How ICTs can influence psychological wellbeing: an analysis of uses and addiction potential

Tayana Panova

DOCTORAL THESIS

Title: How ICTs can influence psychological wellbeing: an analysis of uses and addiction potential

Presented by: Tayana Panova

Center: Facultat de Psicologia, Ciències de l'Educació I de l'Esport Blanquerna. Universitat Ramon Llull

Department: Psicologia

Directed by: Dr. Xavier Carbonell (FPCEE Blanquerna, Universitat Ramon Llull)

Blanquerna
UNIVERSITAT RAMON LLULL

DOCTORAL THESIS

Tayana Panova

How ICTs can influence psychological wellbeing: an analysis of uses and addiction potential

Directed by Dr. Xavier Carbonell

Date: 09/05/2019

Summaries/Resúmenes/Resums

English

Title: How ICTs can influence psychological wellbeing: an analysis of uses and addiction potential

Information and Communication Technologies (ICTs) such as the Internet and smartphones entered our lives only about 20 years ago, yet in that short time they have deeply rewired the way society and individuals all around the world function. This has led to questions and investigations regarding how the frequent use of technology influences our societal and psychological health. This thesis work aims to contribute some insight on this subject through four research papers about three of the most popular ICTs - smartphones, social media and the Internet and through the lens of three research questions - 1) Is addiction the correct framework to use when researching problematic ICT use?; 2) What are the effects of culture on problematic ICT use?; and 3) What specific uses are associated with ICT-related problems? The conclusions we arrive at are the following. At this time, addiction is not a suitable term to use in the research on ICT related problems. Secondly, certain specific uses are associated with problematic consequences of ICT use whereas other uses are not, therefore it is unwise to pathologize the entire ICT. Thirdly, the uses that are associated with problematic ICT use are different depending on the culture of the user. In one culture a particular ICT use can be problematic, whereas in another country it may be adaptive. Fourthly, certain aspects of ICT use appear to be more or less constant across cultures such as the most popular smartphone uses and the underlying factors of problematic ICT use.

Key Words: Information and Communication Technology (ICT), smartphones, smartphone addiction, Internet addiction, social networking sites (SNS), SNS addiction, social media, mobile phones

Castellano

Título: Cómo las TIC pueden influir en el bienestar psicológico: un análisis de usos y potencial de adicción

Las Tecnologías de Información y Comunicación (TIC) como Internet y los teléfonos inteligentes entraron en nuestras vidas hace solo 20 años, pero en este corto periodo de tiempo han rediseñado profundamente la forma en que funcionan la sociedad y las personas en todo el mundo. Esto ha llevado a preguntas y investigaciones sobre cómo el uso frecuente de las tecnologías influye en nuestra salud social y psicológica. El objetivo de este trabajo de tesis es aportar información sobre este tema a través de cuatro estudios sobre tres de las TIC más populares: teléfonos inteligentes, redes sociales en línea y Internet y a través de la lente de tres preguntas de investigación: 1) ¿Es la adicción el marco correcto para usar en las investigaciones del uso problemático de las TIC?; 2) ¿Cuáles son los efectos de la cultura en el uso problemático de las TIC?; y 3) ¿Qué usos específicos están asociados con los problemas relacionados con las TIC? Las conclusiones a las que llegamos son las siguientes. En este momento, la adicción no es

un término adecuado para usar en la investigación sobre problemas relacionados con las TIC. En segundo lugar, ciertos usos específicos están asociados con consecuencias problemáticas del uso de las TIC, mientras que otros usos no lo son, por lo tanto, no es prudente patologizar la totalidad de las TIC. En tercer lugar, los usos asociados con el uso problemático de las TIC son diferentes según la cultura del usuario. En una cultura, un uso particular de las TIC puede ser problemático, mientras que en otro país puede ser adaptativo. En cuarto lugar, ciertos aspectos del uso de las TIC parecen ser más o menos constantes en todas las culturas, como los usos más populares de los smartphones y los factores subyacentes del uso problemático de las TIC.

