantallas y el consumo de alimentos poco saludables, como dulces, bebidas azucaradas, comida rápida y «snacks» en niños españoles de entre 1 y 14 años.

El trabajo constata que a medida que aumentan las horas de exposición a las pantallas se incrementa el consumo de dulces, bebidas azucaradas, comida rápida y «snacks», por lo que «nuestro trabajo aporta evidencia a la hipótesis de que pasar mucho tiempo delante de la pantalla va asociado a unos hábitos peores de alimentación infantil» comentan los autores.

Àurea Cartanyà y el doctor González también han destacado que, entre el grupo de población analizado, los niños de entre 12 y 14 años son los que más pasan un mínimo de dos horas diarias frente a las pantallas con fines recreativos, un porcentaje que asciende al 63,9%. Este colectivo también es el que más consume bebidas azucaradas (20,9%) y comida rápida (12,2%), dentro del grupo analizado.

Otro de los datos relevantes que se desprende del informe es que el porcentaje de niños que consume dulces y comida basura es menor en aquellos que hacen deporte varios días por semana que en los que no hacen nunca ejercicio.

Los autores del trabajo han explicado que « el uso de pantallas puede generar cierta ansiedad entre la población infantil que se acaba traduciendo en el consumo de comida basura». Además, en su opinión, «el hecho de estar más horas expuestos a la publicidad de comida basura puede aumentar también su consumo».

Nivel socio-económico bajo: más pantallas

El nivel socio-económico de las familias es otros de los factores que puede llevar a los menores «a tener un peor estilo de vida». Así, han recordado que las familias más empobrecidas «tienen salarios más bajos, horarios menos flexibles y jornadas laborales más largas, lo que puede provocar que los niños pasen más horas delante de las pantallas y que los padres ofrezcan a sus hijos opciones más rápidas de comida, aunque de menor calidad nutricional».

El grupo de investigadores de UIC Barcelona ha recordado que, como muestra otro estudio suyo publicado en la misma revista (https://www.mdpi.com/2227-9032/9/1/96), durante la pandemia de la covid-19 se disparó la exposición infantil a las pantallas En este sentido, ha destacado que dos de cada tres niños menores de 48 meses estuvieron expuestos a teléfonos inteligentes y tabletas durante el confinamiento de la primera ola y un 30% de ellos utilizaron estos aparatos incluso durante las comidas. Al margen de la pandemia, el uso de pantallas se ha incrementado en los últimos años. «Si en 2011 el porcentaje de niños expuestos a pantallas dos horas o más al día era de entre el 10 y 30%, en 2017 se situaba en el 44,7%», han añadido los autores del trabajo.

Ante estas cifras, que siguen aumentando, el profesor José M. Martínez-Sánchez responsable del grupo de investigación se ha mostrado convencido de que la exposición a pantallas, especialmente a los smartphones y tabletas, en la población infantil será «un nuevo determinante de la salud en los próximos años», ya que también han detectado que «está relacionada con un número insuficiente de horas de sueño, obesidad, y con un mayor riesgo de desarrollar problemas emocionales y de comportamiento».

El doctor Martínez-Sánchez ha afirmado que trasladarán los resultados del estudio a las autoridades sanitarias para que tomen medidas y ha recordado a las familias la importancia de seguir las recomendaciones de las instituciones sanitarias: evitando el uso de pantallas en niños menores de 2 años, limitar a 1 hora diaria el tiempo en menores de entre 2 y 4 años y a 2 horas el uso recreativo de pantallas en niños de entre 5 y 17 años. Además, ha insistido en la necesidad de que las instituciones sanitarias **«revisen y regulen la publicidad de comida basura»**.

Ver los comentarios

Los niños que pasan más de una hora al día ante una pantalla comen más comida basura

sevilla.abc.es/familia/educacion/abci-ninos-pasan-mas-hora-ante-pantalla-comen-mas-comida-basura-202103241721_noticia.html

24 de marzo de 2021

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Noticias relacionadas

- La exposición a pantallas antes de los 2 años puede entorpecer el desarrollo neuronal o cognitivo de tu hijo
- Una investigadora de Harvard: «Cenar después de las nueve tiene consecuencias muy graves para la salud de los niños»
- Una doctora advierte: «Limiten el uso de la tecnología o repercutirá en la salud de sus hijos»

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Àurea Cartanyà y el doctor González también han destacado que, entre el grupo de población analizado, los niños de entre 12 y 14 años son los que más pasan un mínimo de dos horas diarias frente a las pantallas con fines recreativos, un porcentaje que asciende al 63,9%. Este colectivo también es el que más consume bebidas azucaradas (20,9%) y comida rápida (12,2%), dentro del grupo analizado.

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Los niños que pasan más de una hora al día ante una pantalla comen más comida basura es un contenido original de ABC.es

Ver los comentarios

Alimentación infantil

Los niños que pasan más de una hora con pantallas comen peor

S.F. MADRID

Los niños de entre 1 y 14 años que pasan más de una hora al día de su tiempo de ocio frente a una pantalla comen más comida basura, como dulces y aperitivos, que el resto de menores, según un estudio del Grupo de Evaluación de Determinantes de Salud y Políticas Sanitarias de UIC Barcelona.

El informe, liderado por la doctoranda Àurea Cartanya-Hueso y el doctor Adrián González Marrón y publicado en la revista 'Healthcare', constata que a medida que aumentan las horas de pantallas se incrementa el consumo de estos dulces, bebidas azucaradas, comida rápida y aperitivos, por lo que «la hipótesis de que pasar mucho tiempo con pantallas está asociado a unos hábitos peores de alimentación infantil cobra fuerza», comentan.

Ambos doctores también han destacado que, entre el grupo de población analizado, los niños de entre 12 y 14 años son los que pasan un mínimo de dos horas diarias más frente a las pantallas con fines recreativos, un porcentaje que asciende al 63,9%. Este colectivo también es el que más consume bebidas azucaradas (20,9%) y comida rápida (12,2%) dentro del grupo analizado.

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Más ejercicio

El porcentaje de niños que ingieren comida basura es menor en aquellos que hacen deporte varios días

El nivel socio-económico de las familias es otros de los factores que puede llevar a los menores a un peor estilo de vida. Así, han recordado que las familias más empobrecidas «tienen salarios más bajos, horarios menos flexibles y jornadas laborales más largas, lo que puede provocar que los niños pasen más horas delante de las pantallas y que los padres ofrezcan a sus hijos opciones más rápidas de comida, aunque de menor calidad nutricional».

Si pasas más de 1 hora viendo la tele y eres un niño, comes más comida basura

cope.es/emisoras/cataluna/barcelona-provincia/barcelona/noticias/pasas-mas-hora-viendo-tela-eres-nino-comes-mas-comida-basura-20210323_1203119

23 de marzo de 2021

Los menores de 14 años que pasan más de una hora al día de su tiempo de ocio frente a una pantalla comen más comida basura, refiriéndose a estos como dulces y 'snacks'. Este es la conclusión de un estudio elaborado por el Grupo de Evaluación de Determinantes de Salud y Políticas Sanitarias de UIC Barcelona https://www.uic.es/ca. **Ha sido la primera vez que se analiza la relación entre el uso recreativo de pantallas y el consumo de alimentos poco saludables en niños españoles.** El trabajo ha sido liderado por la doctoranda Àurea Cartanya-Hueso y el doctor Adrián González Marrón y publicado en la prestigiosa revista 'Healthcare'.

Según los autores, el estudio "**aporta evidencia a la hipótesis de que pasar mucho tiempo delante de la pantalla va asociado a unos hábitos peores de alimentación infantil"** y señala que el **porcentaje de niños que consume comida basura es menor entre los que hacen deporte varios días** por semana. El trabajo indica también que un 63,9% de los **preadolescentes entre 12 y 14 años** están al menos dos horas al día frente a las pantallas con fines recreativos y que esta franja de edad **es la que más bebidas azucaradas y comida rápida consume.**

Estos resultados han llevado al responsable del grupo de investigación, el profesor José M. Martínez-Sánchez, a afirmar que **la exposición a las pantallas, especialmente las de los smartphones y tabletas, será "un nuevo determinante de la salud en los próximos años"** para la población infantil. Martínez-Sánchez ha recordado que la exposición a las pantallas en menores también está relacionada "con un número insuficiente de horas de sueño, obesidad, y con un mayor riesgo de desarrollar problemas emocionales y de comportamiento", por lo que ha recomendado limitar su uso y ha insistido en la necesidad de regular la publicidad de comida basura.

Los niños que pasan más de una hora al día ante una pantalla comen más comida basura

calidadtenerife.org

Fecha:

25/03/2021

Los niños de entre 1 y 14 años que pasan más de una hora al día de su tiempo de ocio frente a una pantalla comen más comida basura, como dulces y «snacks», que el resto de menores, según un estudio elaborado por el Grupo de Evaluación de Determinantes de Salud y Políticas Sanitarias de UIC Barcelona.

El estudio, liderado por la doctoranda Àurea Cartanya-Hueso y el doctor Adrián González Marrón y publicado en la revista Healthcare, analiza por primera vez la relación entre el uso recreativo de pantallas y el consumo de alimentos poco saludables, como dulces, bebidas azucaradas, comida rápida y «snacks» en niños españoles de entre 1 y 14 años.

Fuente:

www.abc.es

Los niños que pasan más de una hora al día ante una pantalla comen más comida basura

lavozdigital.es/familia/educacion/abci-ninos-pasan-mas-hora-ante-pantalla-comen-mas-comida-basura-202103241721_noticia.html

24 de marzo de 2021

Según señala este estudio de la UIC Barcelona el porcentaje de niños que consume este tipo de alimentos es menor en aquellos que hacen deporte varios días por semana que en los que no hacen nunca ejercicio

MADRID Actualizado:25/03/2021 09:15h Guardar

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El trabajo constata que a medida que aumentan las horas de exposición a las pantallas se incrementa el consumo de dulces, bebidas azucaradas, comida rápida y «snacks», por lo que «nuestro trabajo aporta evidencia a la hipótesis de que pasar mucho tiempo delante de la pantalla va asociado a unos hábitos peores de alimentación infantil» comentan los autores.

Àurea Cartanyà y el doctor González también han destacado que, entre el grupo de población analizado, los niños de entre 12 y 14 años son los que más pasan un mínimo de dos horas diarias frente a las pantallas con fines recreativos, un porcentaje que asciende al 63,9%. Este colectivo también es el que más consume bebidas azucaradas (20,9%) y comida rápida (12,2%), dentro del grupo analizado.

Otro de los datos relevantes que se desprende del informe es que el porcentaje de niños que consume dulces y comida basura es menor en aquellos que hacen deporte varios días por semana que en los que no hacen nunca ejercicio.

Los autores del trabajo han explicado que « el uso de pantallas puede generar cierta ansiedad entre la población infantil que se acaba traduciendo en el consumo de comida basura». Además, en su opinión, «el hecho de estar más horas expuestos a la publicidad de comida basura puede aumentar también su consumo».

Nivel socio-económico bajo: más pantallas

El nivel socio-económico de las familias es otros de los factores que puede llevar a los menores «a tener un peor estilo de vida». Así, han recordado que las familias más empobrecidas «tienen salarios más bajos, horarios menos flexibles y jornadas laborales más largas, lo que puede provocar que los niños pasen más horas delante de las pantallas y que los padres ofrezcan a sus hijos opciones más rápidas de comida, aunque de menor calidad nutricional».

El grupo de investigadores de UIC Barcelona ha recordado que, como muestra otro estudio suyo publicado en la misma revista (https://www.mdpi.com/2227-9032/9/1/96), durante la pandemia de la covid-19 se disparó la exposición infantil a las pantallas En este sentido, ha destacado que dos de cada tres niños menores de 48 meses estuvieron expuestos a teléfonos inteligentes y tabletas durante el confinamiento de la primera ola y un 30% de ellos utilizaron estos aparatos incluso durante las comidas. Al margen de la pandemia, el uso de pantallas se ha incrementado en los últimos años. «Si en 2011 el porcentaje de niños expuestos a pantallas dos horas o más al día era de entre el 10 y 30%, en 2017 se situaba en el 44,7%», han añadido los autores del trabajo.

Ante estas cifras, que siguen aumentando, el profesor José M. Martínez-Sánchez responsable del grupo de investigación se ha mostrado convencido de que la exposición a pantallas, especialmente a los smartphones y tabletas, en la población infantil será «un nuevo determinante de la salud en los próximos años», ya que también han detectado que «está relacionada con un número insuficiente de horas de sueño, obesidad, y con un mayor riesgo de desarrollar problemas emocionales y de comportamiento».

El doctor Martínez-Sánchez ha afirmado que trasladarán los resultados del estudio a las autoridades sanitarias para que tomen medidas y ha recordado a las familias la importancia de seguir las recomendaciones de las instituciones sanitarias: evitando el uso de pantallas en niños menores de 2 años, limitar a 1 hora diaria el tiempo en menores de entre 2 y 4 años y a 2 horas el uso recreativo de pantallas en niños de entre 5 y 17 años. Además, ha insistido en la necesidad de que las instituciones sanitarias **«revisen y regulen la publicidad de comida basura»**.

Los niños que pasan más de una hora al día ante una pantalla comen más comida basura es un contenido original de ABC.es

Los niños que pasan más de una hora al día ante la pantalla comen más comida basura, según un estudio

psiquiatria.com/article.php

Noticia | Psiquiatría general | 25/03/2021

RESUMEN

Los niños de entre 1 y 14 años que pasan más de una hora al día de su tiempo de ocio frente a una pantalla comen más comida basura --como dulces y 'snacks'-- que el resto de menores, según un estudio elaborado por el grupo de Evaluación de Determinantes de Salud y Políticas Sanitarias de UIC Barcelona.

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El trabajo indica también que un 63, 9% de los menores de entre 12 y 14 años están al menos dos horas al día frente a las pantallas con fines recreativos y que esta franja de edad es la que más bebidas azucaradas y comida rápida consume.

Los autores han explicado que **"el uso de pantallas puede generar cierta ansiedad entre la población infantil que se acaba traduciendo en el consumo de comida basura"** y han sostenido que el hecho de estar más horas expuestos a la publicidad de comida basura puede aumentar también su consumo.

Estos resultados han llevado al responsable del grupo de investigación, el profesor José M. Martínez-Sánchez, a afirmar que la exposición a las pantallas, especialmente las de los smartphones y tabletas, será "un nuevo determinante de la salud en los próximos años" para la población infantil.

Martínez-Sánchez ha recordado que la exposición a las pantallas en menores también está relacionada **"con un número insuficiente de horas de sueño, obesidad, y con un mayor riesgo de desarrollar problemas emocionales y de comportamiento"**, por lo que ha recomendado limitar su uso y ha insistido en la necesidad de regular la publicidad de comida basura.

Fuente periodística: Europa Press
Url corta de esta página: http://psiqu.com/2-64064

Breves

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Los niños que pasan más horas frente a la pantalla tienen peor alimentación

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Los niños comen peor si están más de una hora ante la pantalla

Consumen más comida basura, como dulces y 'snacks'// Peores hábitos con más dispositivos

La publicidad que ven en la televisión también les influye en su alimentación. *Foto: Ksenia*

IRENE JIMÉNEZ
Barcelona

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Los autores explicaron que "el uso de pantallas puede generar cierta ansiedad entre la población infantil que se acaba traduciendo en el consumo de comida basura" y que el hecho de estar más horas expuestos a la publicidad de comida basura puede aumentar también su consumo.

Estos resultados llevaron al responsable del grupo de investigación, el profesor José M. Martínez-Sánchez, a afirmar que la exposición a las pantallas, especialmente las de los *smartphones* y tabletas, será "un nuevo determinante de la salud infantil".

Los niños que pasan más de una hora frente a la pantalla comen más comida mala

BARCELONA / EUROPA PRESS

Los niños de entre 1 y 14 años que pasan más de una hora al día de su tiempo de ocio frente a una pantalla comen más comida basura, como dulces y *snacks*, que el resto de menores. Lo indica un estudio del Grupo de Evaluación de Determinantes de Salud y Políticas Sanitarias de UIC Barcelona.

El trabajo, liderado por la doctora Àurea Cartanya-Hueso y el doctor Adrián González Marrón, y publicado en la revista *Healthcare*, analiza la relación entre el uso recreativo de pantallas y el consumo de alimentos poco saludables, como dulces, bebidas azucaradas, comida rápida y *snacks* en niños españoles de entre 1 y 14 años. El trabajo constata que a medida que aumentan las horas de exposición a las pantallas se incrementa el consumo de dulces, bebidas azucaradas, comida rápida y *snacks*, por lo que «nuestro trabajo aporta evidencia a la hipótesis de una peor alimentación», dicen.

Los niños que pasan más de una hora al día ante la pantalla comen más comida basura, según un estudio

infosalus.com/nutricion/noticia-ninos-pasan-mas-hora-dia-pantalla-comen-mas-comida-basura-estudio-20210323143623.html

23 de marzo de 2021

BARCELONA, 23 Mar. (EUROPA PRESS) -

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Y además

A más horas ante la tele, más comida basura

Un estudio de la Universidad Internacional de Cataluña (UIC) ha mostrado que un 63,9% de los menores de entre 12 y 14 años están al menos dos horas al día frente a las pantallas y son los que más consumen comida rápida.

Los niños con más horas ante la pantalla abusan de la comida rápida

Un estudio del Grupo de Evaluación de Determinantes de la Salud y Políticas Sanitarias de la Universidad Internacional de Cataluña (UIC) mostró que un 63,9% de los menores de entre 12 y 14 años están al menos dos horas al día frente a las pantallas y son los que más consumen comida rápida.

Según la UIC, el estudio también señala que el porcentaje de niños que consume este tipo de alimentos es menor entre aquellos que hacen deporte varios días por semana que en los que no hacen nunca ejercicio.

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Los expertos afirman que su trabajo "aporta evidencia a la hipótesis de que pasar mucho tiempo delante de la pantalla va asociado a unos hábitos peores de alimentación infantil".

ENTRE 12 Y 14 AÑOS

El 63,9% de los niños de entre 12 y 14 años son los que más tiempo pasan frente a las pantallas con fines recreativos, un mínimo de dos horas diarias, y consumen más bebidas azucaradas (20,9%) y comida rápida (12,2%).

Los responsables del estudio explican que "el uso de pantallas puede generar cierta ansiedad entre la población infantil que se acaba traduciendo en el consumo de comida basura, y el hecho de estar más horas expuestos a la publicidad de comida basura puede aumentar también su consumo".

Destacan asimismo la importancia del nivel socioeconómico, ya que "las familias más empobrecidas tienen salarios más bajos, horarios menos flexibles y jornadas laborales más largas, lo que puede provocar que los niños pasen más horas delante de las pantallas y que los padres ofrezcan a sus hijos opciones más rápidas de comida", remarcan.

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Los niños que pasan más horas frente a la pantalla consumen más comida rápida

20minutos.es/noticia/4629966/0/ninos-pasan-mas-horas-frente-pantalla-consumen-mas-comida-rapida

23 de marzo de 2021

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Según ha informado la UIC, el estudio también señala que el porcentaje de niños que consume este tipo de alimentos es **menor entre aquellos que hacen deporte** varios días por semana que en los que no hacen nunca ejercicio.

El estudio, publicado en la revista "Healthcare" y liderado por la doctoranda Àurea Cartanya-Hueso y el doctor Adrián González Marrón, ha analizado la **relación entre el uso recreativo de pantallas y el consumo de alimentos poco saludables** en niños españoles de entre 1 y 14 años.

Relación entre pasar tiempo ante pantallas y malos hábitos alimentarios

Los resultados del estudio de la UIC han indicado que los **niños de entre 1 y 14 años** que pasan más de una hora al día de su tiempo de ocio frente a una pantalla comen más comida basura, como dulces, bebidas azucaradas o "snacks", que el resto de menores.

Los expertos han afirmado que su trabajo "aporta evidencia a la hipótesis de que **pasar mucho tiempo delante de la pantalla va asociado a unos hábitos peores** de alimentación infantil".

Los autores han destacado que, entre el grupo de población analizado, el 63,9 % de los **niños de entre 12 y 14 años son los que más tiempo pasan** frente a las pantallas con fines recreativos, un mínimo de dos horas diarias, y consumen más bebidas azucaradas (20,9 %) y comida rápida (12,2 %).

El uso de pantallas puede generar ansiedad

Los responsables del estudio han explicado que "el uso de pantallas puede generar cierta ansiedad entre la población infantil que **se acaba traduciendo en el consumo de comida basura**, y el hecho de estar más horas expuestos a la publicidad de comida basura puede aumentar también su consumo".

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El grupo de investigadores de UIC Barcelona ha recordado que durante la pandemia de **la Covid-19 se disparó la exposición infantil a las pantallas**, y que los porcentajes suben año tras año.

"Si en 2011 el porcentaje de niños expuestos a pantallas dos horas o más al día era de entre el 10 y 30 %, **en 2017 se situaba en el 44,7 %**", han añadido los autores del trabajo.

Nuevo determinante de la salud

José M. Martínez-Sánchez, responsable del grupo de investigación, ha asegurado que la exposición a pantallas en la población infantil será "un nuevo determinante de la salud en los próximos años, ya que está **relacionada con un número insuficiente de horas de sueño, obesidad**, y con un mayor riesgo de desarrollar problemas emocionales y de comportamiento".

Martínez-Sánchez ha dicho que **trasladarán los resultados del estudio a las autoridades sanitarias** "para que tomen medidas", y ha insistido en la necesidad de que las instituciones sanitarias "revisen y regulen la publicidad de comida basura".

Un estudio revela que los niños que pasan más de una hora al día frente a una pantalla comen más comida basura

cordobabn.com/articulo/salud/estudio-revela-ninos-1-14-anos-pasan-mas-hora-dia-tiempo-ocio-frente-pantalla-comen-mas-comida-basura/20210323115203082467.html

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Martínez-Sánchez ha recordado que la exposición a las pantallas en menores también está relacionada "con un número insuficiente de horas de sueño, obesidad, y con un mayor riesgo de desarrollar problemas emocionales y de comportamiento", por lo que ha recomendado limitar su uso y ha insistido en la necesidad de regular la publicidad de comida basura.

Los niños que pasan más horas frente a la pantalla consumen más comida rápida

espana.servidornoticias.com/438_salud/7438548_los-ninos-que-pasan-mas-horas-frente-a-la-pantalla-consumen-mas-comida-rapida.html

23 de Marzo de 2021

Barcelona, 23 mar (EFE).- Un estudio del Grupo de Evaluación de Determinantes de la Salud y Políticas Sanitarias de la Universidad Internacional de Cataluña (UIC) ha mostrado que un 63,9 % de los menores de entre 12 y 14 años están al menos dos horas al día frente a las pantallas y son los que más consumen comida rápida.

Los niños que pasan más horas frente a la pantalla consumen más comida rápida. EFE/Latif Kassidi/Archivo

Barcelona, 23 mar (EFE).- Un estudio del Grupo de Evaluación de Determinantes de la Salud y Políticas Sanitarias de la Universidad Internacional de Cataluña (UIC) ha mostrado que un 63,9 % de los menores de entre 12 y 14 años están al menos dos horas al día frente a las pantallas y son los que más consumen comida rápida.

Según ha informado la UIC, el estudio también señala que el porcentaje de niños que consume este tipo de alimentos es menor entre aquellos que hacen deporte varios días por semana que en los que no hacen nunca ejercicio.

El estudio, publicado en la revista "Healthcare" y liderado por la doctoranda Àurea Cartanya-Hueso y el doctor Adrián González Marrón, ha analizado la relación entre el uso recreativo de pantallas y el consumo de alimentos poco saludables en niños españoles de entre 1 y 14 años.

Los resultados del estudio de la UIC han indicado que los niños de entre 1 y 14 años que pasan más de una hora al día de su tiempo de ocio frente a una pantalla comen más comida basura, como dulces, bebidas azucaradas o "snacks", que el resto de menores.

Los expertos han afirmado que su trabajo "aporta evidencia a la hipótesis de que pasar mucho tiempo delante de la pantalla va asociado a unos hábitos peores de alimentación infantil".

Los autores han destacado que, entre el grupo de población analizado, el 63,9 % de los niños de entre 12 y 14 años son los que más tiempo pasan frente a las pantallas con fines recreativos, un mínimo de dos horas diarias, y consumen más bebidas azucaradas (20,9 %) y comida rápida (12,2 %).