Palabras clave: tecnología de la información y la comunicación (TIC), teléfonos inteligentes, adicción a los teléfonos inteligentes, adicción a Internet, redes sociales, adicción a las redes sociales, móviles

Catalán

Títol: Com les TIC poden influir en el benestar psicològic: anàlisi dels usos i potencial addicció

Les Tecnologies de la Informació i les Comunicacions (TIC) com Internet i els telèfons intel·ligents van entrar a la nostra vida fa només uns 20 anys, però, en aquest curt període de temps, han reconvertit profundament el funcionament de la societat i dels individus de tot el món. Això ha portat a preguntes i investigacions sobre com l'ús freqüent de la tecnologia influeix en la nostra salut social i psicològica. Aquest treball de tesi vol aportar informació sobre aquest tema a través de quatre estudis sobre tres de les TIC més populars - telèfons intel·ligents, xarxes socials en línia i Internet- i mitjançant la lent de tres preguntes d'investigació - 1) La addicció és el marc adequat per utilitzar a l'hora de investigar. ús problemàtic de les TIC?; 2) Quins són els efectes de la cultura en un ús problemàtic de les TIC?; i 3. Quins usos concrets s'associen a problemes relacionats amb les TIC? Les conclusions a què arribem són les següents. En aquest moment, l'addicció no és un terme adequat per utilitzar-se en la investigació sobre problemes relacionats amb les TIC. En segon lloc, certs usos específics s'associen a conseqüències problemàtiques de l'ús de les TIC, mentre que altres usos no ho són, per tant no és prudent patologitzar totes les TIC. En tercer lloc, els usos associats a un ús problemàtic són diferents segons la cultura de l'usuari. En una cultura, un ús particular de les TIC pot ser problemàtic, mentre que en un altre país pot ser adaptatiu. En quart lloc, alguns aspectes de l'ús de les TIC semblen ser més o menys constants en cultures com ara els usos més populars dels telèfons intel·ligents i els factors subjacents de l'ús problemàtic de les TIC.

Paraules clau: Tecnologies de la informació i la comunicació (TIC), telèfons intel·ligents, addicció a telèfons intel·ligents, addicció a Internet, xarxes socials, addicció a xarxes socials, mòbils

Contents

1. Acknowledgments

I would like to thank my research director, Dr. Xavier Carbonell, for his help and support throughout the development of this thesis work. Thank you for everything from initially believing in me and accepting me into the Condesa research group to now helping me accomplish this important achievement in my life. I would also like to thank the director of my bachelor's thesis, Dr. Alejandro Lleras for all his help in the development of the cross-cultural studies in this compendium.

On a personal note I am very grateful to my friends and family who supported me through the long hours of writing and researching for this thesis work and who celebrated all the achievements along the way.

2. Introduction

A few years ago, I noticed the growing amount of people that had their faces intently staring down at glowing screens for prolonged periods of time – on the street, in buses, at cafés, in restaurants, in classrooms and everywhere else, both while alone and in company. I started to worry about what effects this new technology-focused behavior was having on personal and societal well-being and how the consequences of such intensive technology use would develop over the short and long term. Was the behavior harmless or threatening for our health and happiness? What risks might it carry and who would be susceptible to them? How would problems related to the behavior manifest and how serious would they be? The search for answers to those questions gave rise to the development of this thesis work.

This thesis-by-compendium aims to explore the specific ways in which Information and Communication Technologies (ICTs) such as the Internet, smartphones and social media can negatively affect psychological well-being. Over the past 15 years, the Internet and technologies used to access it such as smartphones have become widespread, infiltrating almost every corner of the world. This global use makes it clear that ICTs appeal to us independently of cultural, socioeconomic, religious, political, and other differences and that they satisfy fundamentally human needs and interests. Therefore, it is important to study how and why they do so, and what the consequences of their use may be on our health, development and wellbeing so that we can minimize the problems related to their use and maximize the benefits.