Los responsables del estudio han explicado que "el uso de pantallas puede generar cierta ansiedad entre la población infantil que se acaba traduciendo en el consumo de comida basura, y el hecho de estar más horas expuestos a la publicidad de comida basura puede aumentar también su consumo".

Han destacado asimismo la importancia del nivel socioeconómico, ya que "las familias más empobrecidas tienen salarios más bajos, horarios menos flexibles y jornadas laborales más largas, lo que puede provocar que los niños pasen más horas delante de las pantallas y que los padres ofrezcan a sus hijos opciones más rápidas de comida”, han remarcado.

El grupo de investigadores de UIC Barcelona ha recordado que durante la pandemia de la COVID-19 se disparó la exposición infantil a las pantallas, y que los porcentajes suben año tras año.

"Si en 2011 el porcentaje de niños expuestos a pantallas dos horas o más al día era de entre el 10 y 30 %, en 2017 se situaba en el 44,7 %", han añadido los autores del trabajo.

José M. Martínez-Sánchez, responsable del grupo de investigación, ha asegurado que la exposición a pantallas en la población infantil será "un nuevo determinante de la salud en los próximos años, ya que está relacionada con un número insuficiente de horas de sueño, obesidad, y con un mayor riesgo de desarrollar problemas emocionales y de comportamiento".

Martínez-Sánchez ha dicho que trasladarán los resultados del estudio a las autoridades sanitarias "para que tomen medidas", y ha insistido en la necesidad de que las instituciones sanitarias "revisen y regulen la publicidad de comida basura".

Niños que pasan más de una hora diaria ante pantallas comen más comida basura

que.es/2021/03/23/ninos-pasan-mas-hora-diaria-pantallas-comen-comida-basura

23 de marzo de 2021

Agencias
23 marzo, 2021

Los niños de entre 1 y 14 años que pasan más de una hora al día de su tiempo de ocio frente a una pantalla comen más comida basura, como dulces y "snacks", que el resto de menores, según un estudio elaborado por el Grupo de Evaluación de Determinantes de Salud y Políticas Sanitarias de UIC Barcelona.

El estudio, liderado por la doctoranda Àurea Cartanya-Hueso y el Dr. Adrián González Marrón y publicado en la revista Healthcare, analiza por primera vez la relación entre el uso recreativo de pantallas y el consumo de alimentos poco saludables, como dulces, bebidas azucaradas, comida rápida y "snacks" en niños españoles de entre 1 y 14 años. **El trabajo constata que a medida que aumentan las horas de exposición a las pantallas se incrementa el consumo de dulces, bebidas azucaradas, comida rápida y "snacks", por lo que "nuestro trabajo aporta evidencia a la hipótesis de que pasar mucho tiempo delante de la pantalla va asociado a unos hábitos peores de alimentación infantil",** comentan los autores.

Àurea Cartanyà y el Dr. González también han destacado que, entre el grupo de población analizado, los niños de entre 12 y 14 años son los que más pasan un mínimo de dos horas diarias frente a las pantallas con fines recreativos, un porcentaje que asciende al 63,9%. Este colectivo también es el que más consume bebidas azucaradas (20,9%) y comida rápida (12,2%), dentro del grupo analizado.

Otro de los datos relevantes que se desprende del informe es que el porcentaje de niños que consume dulces y comida basura es menor en aquellos que hacen deporte varios días por semana que en los que no hacen nunca ejercicio.

Los autores del trabajo han explicado que **"el uso de pantallas puede generar cierta ansiedad entre la población infantil que se acaba traduciendo en el consumo de comida basura".** Además, en su opinión, "el hecho de estar más horas expuestos a la publicidad de comida basura puede aumentar también su consumo".

Nivel socio-económico bajo: más pantallas y peor alimentación

El nivel socio-económico de las familias es otros de los factores que puede llevar a los menores "a tener un peor estilo de vida". Así, han recordado que las familias más empobrecidas "tienen salarios más bajos, horarios menos flexibles y jornadas laborales más largas, lo que puede provocar que los niños pasen más horas delante de las pantallas y que los padres ofrezcan a sus hijos opciones más rápidas de comida, aunque de menor calidad nutricional".

El grupo de investigadores de UIC Barcelona ha recordado que, como muestra otro estudio suyo publicado en la misma revista (https://www.mdpi.com/2227-9032/9/1/96), durante la pandemia de la covid-19 se disparó la exposición infantil a las pantallas En este sentido, ha destacado que dos de cada tres niños menores de 48 meses estuvieron expuestos a teléfonos inteligentes y tabletas durante el confinamiento de la primera ola y un 30% de ellos utilizaron estos aparatos incluso durante las comidas. Al margen de la pandemia, el uso de pantallas se ha incrementado en los últimos años. "Si en 2011 el porcentaje de niños expuestos a pantallas dos horas o más al día era de entre el 10 y 30%, en 2017 se situaba en el 44,7%", han añadido los autores del trabajo.

Ante estas cifras, que siguen aumentando, el profesor José M. Martínez-Sánchez responsable del grupo de investigación se ha mostrado convencido de que la exposición a pantallas, especialmente a los smartphones y tabletas, en la población infantil será "un nuevo determinante de la salud en los próximos años", ya que también **han detectado que "está relacionada con un número insuficiente de horas de sueño, obesidad, y con un mayor riesgo de desarrollar problemas emocionales y de comportamiento".**

El Dr. Martínez-Sánchez ha afirmado que trasladarán los resultados del estudio a las autoridades sanitarias para que tomen medidas y ha recordado a las familias la importancia de seguir las recomendaciones de las instituciones sanitarias: evitando el uso de pantallas en niños menores de 2 años, limitar a 1 hora diaria el tiempo en menores de entre 2 y 4 años y a 2 horas el uso recreativo de pantallas en niños de entre 5 y 17 años. Además, ha insistido en la necesidad de que las instituciones sanitarias "revisen y regulen la publicidad de comida basura".

Anexo K

Impacto mediático de los artículos no incluidos en la tesis

El tabac de cargolar és tan perjudicial com l'empaquetat, segons un estudi liderat per la UIC

ACN BARCELONA

■ El tabac de cargolar és tan perjudicial com el convencional, segons un estudi liderat per la Universitat Internacional de Catalunya (UIC) i publicat a la revista *Environmental Research*. El treball s'ha centrat en l'estudi de les nitrosamines específiques del tabac, carcinògens més prevalents en el tabac, a la saliva d'adults més grans de 16 anys residents a Barcelona. Algunes d'aquestes nitrosamines, com la NNAL, NNK i NNN, estan vinculades directament amb el càncer oral, d'esòfag i de pulmó. Els resultats conclouen que les concentracions d'aquestes nitrosamines específiques del tabac són similars a la saliva dels fumadors que consumeixen tabac de cargolar i a la de les persones que fumen tabac convencional.

En els últims anys s'ha detectat un augment del consum de tabac de cargolar, especialment entre els més joves, pel fet que el seu preu és més baix i per la falsa creença que és més saludable i natural. A Europa, el consum de tabac empaquetat es va reduir del 76% al 70% entre el 2014 i el 2017, mentre que el tabac d'embolicar va créixer del 23 al 24% en el mateix període.

En el cas de la ciutat de Barcelona, si el consum de tabac convencional era del 89,1% entre el 2004 i el 2005, va caure al 71,8% entre el 2011 i el 2012. Pel que fa al tabac de cargolar, el consum va passar de l'1,4% al 15,4% en els mateixos períodes. Els experts també adverteixen que els fumadors d'altres tipus de tabac, com la pipa o els puros, també estan augmentant.

A més de la UIC, en l'estudi hi han participat especialistes de l'Institut Català d'Oncologia (ICO), l'Institut de Recerca Biomèdica de Bellvitge (IDIBELL), l'Hospital Clínic de Barcelona, la facultat de Medicina de la Universitat de Barcelona (UB), la Universitat Pompeu Fabra (UPF), el Parc de Recerca Biomèdica de Barcelona i la Xarxa Catalana d'Hospitals Lliures de Fum.

José María Martínez

Responsable del Grup de Recerca d'Avaluació de Determinants de Salut i Polítiques Sanitàries de la UIC Barcelona

"El tabac de cargolar és tan perjudicial com el convencional"

● Un estudi català publicat a 'Environmental Research' desmunta la creença que el tabac de cargolar, que té molt d'èxit sobretot entre el jovent, és més saludable que el manufacturat

José María Martínez, fotografiat a l'exterior de la Universitat Internacional de Catalunya ■ UIC

David Bruguè
BARCELONA

És un dels responsables d'un estudi impulsat per la Universitat Internacional de Catalunya sobre el consum del tabac de cargolar. També hi han participat especialistes de l'Institut Català d'Oncologia, l'Institut de Recerca Biomèdica de Bellvitge, el Clínic, la UB i la UPF, entre d'altres.

Quin és l'origen de l'estudi? Per què s'ha decidit tirar-lo endavant?
Aquest estudi va sorgir per la creença entre la societat, sobretot entre els joves, que el tabac de cargolar és menys perjudicial que el manufacturat. Jo quan sento això sempre dic: 'com podeu dir que un tabac és saludable?'. Una cosa saludable és seguir la dieta mediterrània a l'hora d'alimentar-se o és fer esport. Fumar no és un hàbit saludable.

Com s'ha realitzat l'estudi?
Vam agafar una mostra representativa de fumadors majors de 16 anys a la ciutat de Barcelona, tant de tabac de cargolar com convencional. Quan una persona fuma inhala unes 4.000 substàncies, i l'objectiu era comparar les nitrosamines que tenien aquests fumadors a la saliva, comparant els dos tipus de tabac. Les nitrosamines estan vinculades directament amb el càncer oral, el d'esòfag i el de pulmó. Vam comprovar els biomarcadors en tots dos casos.

I la conclusió?
Que les persones que hi han participat tenien les mateixes nitrosamines, les unes i les altres. Cal tenir en compte que s'ha ajustat en base a la quantitat de tabac consumit, el nombre de cigarretes. Qui fuma tabac de cargolar sol fumar més. Fumar una sola cigarreta al dia és perjudicial per a la salut, però la gent que fuma tabac de cargolar sol fumar més cigarretes al dia que les persones que fumen manufacturat. També hi sol posar més quantitat de tabac del que porta el manufacturat.

El consum del tabac de cargolar, però, està arrelant?
L'estudi està emmarcat en un de més ampli, que demostra que el consum de tabac de cargolar ha pujat molt. En el cas de la ciutat de Barcelona, ha passat de ser l'1,4% entre 2004 i 2005 al 15,4% entre 2011 i 2012. Aquesta progressió es dona arreu de Catalunya i Europa. En canvi, el consum del tabac convencional ha caigut. I cal recordar que qui majoritàriament fuma tabac de cargolar és la gent jove.

Per una qüestió de preu?
Per dos motius. El primer és el que dèiem abans: que es té la falsa creença que és més saludable. El segon, efectivament, és el preu més econòmic. És molt més barat i s'hauria d'apujar el preu fins a equiparar-los. Fumar a Catalunya és barat. No és com a altres països amb nivells impositius molt alts. També s'hauria de comunicar més el perjudici que suposa per a la salut.

D'on surt la creença que és més saludable que el manufacturat?
Sobre això existeix un paral·lelisme amb el que va passar amb l'anomenat tabac light, que es venia com un producte més saludable. I era mentida. Amb el de cargolar, com que és el fumador qui es fa la cigarreta i regula la quantitat de tabac que hi posa, es pensa que és menys perjudicial. Però si després fumes més no s'arregla res. I també hi ha qui n'hi posa més quantitat. Però és que els components són exactament els mateixos a la picadura que al tabac manufacturat. La gent pensa que el paper és menys nociu, però no és real.

Passa el mateix amb els cigars o el tabac de pipa?
Exactament el mateix. No hi ha diferències. I com amb el cas del tabac de cargolar, el consum d'aquest tipus de tabac també està augmentant.