Much of what ICTs offer us is positive – ease of communication and information access, the ability to work much faster and more efficiently, the erasure of distance in our attempts to stay connected, and an endless list of small conveniences and entertainment options that grow with each new program or application added to the market. However, ICTs, like nearly everything else, also have the potential to cause or exacerbate various problems. With the rise of ICTs we have seen an apparent increase of disorders such as depression, anxiety, sleep problems, narcissism, lower life satisfaction, underdeveloped communication skills and lower coping abilities among other issues. But to what extent are ICTs to blame for these problems and how exactly do they contribute to their development? After the initial enthusiasm about the efficiency, convenience and progress that ICTs make possible, questions began to arise about what they are taking in return. As with most revolutionary, globally-popular innovations before

them – the television, telephone, and even printed books – their widespread popularity soon became accompanied by intense criticism and fear about how they might be harming our society and its citizens. The media regularly produces articles and programs about the dangers of technology and how people are addicted to them, thereby increasing public concern. However, although the harm caused by our technologies may be real, if we do not understand how exactly it comes about and why, we cannot hope to successfully address it.

In the past 10 years, a new field has emerged to investigate the ICT boom and how it affects our lives. However, as with most previously nonexistent phenomena, the direction of the research has been significantly molded by existing frameworks that seem to most closely apply to the new problems. Regarding the Internet, smartphones, and social media, the dominant framework used up to now has been that of addiction. People see the problematic use of ICTs as analogous to that of addictive substances – mainly, intense use up to the point of sacrificing important aspects of life like academics or relationships, along with an inability to decrease or control one's use. However, similar though some aspects of the behaviors may be, this framework has often been adopted in the literature without a rigorous analysis of whether it is the most appropriate one to use. And in the case that it is not, its widespread application to this issue may be the cause of misdirection and/or mismanagement of concern, time, efforts and resources.

One of the problems related to thinking about ICTs as addictive entities is that it has led to few studies investigating what exactly people do on their ICTs and how those varied specific uses are associated with different kinds of consequences for the particular user. At this time, what has been established is mostly a non-causal association between intense ICT use and certain psychological problems and personality characteristics, with insufficient in-depth analysis regarding the specific behaviors and motivations for said behaviors that affect the relationship between use and negative consequences. The relatively little research on this subject limits our understanding about the pathways between ICT use and psychological health issues which then limits our ability to develop treatment and education initiatives to successfully combat unhealthy manners of use.

Another issue in the current state of research on problematic ICT use is the absence of attention given to the sociocultural context of the participants. ICTs are primarily tools for communication, information gathering and entertainment, and as such they are dependent on the values, interests, needs and motivations of the users, which are in turn influenced by their

personalities, upbringing, socioeconomic status, and culture. That being said, the influence of context and culture is rarely more than mentioned in the research and the findings of studies are usually generalized to ICT users in general. This can be a significant problem because the few cross-cultural studies that have been conducted in the field show significantly different ICT behaviors between countries, therefore the variation in results we see in the literature on ICT use may exist partially or even primarily because of the un-addressed sociocultural context of ICT users.

With the above in mind, this thesis work aims to investigate the effects of ICT use on psychological development by critically analyzing the dominant addiction framework, delving into specific uses of ICTs and their consequences, and researching ICT behaviors from a cross-cultural perspective. Its primary objective is to contribute a deeper, more multifaceted perspective on the use of ICTs in modern society and how exactly that use can develop into a problem.

3. Thesis Structure

The articles in this thesis-by-compendium work address three research areas – the Internet, social networking sites (SNSs), and smartphones – and three research objectives – a critical analysis of addiction potential, specific uses, and cultural context, connected by one theme – how Information and Communication Technology (ICT) use is associated with problems in psychological wellbeing.

First, a general literature review will describe the state of the literature on all aspects of this thesis work's subject matters and the path that has led towards the development of its component studies. Afterwards, a specific literature review will be provided for each of the ICT areas within this compendium, presenting a summary of research on each of the three focuses – addiction potential, specific uses, and cross-cultural data – for that particular ICT. The objectives of the thesis work will then be explained in more detail and the studies which address each objective will be identified. The papers will be presented and afterwards, their findings will be summarized, followed by a discussion section that will explain how they relate to previous research. A general conclusion section will offer final thoughts and future directions.

This doctoral candidate was the most active participant in the planning, design, execution and article writing of all the included studies. The publications that comprise this thesis work are the following:

1. Panova, T., & Carbonell, X. (2018). Is smartphone addiction really an addiction? *Journal of Behavioral Addictions*, 7(2), 252-259. doi: 10.1556/2006.7.2018.49
2. Carbonell, X. & Panova, T. (2017). A critical consideration of social networking sites' addiction potential. *Addiction Research & Theory*, 25(1), 48-57. doi: 10.1080/16066359.2016.1197915
3. Panova, T., Carbonell, X., Chamarro, A., Puerta-Cortés, D. (2019). Specific smartphone uses and how they relate to anxiety and depression in university students: A cross-cultural perspective. *Behaviour and Information Technology*. doi: 10.1080/0144929X.2019.1633405

4. Panova, T., Carbonell, X., Chamarro, A., Puerta-Cortés, D. (2019). Internet Addiction Test research through a cross-cultural perspective: Spain, USA and Colombia. *Adicciones*. (Under Review).

4. Literature Review

4.1. General Literature Review

Information and Communication Technologies are defined as "all devices, networking components, applications and systems that combined allow people and organizations (i.e., businesses, nonprofit agencies, governments and criminal enterprises) to interact in the digital world." (Rouse, 2019). Two of the most prominent and widely used ICTs are the Internet and the smartphone, the latter which is primarily used to access the former. In 2019 there were 4.39 billion Internet users around the world (Kemp, 2019) and 2.71 billion smartphone users (G., 2019). On the Internet itself, infinite activities can be conducted, however one of the most popular and widespread is the use of social networking sites (SNS), with 3.48 billion people using social networking sites, primarily Facebook (2.27 billion monthly active users), Instagram (1 billion) and Twitter (326 million) (Kemp, 2019). On average, people spend 2 hours and 16 minutes per day on SNSs and the demographics of these users are diverse, however the most active SNS user group are young adults, aged 15-34 (Kemp, 2019).

Considering the global appeal of the Internet, smartphones and SNSs, all three of these ICTs figure prominently in the research of how technology and psychology interact. Simple observation of the way that people become fully immersed in their devices, often ignoring their surroundings for extended periods of time while engaging with them, has given rise to concerns about ICTs being addictive in the way that certain substances are. But what is addiction and can it even be applied to ICTs? The well-accepted symptoms of addiction proposed by Griffiths are mood modification (the substance/behavior leads to positive emotional states), tolerance (more and more of the substance/behavior is required over time to achieve the same rewarding effect), salience (the substance/behavior dominates thinking even when it is not being engaged with), withdrawal (strong negative reaction when engagement is stopped), conflict (the substance/behavior leads to interpersonal or intrapsychic conflict), and relapse (reverting back to substance/behavior after an abstinence period) (Griffiths, 1995, 2005). However, each of these criteria can cover a broad-spectrum of severity which can be more or less significant.

Recently, Saunders et al. (2017) stated that in the ICD-11 draft, the primary features of substance dependence are (a) a strong internal drive to use the substance, coupled with an impaired ability to control that use; (b) increasing priority given to using the substance than

doing other activities; and (c) persistence of use despite harm and adverse consequences. Similarly, on the topic of behavioral addiction, Kardefelt-Winther et al. (2017) proposed a definition of two components: (a) significant functional impairment or distress as a direct consequence of the behavior and (b) persistence over time. Using these various definitions we can distill the fundamental components of addiction to two main criteria: 1. Severe/significant harm, impairment, or negative consequences caused by the behavior/substance and 2. Psychological dependence (craving, salience, and loss of control) and/or physical dependence (tolerance and withdrawal) that leads one to carry on engaging with the behavior/substance despite criterion 1.