Les campanyes de conscienciació tenen efecte?
S'ha fet molt, però falta molt per fer. No som cap referent en el control de tabaquisme. Tot i la prohibició de fumar en espais públics, en estadis de futbol es continua fumant, per exemple. I cal donar més suport al fumador que vol deixar de fumar. Hi ha eines, però com sempre és qüestió de pressupost. I és alarmant l'augment del consum de tabac entre les dones. Van començar a fumar sobretot a partir dels 70 i la mortalitat atribuïble al tabac està pujant molt. El càncer de pulmó les està afectant molt més que dècades enrere. Igual que es fan cribratges i seguiment per a la prevenció del càncer de mama, hi hauria d'haver campanyes per reduir la incidència del tabaquisme, especialment entre la població femenina. És un problema de salut pública que cal afrontar des de les administracions. ■

El tabaco de liar es tan perjudicial como el convencional, según un estudio de UIC Barcelona

vivesaludable.es/2019/04/04/el-tabaco-de-liar-es-tan-perjudicial-como-el-convencional-segun-un-estudio-de-uic-barcelona/36883

Redacción 4 de abril de 2019

El tabaco de liar es tan perjudicial como el convencional, según un estudio liderado por investigadores de la Universitat Internacional de Catalunya (UIC Barcelona) cuyos resultados se han publicado en la revista *Environmental Research*.

Además de este grupo de investigación, en el estudio han participado especialistas del Instituto Catalán de Oncología (ICO), del Instituto de Investigación Biomédica de Bellvitge (IDIBELL), del Hospital Clínic de Barcelona, de la Facultad de Medicina de la Universidad de Barcelona (UB), de la Universidad Pompeu Fabra (UPF), del Parque de Investigación Biomédica de Barcelona y de la Red Catalana de Hospitales Libres de Humo.

El trabajo se ha centrado en el estudio de las nitrosaminas específicas del tabaco, carcinógenos más prevalentes en el tabaco, en la saliva de adultos mayores de 16 años residentes en Barcelona. Algunas de estas nitrosaminas, como la NNAL, NNK y la NNN, están vinculadas directamente con el cáncer oral, de esófago y de pulmón.

Los resultados concluyen que las concentraciones de estas nitrosaminas específicas del tabaco son similares en la saliva de los fumadores que consumen tabaco de liar que en la de aquellos que fuman tabaco convencional.

En los últimos años se ha detectado un aumento del consumo de tabaco de liar, especialmente entre los más jóvenes, debido a que su precio es más bajo y a la falsa creencia de que es más saludable y natural.

En Europa, el consumo de tabaco empaquetado se redujo del 76 al 70 % entre 2014 y 2017, mientras que el tabaco de liar creció del 23 al 24 % en el mismo periodo. En el caso de la ciudad de Barcelona, si el consumo de tabaco convencional era del 89,1 % entre 2004 y 2005, este cayó al 71,8 % entre 2011 y 2012. En cuanto al tabaco de liar, el consumo pasó del 1,4 % al 15,4 % en los mismos periodos. Los expertos también advierten que los fumadores de otros tipos de tabaco, como la pipa o los puros, también están aumentando.
El tabaco provoca cada año cerca de un millón de muertes por cáncer en todo el mundo. En los países desarrollados, un 26 % de las muertes por cáncer pueden atribuirse al tabaco, según datos de la Organización Mundial de Salud.

Equiparar precios y campañas de concienciación
Ante esta situación, los autores del estudio consideran que endurecer el precio del tabaco de liar y equipararlo al convencional podría ser una estrategia efectiva para controlar el consumo sobre todo entre los jóvenes. En este sentido, Àurea Cartanyà, primera autora del trabajo, ha explicado que el objetivo de esta medida sería que el tabaco de liar “no fuera una alternativa más económica” al tabaco empaquetado.

Además, el Dr. José M. Martínez-Sánchez, responsable del Grupo de Investigación de Evaluación de Determinantes de Salud y Políticas Sanitarias de UIC Barcelona ha insistido en la necesidad de seguir con las campañas de concienciación y advertir que el tabaco de liar “es tan perjudicial como el convencional”. “Es importante seguir realizando campañas de salud en las escuelas para incidir en las edades en que los jóvenes empiezan a fumar”, ha añadido.

El tabac de cargolar és tan perjudicial com l'empaquetat, segons un estudi liderat per la UIC

ACN BARCELONA

El tabac de cargolar és tan perjudicial com el convencional, segons un estudi liderat per la Universitat Internacional de Catalunya (UIC) i publicat a la revista Environmental Research. El treball s'ha centrat en l'estudi de les nitrosamines específiques del tabac, carcinògens més prevalents en el tabac, a la saliva d'adults més grans de 16 anys residents a Barcelona. Algunes d'aquestes nitrosamines, com la NNAL, NNK i NNN, estan vinculades directament amb el càncer oral, d'esòfag i de pulmó. Els resultats conclouen que les concentracions d'aquestes nitrosamines específiques del tabac són similars a la saliva dels fumadors que consumeixen tabac de cargolar i a la de les persones que fumen tabac convencional.

En els últims anys s'ha detectat un augment del consum de tabac de cargolar, especialment entre els més joves, pel fet que el seu preu és més baix i per la falsa creença que és més saludable i natural. A Europa, el consum de tabac empaquetat es va reduir del 76% al 70% entre el 2014 i el 2017, mentre que el tabac d'embolicar va créixer del 23 al 24% en el mateix període.

En el cas de la ciutat de Barcelona, si el consum de tabac convencional era del 89,1% entre el 2004 i el 2005, va caure al 71,8% entre el 2011 i el 2012. Pel que fa al tabac de cargolar, el consum va passar de l'1,4% al 15,4% en els mateixos períodes. Els experts també adverteixen que els fumadors d'altres tipus de tabac, com la pipa o els puros, també estan augmentant.

A més de la UIC, en l'estudi hi han participat especialistes de l'Institut Català d'Oncologia (ICO), l'Institut de Recerca Biomèdica de Bellvitge (IDIBELL), l'Hospital Clínic de Barcelona, la facultat de Medicina de la Universitat de Barcelona (UB), la Universitat Pompeu Fabra (UPF), el Parc de Recerca Biomèdica de Barcelona i la Xarxa Catalana d'Hospitals Lliures de Fum.

Equiparar preus i fer campanyes de conscienciació

Davant d'aquesta situació, els autors de l'estudi consideren que augmentar el preu del tabac de cargolar i equiparar-lo al convencional podria ser una estratègia efectiva per controlar el consum sobretot entre els joves.

En aquest sentit, Àurea Cartanyà, primera autora del treball, ha explicat que l'objectiu d'aquesta mesura seria que el tabac de cargolar «no fos una alternativa més econòmica» al tabac empaquetat.

El tabac d'embolicar és tan perjudicial com l'empaquetat

El tabac d'enrotllar és tan perjudicial com el convencional, segons un estudi liderat per la Universitat Internacional de Catalunya (UIC) i publicat a la revista 'Environmental Research'.

El treball s'ha centrat en l'estudi de les nitrosamines específiques del tabac, carcinògens més

Detecten un augment en el consum del tabac d'enrotllar, lligat al seu preu

prevalents en el tabac, a la saliva d'adults majors de 16 anys residents a Barcelona. Algunes d'aquestes nitrosamines, com la NNAL, NNK i la NNN, estan vinculades directament amb el càncer oral, d'esòfag i de pulmó. Els resultats conclouen que les concentracions d'aquestes nitrosamines específiques del tabac són similars a la saliva dels fumadors que consumeixen tabac d'embolicar que a la d'aquells que fumen tabac convencional.


FOTO: EFE

En els últims anys s'ha detectat un augment del consum de tabac d'embolicar, especialment entre els més joves, pel fet que el seu preu és més baix i per la falsa creença que és més saludable i natural. A Europa, el consum de tabac empaquetat es va reduir del 76% al 70% entre 2014 i 2017, mentre que el tabac d'embolicar va créixer del 23 al 24% en el mateix període. En el cas de la ciutat de Barcelona, si el consum de tabac convencional era del 89,1% entre 2004 i 2005, aquest va caure al 71,8% entre 2011 i 2012. Pel que fa al tabac d'embolicar, el consum va passar de l'1,4% al 15,4% en els mateixos períodes. Els experts també adverteixen que els fumadors d'altres tipus de tabac, com la pipa o els puros, també estan augmentant.

PREUS I CAMPANYES DE CONSCIENCIACIÓ

Davant d'aquesta situació, els autors de l'estudi consideren que endurir el preu del tabac d'embolicar i equiparar-lo al convencional podria ser una estratègia efectiva per controlar el consum sobretot entre els joves.

En aquest sentit, Àurea Cartanyà, primera autora del treball, ha explicat que l'objectiu d'aquesta mesura seria que el tabac d'enrotllar "no fos una alternativa més econòmica" al tabac empaquetat.

El falso mito de que el tabaco de liar es mas sano

noticierouniversal.com/salud/el-falso-mito-de-que-el-tabaco-de-liar-es-mas-sano

viernes, 22 de marzo de 2019

Saque el tabaco, los filtros y el papel. Amontone en la mano la cantidad justa, sin pasarse, pero sin quedarse corto porque si no no tira. Pongase el filtro en la boca mientras trata de volcar el tabaco en el papel y le da forma. Sujete de ambos extremos para que no se salga, es importante. Pongase la boquilla en un lateral y enróllelo cuando vea que está compacto y ha cogido la forma. ¡Ya está listo! Mechero en mano para encendértelo y a **¡fumar**!

Mucha es la gente que prefiere a día de hoy **no sólo perder tiempo de vida por ser fumadores, sino perderlo en elaborar en cada momento del día que les apetece un cigarro.** Muchos son también los que caen en el error de pensar que ese esfuerzo que hacen, a pesar de que para ellos es «muy fácil liárselo» es porque es algo mas sano que los cigarros convencionales. Pero no.

El Grupo de Investigación de Evaluación de Determinantes de Salud y Políticas Sanitarias de Universidad Internacional de Cataluña ha publicado un estudio en la revista «Environmental Research» que **el consumo de tabaco de liar ha aumentado del 1,4% al 15,4% en ocho años en Barcelona**. ¿Las causas? Su **precio mas bajo** frente a los convencionales y la **falsa creencia de que es menos perjudicial para la salud**.

Algunos datos

El tabaco cada año provoca cerca de un millón de muertes por cáncer en todo el mundo. Según la Organización Mundial de Salud, en los **países desarrollados, un 26% de las muertes por cáncer se atribuyen a esto**. Por otra parte, el Comisionado para el Mercado de Tabacos apunta que durante los años 2008 y 2011 **se produjo un incremento espectacular en el consumo de liar de un 32%,** reforzándose los datos en el caso de Europa, puesto que entre los años 2014 y 2017 **se redujo en un 6% el empaquetado (del 76% al 70%), mientras que el de liar pasó de un 23% al 24%.**

El trabajo revela que **no existe diferencia alguna en la concentración de nitrosaminas en la saliva de los fumadores en función del tipo de tabaco que consuman** y que los efectos dañinos para la salud del de liar están claros. Los fumadores de este tipo de cigarrillos muestran **mayor riesgo de cáncer de boca, laringe, faringe y pulmón que los fumadores de cigarrillos convencionales**.

Por otra parte, los contenidos de nicotina, que relaciona **mayor poder de adicción**, y el alquitrán y el monóxido de carbono, que **se traducen en una mayor capacidad de producir enfermedades**, alcanzan **valores de hasta el 70%, 85% y el 84%** respectivamente, mas de lo permitido para los cigarrillos convencionales.

El trabajo -desarrollado además del **Grupo de Investigación la UJC** , el Instituto Catalán de Oncología (ICO), el Instituto de Investigación Biomédica de Bellvitge (Idibell), del Hospital Clínic, y las facultades de Medicina de las universidades de Barcelona y Pompeu Fabra (UPF) (todas ellas de Barcelona), entre otros- se ha centrado en **adultos mayores de 16 años y que fueran residentes en Barcelona**. Han estudiado **las nitrosaminas específicas del tabaco, carcinógenos más prevalentes en el tabaco, en la saliva de los mismos**. Algunas de estas sustancias están vinculadas directamente con el cáncer oral, de esófago y de pulmón como son: la **NNAL, NNK y la NNN**.

Concienciar

«Es **importante seguir realizando campañas de salud en las escuelas para incidir en las edades en que los jóvenes empiezan a fumar**», añadió el doctor José M. Martínez-Sánchez, el responsable del Grupo de Investigación de Evaluación de Determinantes de Salud y Políticas Sanitarias de UIC Barcelona.