Using Griffiths' components model of addiction, we can see similarities between intense ICT use and addiction. For example, mood modification is exemplified by people receiving pleasure from using their ICTs, tolerance could be illustrated by people's increasing use of ICTs over time, salience appears to exist in the way people often think about the Internet or their smartphones or SNSs even when not using them, conflict occurs when people face interpersonal problems because of their ICT use such as arguments with family members over intense use, and withdrawal is illustrated by people's displeasure/discomfort when they are apart from their ICTs. However, analogous as these experiences may be to addiction criteria on some level, the most important thing to consider is the first of the two criteria we identified as being a requirement of all true addictions: the presence of severe/significant harm or impairment. Is the harm/impairment experienced by ICT "addicts" severe enough to merit the label of addiction? If not, then are we perhaps incorrectly pathologizing the problematic use of ICTs?

Addiction as a framework for ICT-related problems began with Dr. Kimberly Young, who developed the concept of Internet Addiction based on the diagnostic criteria for gambling addiction. Gambling addiction was the first officially recognized behavioral addiction in the DSM, and Young saw in problematic Internet use many of the same features. She therefore published a paper (Young, 1998b) and wrote a book on the subject (Young, 1998a) and developed a questionnaire to diagnose Internet addicts called the Internet Addiction Test, which has become the most widely used tool in the research of problematic Internet use around the world (Laconi, Rodgers & Chabrol, 2014). With the launch and popularization of smartphones and SNSs, the addiction framework which had been applied to Internet use around the world (see Chen & Li, 2014 for a review) expanded to include these other ICTs as well, leading to

numerous studies claiming the existence of smartphone/mobile phone addiction (see Guitierrez, de Fonseca & Rubio, 2016 for a review) and SNS addiction (see Ryan, Chester, Reece & Xenos, 2014 for a review).

However, the issue with accepting this dominant dialogue about ICT addiction is that addiction to ICTs has not been definitively proven by scientific research and debate still exists about whether it is the most appropriate framework to use for ICT-related problems. Studies in the field often talk about it as though it were a confirmed construct, using the term "addiction" liberally, yet there have been few rigorous efforts conducted to analyze whether addiction is the proper term for many of ICTs that are given the label of being addictive, with several researchers recently stating that Internet addiction, the most common of the ICT "addictions", is a "conceptual minefield" and a misnomer (Griffiths, 2018). Conceptualization problems for ICT addictions include insufficient clinical studies, case studies, longitudinal studies, experimental studies and standardized diagnostic measures/procedures and terminology (Griffiths, 2012; Kardefelt, 2014a; Starcevic, 2012).

Oftentimes, it seems that the belief in ICT addictions such as smartphone addiction stems not so much from empirical proof as from observations similar to mine in the Introduction of this thesis work – seeing people around us constantly interacting with ICTs in what appears to be unnatural, prolonged and intense attachment and the concerns that arise from that observation (Billieux, 2015). With the recent explosion in popularity of personal technologies, it often looks to us that people are entranced by their devices and cannot resist using them which is interpreted as a sign of a problem. In the literature on the subject it often feels like studies are developed to confirm rather than to objectively investigate the veracity of this theory. However, the smartphone and other ICTs are merely a point of access for countless possible behaviors that were accomplished using other means before the existence of the device. For example, a person on public transport could ignore their fellow passengers by reading a physical newspaper as was the norm a couple decades ago or by reading an online newspaper on their smartphone. Does it make a difference which of the two it is? Similarly, does it make a difference if a person watches two hours of television after a hard day of work or two hours of Netflix on their smartphone/tablet? Or if one stares at a paper map vs. their phone's GPS when they are lost? Satirical art on this subject often presents images of people staring down at their screens with the light reflected on their zombie-like faces to illustrate their addictions and the

disintegration of our society, but rarely does the art show what those people are looking at, which is an important question. As ICTs are so multi-functional, they have replaced numerous behaviors that we accomplished previously using other tools which have now lost some of their relevance. If we calculate how much time people previously spent using the tools of the past – newspapers, TVs, books, alarm clocks, maps, radios, stationary phones, typewriters, video games, physical stores and banks, travel agencies, etc. – that have now been converted into apps or features on our screens, would that time not be comparable to the average time we spend engaging with those screens today?

This is not to suggest that ICT use is harmless but to comment that our criticism of ICTs is often reactionary, intuitive and one-dimensional, based on a natural rejection and fear of things which fundamentally alter our accepted ways of functioning. It is normal and common for new forms of revolutionary technology to be met with strong suspicion and criticism before we become accustomed to their presence in our society and take a more fine-tuned look at their effects (Surrat, 1999) and before their novelty effect (and consequently our enthusiasm for them) wears off (Stavropoulos et al., 2018). It is important to remember that people are inherently driven to seek human connection, information acquisition and entertainment, and ICTs provide them with all of that in high speed HD 24/7 for virtually no cost or effort. It is therefore natural for them to have the appeal that they do, which we often label "addiction," and this appeal is not a sign of a problem in and of itself. What matters more is what we give up in order to gain that which ICTs have to offer us and how the loss of it impacts our personal and societal well-being in the short and long term. In that cost/benefit analysis is where we can find more concrete answers to the question of when and how problems related to ICT can manifest and develop. For example, if a person sacrifices conversation with friends beside them for a conversation (via texting) with friends far away, thereby missing out on a rich social experience to engage with a less rich social experience, then we can say something is truly being lost here and the smartphone is the cause, thereby indicating a problematic use. However, if an adolescent who lives in an isolated suburb and cannot drive to meet friends in person (a very common situation in North America) uses their smartphone or computer to text those friends or access their friend network via SNSs as their only means of socializing and thereby not feeling alone, then this behavior is adaptive and even benefits rather than harms the user (boyd, 2014). The specific

behavior on the ICT along with its context and the motivations for it are all necessary elements to consider when determining if a person is engaging in problematic use or no (Griffiths, 2018).

One of the problems with the prevalent use of the addiction framework in ICT research is that it often detracts researchers from taking a closer look at the specific behaviors on ICTs. By considering ICTs as a kind of homogenous addictive entity like a drug, there is a tendency to also address them and research them as such – as some inherently problematic one-dimensional thing that one can be addicted to, like a substance, thereby obscuring the numerous variations of use that are conducted on them (Smock et al., 2011). We talk about "Internet addiction" and "smartphone addiction"; however, most ICTs, like the Internet and smartphones, are not homogenous entities that are used the same way and therefore lead to the same consequences – they are multi-faceted entryways to an endless variety of behaviors and uses, the nature of which it is necessary to analyze individually in order to understand which specific ICT behaviors actually have the potential to become harmful for a user and which do not. Using the umbrella term of addiction precludes deeper investigation into problematic ICT behavior's variations, nuances and compensatory functions which also leads to a less rich understanding of ICTs' role in users' lives.

Some specific Internet activities that have so far been confirmed as having the potential to become significantly problematic are gambling (Gainsbury et al., 2014; Griffiths, 2010a; Tsitsika et al., 2011), online video gaming (Kuss & Griffiths, 2011a; Pearcy, McEvoy & Roberts, 2017; Rooij et al., 2010) and the use of sex sites (Kuss & Griffiths, 2011c; Meerkerk et al., 2006). However, the problems associated with those uses are not those of ICT addiction because the ICT is only the method used to access them. In such a situation, we must separate the mode of access from the behavior itself. The only problematic behavior out of those aforementioned that can be accessed solely on the Internet is online video gaming, and specifically, MMORPG gaming where an Internet connection is required. In MMORPG games, the player creates an alternate identity, an avatar, which can become more appealing for the player than the player's real identity, thereby leading to more powerful effects on the user's psychology than other ICT-hosted activities (Griffiths et al., 2016). It has been argued that since psychological wellbeing is connected to the difference between the real self and the ideal self (Higgins, et al., 1987), identifying and growing attached to the idealized version of the self, ie the game avatar, is a contributor to the connection between video game play, depression, and Internet Gaming

Disorder (Burleigh et al., 2018). This identification with the avatar, the strong social aspect of MMORPG games, the powerful stimulation of enticing visuals, ongoing exploration and achievement (Fuster et al., 2012) and the fact that the game is constantly happening in the virtual world leading to a desire to be constantly online due to Fear of Missing Out (FOMO) are all features that make it uniquely appealing and difficult to resist for many players, especially those experiencing real-life struggles or disadvantages (Kardefelt-Winther 2014a), thereby making online video games a more likely candidate for addiction than other ICTs. Internet Gaming Disorder is also the only ICT-related behavior to be included in the DSM as a condition deserving of further research (DSM-V, 2013).