Por ello, los autores del estudio consideran que **endurecer los precios del tabaco de liar y equipararlo al convencional podría ser una estrategia efectiva para controlar el consumo sobre todo en los jóvenes.** Áurea Cartanyá, primera autora del trabajo, quiere dejar claro el objetivo de esta medida sería que el tabaco de liar «no fuera una alternativa mas económica»

El falso mito de que el tabaco de liar es mas sano

larazon.es/atusalud/el-falso-mito-de-que-el-tabaco-de-liar-es-mas-sano-IH22528123

22 de marzo de 2019

Actualidad

Un nuevo estudio realizado por la UIC de Barcelona confirma que es tan perjudicial o peor que el convencional

Marta Baena

/
La Razón
Madrid.
Creada.22-03-2019 | 12:53 H

/
Última actualización.18-11-2019 | 18:58 H

Saque el tabaco, los filtros y el papel. Amontone en la mano la cantidad justa, sin pasarse, pero sin quedarse corto porque si no no tira. Pongase el filtro en la boca mientras trata de volcar el tabaco en el papel y le da forma. Sujete de ambos extremos para que no se salga, es importante. Pongase la boquilla en un lateral y enróllelo cuando vea que está compacto y ha cogido la forma. ¡Ya está listo! Mechero en mano para encendértelo y a **¡fumar**!

Mucha es la gente que prefiere a día de hoy **no sólo perder tiempo de vida por ser fumadores, sino perderlo en elaborar en cada momento del día que les apetece un cigarro.** Muchos son también los que caen en el error de pensar que ese esfuerzo que hacen, a pesar de que para ellos es "muy fácil liárselo"es porque es algo mas sano que los cigarros convencionales. Pero no.

El Grupo de Investigación de Evaluación de Determinantes de Salud y Políticas Sanitarias de Universidad Internacional de Cataluña ha publicado un estudio en la revista «Environmental Research» que **el consumo de tabaco de liar ha aumentado del 1,4% al 15,4% en ocho años en Barcelona**. ¿Las causas? Su **precio mas bajo** frente a los convencionales y la **falsa creencia de que es menos perjudicial para la salud**.

Algunos datos

El tabaco cada año provoca cerca de un millón de muertes por cáncer en todo el mundo. Según la Organización Mundial de Salud, en los **países desarrollados, un 26% de las muertes por cáncer se atribuyen a esto**. Por otra parte, el Comisionado para el Mercado de Tabacos apunta que durante los años 2008 y 2011 **se produjo un incremento espectacular en el consumo de liar de un 32%,** reforzándose los datos en el caso de Europa, puesto que entre los años 2014 y 2017 **se redujo en un 6% el empaquetado (del 76% al 70%), mientras que el de liar pasó de un 23% al 24%.**

El trabajo revela que **no existe diferencia alguna en la concentración de nitrosaminas en la saliva de los fumadores en función del tipo de tabaco que consuman** y que los efectos dañinos para la salud del de liar están claros. Los fumadores de este tipo de cigarrillos muestran **mayor riesgo de cáncer de boca, laringe, faringe y pulmón que los fumadores de cigarrillos convencionales**.

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Concienciar

«Es **importante seguir realizando campañas de salud en las escuelas para incidir en las edades en que los jóvenes empiezan a fumar**», añadió el doctor José M. Martínez-Sánchez, el responsable del Grupo de Investigación de Evaluación de Determinantes de Salud y Políticas Sanitarias de UIC Barcelona.

Por ello, los autores del estudio consideran que **endurecer los precios del tabaco de liar y equipararlo al convencional podría ser una estrategia efectiva para controlar el consumo sobre todo en los jóvenes.** Áurea Cartanyá, primera autora del trabajo, quiere dejar claro el objetivo de esta medida sería que el tabaco de liar «no fuera una alternativa mas económica»

Archivado en:

Ensayo/Salud/Cáncer

Entrevista a José María Martínez Sánchez, miembro de la Universidad Internacional de Cataluña.

Cada vez es más común ver alguien liando sin cigarrito por la calle piensas que es un perrito si claro que si hijo . Con lo cual honor ya yo creo que es normal en una encendido todavía hay dale que te pego que la coleta eso es un señor ya mayor que también los índices claro si haciendo porque claro lo de pisar que me lo que iba a decir es que cada vez está bien te acostumbras si la verdad es que . No no te he dicho también es el adscrito canoso que dices pero ya se te ha pasado el arroz chavales bueno que oye por cierto lo que hacen nuestros padres lo Elías el picadura se llamaba otro mi mi padre fue el caldo gallina aquel el ideales José María Martínez Sánchez buenas tardes hola buenas tardes José María Martínez Sánchez es el responsable de un estudio realizado por la Universidad Internacional de Cataluña que tiene una conclusión el consumo del tabaco de liar ha aumentado en los últimos años con la creencia de que es más saludable y natural y parece que sonoro no está tan claro no totalmente de acuerdo de hecho el como bien comentas X que es más un saludable más natural cuando tendríamos que decir que es es la creencia habría que es menos perjudicial que el tabaco otra pero como bien dice creencia la creencia de que ha habido claros sobre todo en la población jóvenes que el tabaco de liar es es menos perjudicial que el tabaco manufacturada pero nuestro estudio desmiente esta falsa creencia cómo lo desmiente en que cien puntos habéis parado o habéis demostrado que que no que esto no es así y que es igual de perjudicial bueno hemos estudiado unos biomarcadores unos cancerígenos que son litros a minas la del tabaco a que están relacionado directamente con el cáncer oral con el cáncer de pulmón que son específicas de tabaco pues hemos estudiado estas . Minas en la saliva de de fumadores tanto de tabaco convencional cómo te tabaco de liar con el resultado de que ambos fumadores dando lo que fumaban exclusivamente tabaco de liar como los que fumaban exclusivamente tabaco convencional tienen las mismas cantidades de nidos a minas lo que podemos decir que es igual de perjudicial que el tabaco o manufacturados . Si si saque que las Nitro Salinas esas aparecen en ambos casos en el de en el facturar en en en el que se vende y en el de liar cada uno mientras el consumo empaquetado baja el liar sube es sobretodo como decías entre los jóvenes de dónde viene esa creencia o quién ha soltado esa esa leyenda urbana de que es que esto es saludable casi aquí hay dos factores bueno la la creencia urbana viene de que es la gente de los ocho toda la población juvenil que tiene menos adjetivo que un trabajo un tabaco más natural . Que el papel de el papel es defender al papel que sujetar . El filtro . Además que la cantidad de tabaco que se pone es menor pero como como reto es una falsa creencia que hay en en la población sobre todo juvenil después que otro aspecto es el precio el precio del tabaco de liar Juan la económico fumar en en España pues en algo ya es mucho más económico fumar ha sido pues un traspaso sobre todo en la población joven en el otro engaño porque mi padre me contaba que cuando era pequeño se fumaba las zarzas y eso si que es barato ahí está no sea que si fuera por precio lo más barato lo más lo menos perjudicial no nunca ha sido así no eso es eso es eso es además una cosa que hay que lo que desde el grupo lo estamos animando a los legisladores aumentará el precio del tabaco de liar para que no sea una un usó un consumo de tabaco la población más joven informar informa en las cajetillas que que el tabaco es igual de perjudicial porque en ocho años hemos visto que ha aumentado dotado de un uno por ciento un quince por ciento entra sobre todo por la población más joven si no quizá el el asunto del precio que auto engaño que según nos engaña también quizá que ha ganado la batalla como decías de la imagen de parece más sano liar un papel creo que uno que viene liado pero el papeles el mismo no exactamente ya no pasa nada recordemos la campaña que hizo la industrial con los tabaco light de tabaco la ha donado lo cual ahora ya está afortunadamente prohibido pero el tabaco de liar ha generado cultura en la población joven y lo vemos Amaya hemos avanzado mucho me encontró el tabaquismo en España con una regulación de tabaco en todos los espacios públicos la gente sale lo vemos en la en la en las terrazas de los bares de público sobre todo la gente joven en universidades y de tabaco de deber como nosotros lo hemos visto exactamente igual de perjudicial que el tabaco manufactura lo que se hizo en tiempos una campaña similar a ésta con otro tipo de de tabaco que también tenía mejor fama que eran la pipa por ejemplo los hilos puros que también había esa esa manera de decir que el puro es mejor que el tabaco el cigarrillo no también a lo mejor no sé a lo mejor tenía algún punto porque no tenía papel pero en el fondo está fumando hoy no es bueno te cero en nuestro estudio también hemos visto puros Purito nosotros analizamos cinco productos del tabaco diferente tomas lo más como ya hemos todo esto que todos igual lo apoyaban entre podría esos todos son igual de perjudiciales . Y además con un vio marcador específico de de cáncer . Es cuestión de poner la lupa Hay . Común Icaria Hay al consumidor de de que tabaco cualquier tipo producto de es propicia para la salud y aumentar ofrece hoy como ya Europa eh en las la directiva de Control de Tabaquismo europeas muy bien pero José María Martínez Sánchez Sánchez responsable de este estudio realizado por la Universidad Internacional de Cataluña que nos viene a decir que el tabaco de liar es exactamente igual de perjudicial que el tabaco que viene empaquetado muchas gracias muy amable buenas tardes

18 marzo 2019

El tabaco de liar es tan perjudicial como el convencional, según un estudio de la UIC

cope.es/emisoras/cataluna/barcelona-provincia/barcelona/noticias/tabaco-liar-tan-perjudicial-como-convencional-segun-estudio-uic-20190315_373953

15 de marzo de 2019

Un estudio liderado por investigadores de la Universitat Internacional de Catalunya (UIC) demuestra que el tabaco de liar es tan perjudicial como el convencional. Hay que tener en cuenta que el consumo de este tipo de tabaco ha aumentado especialmente entre los jóvenes los últimos años porque es más barato y por la "falsa creencia" de que es más sano y también más natural.

Por poner un ejemplo, en el caso de la ciudad de Barceloina en consumo de tabaco empaquetado, el convencional, era del 89% en 2004 y cayó al 71,8% entre 2011 y 2012. En cambio, el tabaco de liar ha hecho el camino inverso en el mismo periodo: ha pasado de ser residual, de tener un consumo de poco más del 1% a un 15%.

RESULTADOS DEL ESTUDIO

Ahora este estudio liderado por la UIC demuestra que no hay diferencias entre los dos tipos de tabaco, y por lo tanto, son iguales de perjudiciales para la salud. En concreto, los investigadores se han centrado en el estudio de las nitrosaminas específicas del tabaco que se encuentran en la saliva de adultos mayores de 16 años en la ciudad de Barcelona. Algunas de estas nitrosaminas, como la NNAL, NNK o la NNN están vinculadas directamente con el cáncer oral, de esófago y de pulmón. Los resultados demuestran que las concentraciones de estas nitrosaminas son parecidas en la saliva de los fumadores que consumen uno u otro tipo de tabaco. Por este motivo, uno de los impulsores del estudio, el doctor José María Martínez-Sánchez, responsable del Grupo de Evaluación de Determinantes de Salud y Políticas Sanitarias de la UIC Barcelona apuesta por equiparar el precio de los dos tipos de tabaco y también por seguir haciendo campañas de salud en las escuelas para incidir en las edades en que los jóvenes empiezan a fumar".

Hay que tener en cuenta que el tabaco provoca cada año cerca de un millón de muertos por cáncer en todo el mundo. Según la OMS, en los países desarrollados una cuarta parte de las muertes por cáncer pueden atribuirse al tabaco.

En el estudio también han participado especialistes del Instituto Catalán de Oncología (ICO), del Instituto de Investigación Biomédica de Bellvitge (IDIBELL), del Hospital Clínico de Barcelona, de la Facultad de medicina de la UB, de la Universidad Pompeu Fabra, así como del parque de Investigación Biomédica de Barcelona.

El tabaco de liar es tan perjudicial como el convencional

salamanca24horas.com/texto-diario/mostrar/1355378/tabaco-liar-perjudicial-como-convencional

17 de marzo de 2019

El tabaco de liar es tan perjudicial como el convencional, según un estudio liderado por investigadores de la Universitat Internacional de Catalunya (UIC Barcelona) cuyos resultados se han publicado en la revista Environmental Research.

Además de este grupo de investigación, en el estudio han participado especialistas del Instituto Catalán de Oncología (ICO), del Instituto de Investigación Biomédica de Bellvitge (IDIBELL), del Hospital Clínic de Barcelona, de la Facultad de Medicina de la Universidad de Barcelona (UB), de la Universidad Pompeu Fabra (UPF), del Parque de Investigación Biomédica de Barcelona y de la Red Catalana de Hospitales Libres de Humo.

El trabajo se ha centrado en el estudio de las nitrosaminas específicas del tabaco, carcinógenos más prevalentes en el tabaco, en la saliva de adultos mayores de 16 años residentes en Barcelona. Algunas de estas nitrosaminas, como la NNAL, NNK y la NNN, están vinculadas directamente con el cáncer oral, de esófago y de pulmón.

Los resultados concluyen que las concentraciones de estas nitrosaminas específicas del tabaco son similares en la saliva de los fumadores que consumen tabaco de liar que en la de aquellos que fuman tabaco convencional.

En los últimos años se ha detectado un aumento del consumo de tabaco de liar, especialmente entre los más jóvenes, debido a que su precio es más bajo y a la falsa creencia de que es más saludable y natural.

En Europa, el consumo de tabaco empaquetado se redujo del 76 al 70 % entre 2014 y 2017, mientras que el tabaco de liar creció del 23 al 24 % en el mismo periodo. En el caso de la ciudad de Barcelona, si el consumo de tabaco convencional era del 89,1 % entre 2004 y 2005, este cayó al 71,8 % entre 2011 y 2012. En cuanto al tabaco de liar, el consumo pasó del 1,4 % al 15,4 % en los mismos periodos. Los expertos también advierten que los fumadores de otros tipos de tabaco, como la pipa o los puros, también están aumentando.

El tabaco provoca cada año cerca de un millón de muertes por cáncer en todo el mundo. En los países desarrollados, un 26 % de las muertes por cáncer pueden atribuirse al tabaco, según datos de la Organización Mundial de Salud.

Equiparar precios y campañas de concienciación

Ante esta situación, los autores del estudio consideran que endurecer el precio del tabaco de liar y equipararlo al convencional podría ser una estrategia efectiva para controlar el consumo sobre todo entre los jóvenes. En este sentido, Àurea Cartanyà, primera autora del trabajo, ha explicado que el objetivo de esta medida sería que el tabaco de liar "no fuera una alternativa más económica" al tabaco empaquetado.

Además, el Dr. José M. Martínez-Sánchez, responsable del Grupo de Investigación de Evaluación de Determinantes de Salud y Políticas Sanitarias de UIC Barcelona ha insistido en la necesidad de seguir con las campañas de concienciación y advertir que el tabaco de liar "es tan perjudicial como el convencional". "Es importante seguir realizando campañas de salud en las escuelas para incidir en las edades en que los jóvenes empiezan a fumar", ha añadido.

Estudio asegura que el tabaco de liar es tan perjudicial como el convencional

lavanguardia.com/vida/20190314/461023960557/estudio-asegura-que-el-tabaco-de-liar-es-tan-perjudicial-como-el-convencional.html

SALUD TABAQUISMO

Barcelona, 14 mar (EFE).- El tabaco de liar es tan perjudicial como el convencional, según concluye un estudio de la Universidad Internacional de Cataluña (UIC) que ha demostrado que no existen diferencias en la concentración de compuestos cancerígenos en la saliva de los fumadores en función del tipo de tabaco que consumen.

Según el estudio, elaborado por el Grupo de Investigación de Evaluación de Determinantes de Salud y Políticas Sanitarias de la UIC (GRE), el consumo de tabaco de liar ha aumentado del 1,4 % al 15,4 % en ocho años por su precio más bajo y la falsa creencia de que es menos perjudicial para la salud.

Por este motivo, los investigadores de la UIC instan a los expertos a endurecer los precios sobre este tipo de tabaco para dejar de potenciar su consumo entre los jóvenes.

El trabajo se ha centrado en el estudio de las nitrosaminas o compuestos cancerígenos específicos del tabaco presentes en la saliva de adultos mayores de 16 años residentes en Barcelona, y han concluido que las concentraciones son similares en los consumidores de los dos tipos de tabaco.

El responsable del GRE, el doctor José María Martínez Sánchez, ha insistido en la necesidad de seguir con las campañas de concienciación: "es importante seguir realizando campañas de salud en las escuelas para incidir en las edades en que los jóvenes empiezan a fumar".

En Europa, el consumo de tabaco empaquetado se ha reducido del 76 al 70 % entre 2014 y 2017, y los expertos advierten que los fumadores de otros tipos de tabaco, como la pipa o los puros, también están aumentando. EFE

El tabac d'embolicar és tan perjudicial com l'empaquetat, segons un estudi català

eixdiari.cat/societat/doc/82115/el-tabac-dembolicar-es-tan-perjudicial-com-lempaquetat-segons-un-estudi-catala.html

Adiccions

ACN/ Pol Solà Barcelona 15-03-2019 9:58 Lectures 2774

El tabac d'enrotllar és tan perjudicial com el convencional, segons un estudi liderat per la Universitat Internacional de Catalunya (UIC) i publicat a la revista 'Environmental Research'. El treball s'ha centrat en l'estudi de les nitrosamines específiques del tabac, carcinògens més prevalents en el tabac, a la saliva d'adults majors de 16 anys residents a Barcelona. Algunes d'aquestes nitrosamines, com la NNAL, NNK i la NNN, estan vinculades directament amb el càncer oral, d'esòfag i de pulmó. Els resultats conclouen que les concentracions d'aquestes nitrosamines específiques del tabac són similars a la saliva dels fumadors que consumeixen tabac d'embolicar que a la d'aquells que fumen tabac convencional.

En els últims anys s'ha detectat un augment del consum de tabac d'embolicar, especialment entre els més joves, pel fet que el seu preu és més baix i per la falsa creença que és més saludable i natural. A Europa, el consum de tabac empaquetat es va reduir del 76% al 70% entre 2014 i 2017, mentre que el tabac d'embolicar va créixer del 23 al 24% en el mateix període. En el cas de la ciutat de Barcelona, si el consum de tabac convencional era del 89,1% entre 2004 i 2005, aquest va caure al 71,8% entre 2011 i 2012. Pel que fa al tabac d'embolicar, el consum va passar de l'1,4% al 15,4% en els mateixos períodes. Els experts també adverteixen que els fumadors d'altres tipus de tabac, com la pipa o els puros, també estan augmentant.

A més de la UIC, en l'estudi han participat especialistes de l'Institut Català d'Oncologia (ICO), l'Institut de Recerca Biomèdica de Bellvitge (IDIBELL), l'Hospital Clínic de Barcelona, de la Facultat de Medicina de la Universitat de Barcelona (UB), de la Universitat Pompeu Fabra (UPF), del Parc de Recerca Biomèdica de Barcelona i de la Xarxa Catalana d'Hospitals Lliures de Fum.

Equiparar preus i campanyes de conscienciació

Davant d'aquesta situació, els autors de l'estudi consideren que endurir el preu del tabac d'embolicar i equiparar-lo al convencional podria ser una estratègia efectiva per controlar el consum sobretot entre els joves. En aquest sentit, Àurea Cartanyà, primera autora del treball, ha explicat que l'objectiu d'aquesta mesura seria que el tabac d'enrotllar "no fos una alternativa més econòmica" al tabac empaquetat.

A més, el doctor José María Martínez-Sánchez, responsable del Grup de Recerca d'Avaluació de Determinants de Salut i Polítiques Sanitàries de UIC Barcelona, ha insistit en la necessitat de seguir amb les campanyes de conscienciació i advertir que el tabac d'enrotllar "és tan perjudicial com el convencional". "És important seguir realitzant campanyes de salut a les escoles per incidir en les edats en què els joves comencen a fumar", ha afegit.

ESTUDIO

El tabaco de liar es tan perjudicial como el convencional

La Universidad Internacional de Cataluña (UIC) ha demostrado que no existe ninguna variación en la concentración de compuestos cancerígenos en la saliva de los fumadores de tabaco de liar si se comparan con los que fuman tabaco convencional. Según el estudio, el consumo de tabaco de liar ha aumentado un 13,1% en ocho años debido que su precio es más bajo que el convencional. EFE

El tabaco de liar es tan perjudicial como el convencional, según un estudio

eldiariocantabria.publico.es/articulo/espanha/tabaco-liar-es-tan-perjudicial-convencional-estudio/20190314203218058110.html

El tabaco de liar es tan perjudicial como el convencional, según constata un estudio liderado por investigadores de la Universitat Internacional de Catalunya (UIC Barcelona), cuyos resultados se han publicado en la **revista 'Environmental Research'**. Además de este grupo de investigación, en el estudio han participado especialistas del Instituto Catalán de Oncología (ICO), del Instituto de Investigación Biomédica de Bellvitge (Idibell), del Hospital Clínic de Barcelona, de la Facultad de Medicina de la Universitat de Barcelona (UB), de la Universitat Pompeu Fabra (UPF), del Parque de Investigación Biomédica de Barcelona y de la Red Catalana de Hospitales Libres de Humo.

El trabajo se ha centrado en el **estudio de las nitrosaminas específicas del tabaco, carcinógenos más prevalentes en el tabaco**, en la saliva de adultos mayores de 16 años residentes en Barcelona. Algunas de estas nitrosaminas, como la NNAL, NNK y la NNN, están vinculadas directamente con el cáncer oral, de esófago y de pulmón. Los resultados concluyen que las concentraciones de estas nitrosaminas específicas del tabaco son similares en la saliva de los fumadores que consumen tabaco de liar que en la de aquellos que fuman tabaco convencional.

En los últimos años se ha detectado un **aumento del consumo de tabaco de liar, especialmente entre los más jóvenes**, debido a que su precio es más bajo y a la falsa creencia de que es más saludable y natural. En Europa, el consumo de tabaco empaquetado se redujo del 76% al 70% entre 2014 y 2017, mientras que el tabaco de liar creció del 23% al 24% en el mismo periodo.

En el caso de la ciudad de Barcelona, si el consumo de tabaco convencional era del 89,1% entre 2004 y 2005, este cayó al 71,8% entre 2011 y 2012. En cuanto al tabaco de liar, el consumo pasó del 1,4% al 15,4% en los mismos periodos, y los expertos también advierten que los fumadores de otros tipos de tabaco, como la pipa o los puros, también están aumentando.

El tabac d'embolicar no és més "light" que els cigarrets

catalunyapress.cat/texto-diario/mostrar/1355930/tabac-embolicar-no-mes-light-els-cigarrets

14 de marzo de 2019

Redacció Catalunyapress | dijous, 14 de març de 2019

El tabac d'embolicar és tan perjudicial com el convencional, segons constata un estudi liderat per **investigadors** de la **Universitat Internacional de Catalunya (UIC Barcelona)**, els resultats s'han publicat a la revista 'Environmental Research'.

MÉS INFORMACIÓ

Els fumadors que consumeixen tabac d'embolicar són menys propensos a deixar de fumar

A més d'aquest grup de recerca, en l'estudi han participat especialistes de l'Institut Català d'Oncologia (ICO), l'Institut de Recerca Biomèdica de Bellvitge (Idibell), de l'Hospital Clínic de Barcelona, de la Facultat de Medicina de la Universitat de Barcelona (UB), de la Universitat Pompeu Fabra (UPF), del Parc de Recerca Biomèdica de Barcelona i de la Xarxa Catalana d'Hospitals Lliures de Fum.

El treball s'ha centrat en l'estudi de les nitrosamines específiques del tabac, carcinògens més prevalents en el tabac, a la saliva d'adults majors de 16 anys residents a Barcelona. Algunes d'aquestes nitrosamines, com la NNAL, NNK i la NNN, estan vinculades directament amb el càncer oral, d'esòfag i de pulmó.

Els resultats conclouen que les concentracions d'aquestes nitrosamines específiques del tabac són similars a la saliva dels fumadors que consumeixen **tabac d'embolicar** que a la d'aquells que fumen tabac convencional.

En els últims anys s'ha detectat un augment del consum de tabac d'embolicar, especialment entre els més joves, a causa de que el seu preu és més baix i a la falsa creença que és més saludable i natural.

A Europa, el consum de tabac empaquetat es va reduir del 76% al 70% entre 2014 i 2017, mentre que **el tabac d'embolicar va créixer el 23% al 24% en el mateix període**.

En el cas de la ciutat de Barcelona, si el consum de tabac convencional era del 89,1% entre 2004 i 2005, aquest va caure al 71,8% entre 2011 i 2012.