The use of SNSs has also shown to be associated with various negative effects For example, using SNSs like MMORPGs, ie to create an alternate and more desirable identity that one's real identity, has been associated with loneliness and lower offline social support (Leung, 2011) and such a behavior could have negative effects on the user related to identity issues, self-esteem and anxiety in maintaining a fake persona. SNSs can also be the site of various interpersonal problems such as bullying or harassment. However, in this case, the SNSs simply provide the platform for these interpersonal conflicts to be manifested; the SNSs themselves are not inherently harmful. There have been arguments that SNSs provides a convenient platform for cruel interpersonal behavior because they allow for anonymity and therefore an escape from the responsibility of one's unkind actions/words (Wright, 2014), but we could say the same of the telephone if one hides their voice and number, the mailbox if one leaves cruel unsigned notes, etc. Any medium can be misused depending on the intentions of the user but most are not pathologized in the way that SNSs have been.

A unique problem associated with SNSs is the fairly new emotional state they often lead to entitled Fear of Missing Out (FOMO). FOMO is defined as the feeling that others are having a fun time without you and the consequent frustration and negative emotions associated with that sense of being left out (Przybylski et al., 2013). SNSs often create or exacerbate this emotion because one's contacts on SNSs usually upload the highlights of their lives, ie photos from vacations and celebrations, leading to the user seeing a continuous stream of photos that show their peers enjoying themselves. This leads to an incorrect impression that people are regularly having positive and or interesting experiences (as almost nobody posts photos of themselves working or doing the laundry) which leaves the user feeling that their own life is much less

interesting than the norm and therefore causing dissatisfaction. FOMO has been associated with lower general mood, lower overall life satisfaction (Przybylski et al., 2013) and even depressive symptoms (Baker, Krieger & LeRoy, 2016) and has been suggested as a mediator between depression and problematic SNS use (Oberst et al., 2016).

A related problem is the comparison of one's physical self to that of one's peers as seen on SNSs like Instagram. Studies show that the frequency of Instagram use is correlated with depressive symptoms, self-esteem, anxiety about physical appearance, and body dissatisfaction (Sherlock & Wagstaff, 2018) with the relationship between Instagram use and each of these variables being mediated by social comparison. On SNSs such as Instagram photos are carefully taken and edited to show the best of a person's physical attributes, once again leading an Instagram user to obtain false impressions of what is the norm and causing them to feel inadequate and dissatisfied with themselves (Brown & Tiggemann, 2016; Fardouly & Vartanian, 2016). Social comparison of the self to one's peers on SNSs has been associated with lower life satisfaction, lower self-esteem and depression (Vogel et al., 2014; Appel et al., 2016). This is especially true for young women (Kleemans & Dalmaans, 2016) who are often more sensitive to the value put on physical beauty in many societies.

Certain motivations behind ICT use are also more likely to be associated with negative consequences than others. For example, using the ICTs for escapism/avoidance coping has been identified as a potentially problematic behavior (Kircaburun & Griffiths, 2018; Kuss & Griffiths, 2018; Kuss et al., 2018; Panova & Lleras, 2016). These days, it is common for a person who is faced with a stressful situation/thought/emotion to reach for the closest ICT and use it (consciously or subconsciously) to escape the stressor and immerse oneself in distraction (Panova & Lleras, 2016). However, daily life's small stressors can function as a kind of vaccine, training people's emotions and thoughts to more successfully handle similar or bigger stressors in the future, a process which has been called "hardship inoculation" (Alter, 2017). By regularly avoiding such opportunities for the development of internal coping mechanisms in favor of escape from them via distraction, these valuable skills are not gained and a person can develop less resilience in the face of stress, leaving them vulnerable to its negative effects and thereby less likely to feel capable of facing future stressors. Such avoidance coping might feel reinforcing in the short term by staving off stress responses for a while, however it has been shown to be ineffective at truly lowering stress when compared to other forms of stress

management (Panova & Lleras, 2016) and avoidance coping has been associated with lower mental health in the long run (Blalock & Joiner 2000; Holahan et al., 2005).