Pel que fa al **tabac d'embolicar**, el consum va passar del 1,4% al 15,4% en els mateixos períodes, i els experts també adverteixen que els fumadors d'altres tipus de tabac, com la pipa o els purs, també estan augmentant.

El tabaco de liar no es más "light" que los cigarrillos

catalunyapress.es/texto-diario/mostrar/1355929/tabaco-liar-no-light-cigarrillos

14 de marzo de 2019

Redacción Catalunyapress | jueves, 14 de marzo de 2019, 18:18

El tabaco de liar es tan perjudicial como el convencional, según constata un estudio liderado por **investigadores** de la **Universitat Internacional de Catalunya (UIC Barcelona)**, cuyos resultados se han publicado en la revista 'Environmental Research'.

MÁS INFORMACIÓN

Los fumadores que consumen tabaco de liar son menos propensos a dejar de fumar

Además de este grupo de investigación, en el estudio han participado especialistas del Instituto Catalán de Oncología (ICO), del Instituto de Investigación Biomédica de Bellvitge (Idibell), del Hospital Clínic de Barcelona, de la Facultad de Medicina de la Universitat de Barcelona (UB), de la Universitat Pompeu Fabra (UPF), del Parque de Investigación Biomédica de Barcelona y de la Red Catalana de Hospitales Libres de Humo.

El trabajo se ha centrado en el estudio de las nitrosaminas específicas del tabaco, carcinógenos más prevalentes en el tabaco, en la saliva de adultos mayores de 16 años residentes en Barcelona. Algunas de estas nitrosaminas, como la NNAL, NNK y la NNN, están vinculadas directamente con el cáncer oral, de esófago y de pulmón.

Los resultados concluyen que las concentraciones de estas nitrosaminas específicas del tabaco son similares en la saliva de los fumadores que consumen **tabaco de liar** que en la de aquellos que fuman tabaco convencional.

En los últimos años se ha detectado un aumento del consumo de tabaco de liar, especialmente entre los más jóvenes, debido a que su precio es más bajo y a la falsa creencia de que es más saludable y natural.

En Europa, el consumo de tabaco empaquetado se redujo del 76% al 70% entre 2014 y 2017, mientras que **el tabaco de liar creció del 23% al 24% en el mismo periodo**.

En el caso de la ciudad de Barcelona, si el consumo de tabaco convencional era del 89,1% entre 2004 y 2005, este cayó al 71,8% entre 2011 y 2012.

En cuanto al **tabaco de liar**, el consumo pasó del 1,4% al 15,4% en los mismos periodos, y los expertos también advierten que los fumadores de otros tipos de tabaco, como la pipa o los puros, también están aumentando.

Ràdio Balaguer - El tabac d'embolicar és tan perjudicial com l'empaquetat, segons un estudi català. El consum d'aquest tipus de tabac entre els joves ha augmentat els últims anys perquè és més barat i per la falsa creença que és més sa i natural

radiobalaguer.cat/portal/131/index.php

14-03-2019

El tabac d'embolicar és tan perjudicial com l'empaquetat, segons un estudi català. El consum d'aquest tipus de tabac entre els joves ha augmentat els últims anys perquè és més barat i per la falsa creença que és més sa i natural

El tabac d'enrotllar és tan perjudicial com el convencional, segons un estudi liderat per la Universitat Internacional de Catalunya (UIC) i publicat a la revista 'Environmental Research'. El treball s'ha centrat en l'estudi de les nitrosamines específiques del tabac, carcinògens més prevalents en el tabac, a la saliva d'adults majors de 16 anys residents a Barcelona. Algunes d'aquestes nitrosamines, com la NNAL, NNK i la NNN, estan vinculades directament amb el càncer oral, d'esòfag i de pulmó. Els resultats conclouen que les concentracions d'aquestes nitrosamines específiques del tabac són similars a la saliva dels fumadors que consumeixen tabac d'embolicar que a la d'aquells que fumen tabac convencional.

En els últims anys s'ha detectat un augment del consum de tabac d'embolicar, especialment entre els més joves, pel fet que el seu preu és més baix i per la falsa creença que és més saludable i natural. A Europa, el consum de tabac empaquetat es va reduir del 76% al 70% entre 2014 i 2017, mentre que el tabac d'embolicar va créixer del 23 al 24% en el mateix període. En el cas de la ciutat de Barcelona, si el consum de tabac convencional era del 89,1% entre 2004 i 2005, aquest va caure al 71,8% entre 2011 i 2012. Pel que fa al tabac d'embolicar, el consum va passar de l'1,4% al 15,4% en els mateixos períodes. Els experts també adverteixen que els fumadors d'altres tipus de tabac, com la pipa o els puros, també estan augmentant.

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Equiparar preus i campanyes de conscienciació

Davant d'aquesta situació, els autors de l'estudi consideren que endurir el preu del tabac d'embolicar i equiparar-lo al convencional podria ser una estratègia efectiva per controlar el consum sobretot entre els joves. En aquest sentit, Àurea Cartanyà, primera autora del treball, ha explicat que l'objectiu d'aquesta mesura seria que el tabac d'enrotllar "no fos una alternativa més econòmica" al tabac empaquetat.

A més, el doctor José María Martínez-Sánchez, responsable del Grup de Recerca d'Avaluació de Determinants de Salut i Polítiques Sanitàries de UIC Barcelona, ha insistit en la necessitat de seguir amb les campanyes de conscienciació i advertir que el tabac d'enrotllar "és tan perjudicial com el convencional". "És important seguir realitzant campanyes de salut a les escoles per incidir en les edats en què els joves comencen a fumar", ha afegit.

El tabaco de liar es tan perjudicial como el convencional

revistaacofar.com/actualidad/noticias/el-tabaco-de-liar-es-tan-perjudicial-como-el-convencional-segun-un-estudio-de-uic-barcelona

14/03/2019

Además de este grupo de investigación, en el estudio han participado especialistas del Instituto Catalán de Oncología (ICO), del Instituto de Investigación Biomédica de Bellvitge (IDIBELL), del Hospital Clínic de Barcelona, de la Facultad de Medicina de la Universidad de Barcelona (UB), de la Universidad Pompeu Fabra (UPF), del Parque de Investigación Biomédica de Barcelona y de la Red Catalana de Hospitales Libres de Humo.

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Los resultados concluyen que las concentraciones de estas nitrosaminas específicas del tabaco son similares en la saliva de los fumadores que consumen tabaco de liar que en la de aquellos que fuman tabaco convencional.

En los últimos años se ha detectado un aumento del consumo de tabaco de liar, especialmente entre los más jóvenes, debido a que su precio es más bajo y a la falsa creencia de que es más saludable y natural.

En Europa, el consumo de tabaco empaquetado se redujo del 76 al 70 % entre 2014 y 2017, mientras que el tabaco de liar creció del 23 al 24 % en el mismo periodo. En el caso de la ciudad de Barcelona, si el consumo de tabaco convencional era del 89,1 % entre 2004 y 2005, este cayó al 71,8 % entre 2011 y 2012. En cuanto al tabaco de liar, el consumo pasó del 1,4 % al 15,4 % en los mismos periodos. Los expertos también advierten que los fumadores de otros tipos de tabaco, como la pipa o los puros, también están aumentando.

Equiparar precios y campañas de concienciación

Ante esta situación, los autores del estudio consideran que endurecer el precio del tabaco de liar y equipararlo al convencional podría ser una estrategia efectiva para controlar el consumo sobre todo entre los jóvenes. En este sentido, Àurea Cartanyà, primera autora del trabajo, ha explicado que el objetivo de esta medida sería que el tabaco de liar “no fuera una alternativa más económica” al tabaco empaquetado.

Además, el Dr. José M. Martínez-Sánchez, responsable del Grupo de Investigación de Evaluación de Determinantes de Salud y Políticas Sanitarias de UIC Barcelona ha insistido en la necesidad de seguir con las campañas de concienciación y advertir que el tabaco de liar “es tan perjudicial como el convencional”. “Es importante seguir realizando campañas de salud en las escuelas para incidir en las edades en que los jóvenes empiezan a fumar”, ha añadido.

El tabac d'embolicar és tan perjudicial com l'empaquetat, segons un estudi català

naciodigital.cat/noticia/175486/tabac/embolicar/es/tan/perjudicial/empaquetat/segons/estudi/catala

Aquesta informació es va publicar originalment el **14 de març de 2019** i, per tant, la informació que hi apareix fa referència a la data especificada.

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El tabaco de liar es tan perjudicial como el convencional

DA diariodeavisos.elespanol.com/2019/03/el-tabaco-de-liar-es-tan-perjudicial-como-el-convencional

Europa Press 14 de marzo de 2019

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El tabaco de liar es tan perjudicial como el convencional

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Estudio asegura que el tabaco de liar es tan perjudicial como el convencional

espana.servidornoticias.com/53_cataluna/6017936_estudio-asegura-que-el-tabaco-de-liar-es-tan-perjudicial-como-el-convencional.html

14 de Marzo de 2019

Barcelona, 14 mar (EFE).- El tabaco de liar es tan perjudicial como el convencional, según concluye un estudio de la Universidad Internacional de Cataluña (UIC) que ha demostrado que no existen diferencias en la concentración de compuestos cancerígenos en la saliva de los fumadores en función del tipo de tabaco que consumen.

Según el estudio, elaborado por el Grupo de Investigación de Evaluación de Determinantes de Salud y Políticas Sanitarias de la UIC (GRE), el consumo de tabaco de liar ha aumentado del 1,4 % al 15,4 % en ocho años por su precio más bajo y la falsa creencia de que es menos perjudicial para la salud.

Por este motivo, los investigadores de la UIC instan a los expertos a endurecer los precios sobre este tipo de tabaco para dejar de potenciar su consumo entre los jóvenes.

El trabajo se ha centrado en el estudio de las nitrosaminas o compuestos cancerígenos específicos del tabaco presentes en la saliva de adultos mayores de 16 años residentes en Barcelona, y han concluido que las concentraciones son similares en los consumidores de los dos tipos de tabaco.

El responsable del GRE, el doctor José María Martínez Sánchez, ha insistido en la necesidad de seguir con las campañas de concienciación: "es importante seguir realizando campañas de salud en las escuelas para incidir en las edades en que los jóvenes empiezan a fumar".

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El tabaco de liar es tan perjudicial como el convencional

infosalus.com/salud-investigacion/noticia-tabaco-liar-tan-perjudicial-convencional-20190314151115.html

14 de marzo de 2019

EUROPA PRESS - Archivo

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Thank you for watching

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O tabaco de lear é tan prexudicial como o convencional

galego.lavozdegalicia.es/noticia/sociedad/2019/03/14/tabaco-liar-perjudicial-convencional/00031552567907395416390.htm

14 de marzo de 2019

Un estudo da Universidade Internacional de Cataluña demostra que teñen a mesma concentración de compoñentes cancerígenos

Barcelona 14/03/2019 17:13 h

O tabaco de lear é tan prexudicial como o convencional, segundo conclúe un estudo da Universidade Internacional de Cataluña (UIC) que demostrou que non existen diferenzas na concentración de compostos cancerígenos na saliva dos fumadores en función do tipo de tabaco que consumen.

Segundo o estudo, elaborado polo Grupo de Investigación de Avaliación de Determinantes de Saúde e Políticas Sanitarias da UIC (GRE), **o consumo de tabaco de lear aumentou do 1,4 % ao 15,4 % en oito anos polo seu prezo máis baixo e a falsa crenza de que é menos prexudicial para a saúde.**

Por este motivo, os investigadores da UIC instan os expertos a endurecer os prezos sobre este tipo de tabaco para deixar de potenciar o seu consumo entre os mozos. O traballo hase centrado no estudo das **nitrosaminas ou compostos cancerígenos específicos do tabaco presentes na saliva de adultos maiores de 16 anos** residentes en Barcelona, e concluíron que as concentracións son similares nos consumidores dos dous tipos de tabaco.

O responsable do GRE, o doutor José María Martínez Sánchez, insistiu na necesidade de seguir coas campañas de concienciación: «**é importante seguir realizando campañas de saúde nas escolas para incidir nas idades en que os mozos empezan a fumar**». En Europa, o consumo de tabaco empaquetado reduciuse do 76 ao 70 % entre 2014 e 2017, e os expertos advirten que os fumadores doutros tipos de tabaco, como a pipa ou os puros, tamén están a aumentar.

Estudio asegura que el tabaco de liar es tan perjudicial como el convencional

14/03/2019 - 14:32

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El tabaco de liar es tan perjudicial como el convencional, según un estudio de la Universitat Internacional de Catalunya

GM gacetamedica.com/profesion/el-tabaco-de-liar-es-tan-perjudicial-como-el-convencional-segun-un-estudio-de-la-universitat-internacional-de-catalunya-fj1964698

Gaceta Médica 14 de marzo de 2019

El **tabaco de liar** es tan perjudicial como el convencional, según un estudio liderado por investigadores de la **Universitat Internacional de Catalunya** (UIC Barcelona) cuyos resultados se han publicado en la revista Environmental Research.

Además de este grupo de investigación, en el estudio han participado especialistas del Instituto Catalán de Oncología (ICO), del Instituto de Investigación Biomédica de Bellvitge (IDIBELL), del Hospital Clínic de Barcelona, de la Facultad de Medicina de la Universidad de Barcelona (UB), de la Universidad Pompeu Fabra (UPF), del Parque de Investigación Biomédica de Barcelona y de la Red Catalana de Hospitales Libres de Humo.

El trabajo se ha centrado en el estudio de las nitrosaminas específicas del tabaco, los **carcinógenos** más prevalentes en el tabaco, en la saliva de adultos mayores de 16 años residentes en Barcelona. Algunas de estas nitrosaminas, como la NNAL, NNK y la NNN, están vinculadas directamente con el **cáncer oral, de esófago y de pulmón.**

Los resultados concluyen que las concentraciones de estas nitrosaminas específicas del tabaco son similares en la saliva de los fumadores que consumen tabaco de liar que en la de aquellos que fuman tabaco convencional.

En los últimos años se ha detectado un **aumento del consumo de tabaco de liar**, especialmente entre los **más jóvenes**, debido a que su precio es más bajo y a la falsa creencia de que es más saludable y natural.

En Europa, el consumo de tabaco empaquetado se redujo del 76 al 70 por ciento entre 2014 y 2017, mientras que el tabaco de liar creció del 23 al 24 por ciento en el mismo periodo. En el caso de la ciudad de Barcelona, si el consumo de tabaco convencional era del 89,1 por ciento entre 2004 y 2005, este cayó al 71,8 por ciento entre 2011 y 2012. En cuanto al tabaco de liar, el consumo pasó del 1,4 por ciento al 15,4 por ciento en los mismos periodos. Los expertos también advierten que los fumadores de otros tipos de tabaco, como la pipa o los puros, también están aumentando.

El tabaco provoca cada año cerca de un millón de muertes por cáncer en todo el mundo. En los países desarrollados, un 26 por ciento de las muertes por cáncer pueden atribuirse al tabaco, según datos de la Organización Mundial de Salud.

Equiparar precios y campañas de concienciación

Ante esta situación, los autores del estudio consideran que endurecer el precio del tabaco de liar y equipararlo al convencional podría ser una estrategia efectiva para controlar el consumo sobre todo entre los jóvenes. En este sentido, Àurea Cartanyà, primera autora del trabajo, ha explicado que el objetivo de esta medida sería que el tabaco de liar "**no fuera una alternativa más económica**" al tabaco empaquetado.

Además, José M. Martínez-Sánchez, responsable del Grupo de Investigación de Evaluación de Determinantes de Salud y Políticas Sanitarias de UIC Barcelona ha insistido en la necesidad de seguir con las campañas de concienciación y advertir que el tabaco de liar "es tan perjudicial como el convencional". "Es importante seguir realizando campañas de salud en las escuelas para incidir en las edades en que los jóvenes empiezan a fumar", ha añadido.

El tabaco de liar, tan perjudicial como el convencional

laregion.es/articulo/salud/tabaco-liar-tan-perjudicial-convencional/20190314132644860168.html

Un estudio de la Universidad Internacional de Cataluñaha demostrado que no existen diferencias en la concentración de compuestos cancerígenos en la saliva de los fumadores en función del tipo de tabaco que consumen.

El tabaco de liar es tan perjudicial como el convencional, según concluye un estudio de la Universidad Internacional de Cataluña (UIC) que ha demostrado que no existen diferencias en la concentración de compuestos cancerígenos en la saliva de los fumadores en función del tipo de tabaco que consumen.

Según el estudio, elaborado por el Grupo de Investigación de Evaluación de Determinantes de Salud y Políticas Sanitarias de la UIC (GRE), el consumo de tabaco de liar ha aumentado del 1,4 % al 15,4 % en ocho años por su precio más bajo y la falsa creencia de que es menos perjudicial para la salud.

Por este motivo, los investigadores de la UIC instan a los expertos a endurecer los precios sobre este tipo de tabaco para dejar de potenciar su consumo entre los jóvenes.

El trabajo se ha centrado en el estudio de las nitrosaminas o compuestos cancerígenos específicos del tabaco presentes en la saliva de adultos mayores de 16 años residentes en Barcelona, y han concluido que las concentraciones son similares en los consumidores de los dos tipos de tabaco.

El responsable del GRE, el doctor José María Martínez Sánchez, ha insistido en la necesidad de seguir con las campañas de concienciación: "es importante seguir realizando campañas de salud en las escuelas para incidir en las edades en que los jóvenes empiezan a fumar".

En Europa, el consumo de tabaco empaquetado se ha reducido del 76 al 70 % entre 2014 y 2017, y los expertos advierten que los fumadores de otros tipos de tabaco, como la pipa o los puros, también están aumentando.

El tabaco de liar es tan perjudicial como el convencional

eldiadigital.es/art/288080/el-tabaco-de-liar-es-tan-perjudicial-como-el-convencional

14 de marzo de 2019

El tabaco de liar es tan perjudicial como el convencional, según un estudio liderado por investigadores de la Universitat Internacional de Catalunya (UIC Barcelona) cuyos resultados se han publicado en la revista Environmental Research.
Además de este grupo de investigación, en el estudio han participado especialistas del Instituto Catalán de Oncología (ICO), del Instituto de Investigación Biomédica de Bellvitge (IDIBELL), del Hospital Clínic de Barcelona, de la Facultad de Medicina de la Universidad de Barcelona (UB), de la Universidad Pompeu Fabra (UPF), del Parque de Investigación Biomédica de Barcelona y de la Red Catalana de Hospitales Libres de Humo.

El trabajo se ha centrado en el estudio de las nitrosaminas específicas del tabaco, carcinógenos más prevalentes en el tabaco, en la saliva de adultos mayores de 16 años residentes en Barcelona. Algunas de estas nitrosaminas, como la NNAL, NNK y la NNN, están vinculadas directamente con el cáncer oral, de esófago y de pulmón.

Los resultados concluyen que las concentraciones de estas nitrosaminas específicas del tabaco son similares en la saliva de los fumadores que consumen tabaco de liar que en la de aquellos que fuman tabaco convencional.

En los últimos años se ha detectado un aumento del consumo de tabaco de liar, especialmente entre los más jóvenes, debido a que su precio es más bajo y a la falsa creencia de que es más saludable y natural.

En Europa, el consumo de tabaco empaquetado se redujo del 76 al 70 % entre 2014 y 2017, mientras que el tabaco de liar creció del 23 al 24 % en el mismo periodo. En el caso de la ciudad de Barcelona, si el consumo de tabaco convencional era del 89,1 % entre 2004 y 2005, este cayó al 71,8 % entre 2011 y 2012. En cuanto al tabaco de liar, el consumo pasó del 1,4 % al 15,4 % en los mismos periodos. Los expertos también advierten que los fumadores de otros tipos de tabaco, como la pipa o los puros, también están aumentando.

El tabaco provoca cada año cerca de un millón de muertes por cáncer en todo el mundo. En los países desarrollados, un 26 % de las muertes por cáncer pueden atribuirse al tabaco, según datos de la Organización Mundial de Salud.

Equiparar precios y campañas de concienciación

Ante esta situación, los autores del estudio consideran que endurecer el precio del tabaco de liar y equipararlo al convencional podría ser una estrategia efectiva para controlar el consumo sobre todo entre los jóvenes. En este sentido, Àurea Cartanyà, primera autora del trabajo, ha explicado que el objetivo de esta medida sería que el tabaco de liar "no fuera una alternativa más económica" al tabaco empaquetado.

Además, el Dr. José M. Martínez-Sánchez, responsable del Grupo de Investigación de Evaluación de Determinantes de Salud y Políticas Sanitarias de UIC Barcelona ha insistido en la necesidad de seguir con las campañas de concienciación y advertir que el tabaco de liar "es tan perjudicial como el convencional". "Es importante seguir realizando campañas de salud en las escuelas para incidir en las edades en que los jóvenes empiezan a fumar", ha añadido.

El tabaco de liar, tan perjudicial para la salud como el convencional

rtpa.es/noticias-sociedad:---El-tabaco-de-liar,-tan-perjudicial-para-la-salud-como-el-convencional_111552563388.html

El consumo de tabaco de liar ha aumentado en los últimos años

El tabaco de liar es tan perjudicial como el convencional. Según un estudio de la Universidad Internacional de Cataluña, las nitrosaminas, las sustancias cancerígenas específicas del tabaco, son similares en la saliva de los consumidores de ambos tipos.

En los últimos años, el consumo de tabaco de liar ha aumentado, especialmente entre los jóvenes, debido a que su precio es más bajo y a la falsa creencia de que es más saludable y natural.

El tabaco de liar es tan perjudicial como el convencional

cronicaglobal.elespanol.com/vida/el-tabaco-de-liar-es-tan-perjudicial-como-el-convencional_229512_102.html

ARCHIVADO EN: SALUD, TABACO, CÁNCER
Redacción @cronicaglobal
14.03.2019 12:22 h.

Se acabó una de las excusas de los fumadores para justificar su adicción. El tabaco de liar es tan perjudicial como el convencional, sin **trampa ni cartón**. Así lo asegura un estudio de la **Universitat Internacional de Catalunya (UIC)** cuyos resultados se han publicado en la revista *Environmental Research*. En los últimos años se ha detectado un aumento del consumo del de liar, especialmente entre los más jóvenes, debido a que su precio es más bajo y a la **falsa creencia** de que es más saludable y natural.

En Europa, el consumo de tabaco empaquetado se redujo del 76 al 70% entre 2014 y 2017, mientras que el **tabaco de liar** creció del 23 al 24% en el mismo periodo. En el caso de la ciudad de Barcelona, si el consumo de tabaco convencional era del 89,1% entre 2004 y 2005, este cayó al 71,8% entre 2011 y 2012. En cuanto al tabaco de liar, el consumo pasó del 1,4% al 15,4% en los mismos periodos. Los expertos también advierten que los fumadores de otros tipos de tabaco, como la pipa o los puros, también están aumentando.

Tóxicos similares

El trabajo se ha centrado en el estudio de las **nitrosaminas específicas** del tabaco, carcinógenos más prevalentes en el tabaco, en la saliva de adultos mayores de 16 años residentes en Barcelona. Algunas de estas, como la NNAL, NNK y la NNN, están vinculadas directamente con el cáncer oral, de esófago y de pulmón. Los resultados concluyen que las concentraciones de estas partículas son **similares** en la saliva de los fumadores que consumen tabaco de liar que en la de aquellos que fuman **tabaco convencional**.

En el estudio, además de la UIC, han participado especialistas del **Instituto Catalán de Oncología** (ICO), del Instituto de Investigación Biomédica de Bellvitge (IDIBELL), del Hospital Clínic de Barcelona, de la Facultad de Medicina de la **Universidad de Barcelona** (UB), de la Universidad Pompeu Fabra (UPF), del Parque de Investigación Biomédica de Barcelona y de la Red Catalana de Hospitales Libres de Humo.

Soluciones

Ante esta situación, los autores del estudio consideran que **endurecer el precio** del tabaco de liar y equipararlo al convencional podría ser una estrategia efectiva para controlar el consumo sobre todo entre los jóvenes. En este sentido, **Àurea Cartanyà**, primera autora del trabajo, ha explicado que el objetivo de esta medida sería que el tabaco de liar "**no fuera una alternativa** más económica" al tabaco empaquetado.

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El tabaco de liar es tan perjudicial como el convencional

El estudio revela que no existen diferencias en la concentración de nitrosaminas en la saliva de los fumadores en función del tipo de tabaco.

14.03.2019

Sociedad en Castilla-La Mancha

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#nicotina

#tabaco de liar