Similar to this problem is the behavior of turning to the ICTs during moments when no other activity is going on, ie when one is bored or feels that boredom is close at hand. For example, when people are waiting for a bus or a friend or when they are eating in a restaurant alone, instead of simply sitting with their thoughts, they usually pull out their smartphones in order to fill the "empty" time with activity. The instantly-available, infinitely varied stimulation that ICTs can provide us with 24/7 has led to many people being accustomed to its constant presence, so that when they are faced with a moment of downtime without external stimuli, they automatically fill the gap with the ICT which is always at hand, almost as a reflex. Some have even called this "distraction addiction" (Pang, 2013). However, research has shown that cognitive downtime, ie when one's mind is not actively involved with any kind of external stimuli, is very important for self-reflection, memory and the development of creativity, imagination and socioemotional skills (Immordino-Yang et al., 2012). Even boredom has been shown to stimulate creative thinking as the mind attempts to entertain itself (Harris, 2000; Zomorodi, 2015). Therefore, relying on external stimulation such as the kind provided by ICTs may be crippling the development of certain cognitive and emotional abilities, thereby negatively affecting people's development and long-term wellbeing. There have also been concerns raised that the constant consumption of varied, dynamic stimuli may be making our brains more hyperactive and less capable of engaging in deep, slow processing such as the kind used when reading a book (Carr, 2010). Such deeper, complex processing is a valuable skill and a necessary one for mediating, mindfulness, reflection and analysis of situations, problems and emotions.

Certain manners of ICT use can also have negative social effects. Research has shown that just the presence of a mobile phone in a room when two people are attempting to become better acquainted has a negative effect, lowering a person's feelings of trust towards their conversation partner and their willingness to share personal information (Reid & Reid, 2007). The researchers concluded that this likely occurs because the presence of a mobile phone divides people's attention between their conversation partner and the potential outreach from other conversation partners, thus leading to them never being fully present with the other person. This division of attention is perceived by the other person and leads them to be less open and trusting. Using smartphones in group settings also often leads to negative reactions from one's

peers who usually consider it to be disrespectful and as a sign of interpersonal rejection (Kuss et al., 2018) which can lead to a disintegration of relationships or the enjoyment of interpersonal experiences. The behavior of ignoring people in favor of one's phone has become such a common occurrence that it even has a name – "phubbing" (Balta et al., 2018) and it has been associated with various problems in romantic relationships (Roberts & David, 2016) and work settings (Roberts & David, 2017) due to conflicts arising from issues of trust and respect.

Regarding the topic of society and stress coping, in the absence of technology, when people experience a stressful situation in a social context, they often turn to others around them for emotional support, even if it that support is manifested as a simple nod of understanding or a short chat about the problem. Such exchanges may be small but they are valuable in making a person feel they are not alone and helping them develop social skills and community trust which can prevent against depression and other psychological problems (Van Gundy et al., 2011). Situations of stress or tension in a social setting can be bonding opportunities that strengthen the fabric of a community and in turn can strengthen the individual community members' resilience to stress (Hikichi et al., 2016). However, when people regularly turn to their devices instead of each other, they can miss opportunities to connect with their fellow citizens which can weaken community and social cohesion.

Although the aforementioned ICT behaviors have been shown to cause or be associated with negative effects, other ICT behaviors such as making calls, doing administrative or functional tasks like using the GPS and online banking, listening to music, taking photos, etc. have not been shown to be particularly problematic, even though those are some of the most popular ICT uses. Therefore, it is important in ICT psychology research to determine which specific uses and manners of ICT use are potentially harmful and which are not so that future diagnosis/treatment efforts and resources can be correctly focused and applied. Generalizing the problematic nature of technology-mediated behaviors to the entire smartphone, SNS, or Internet does not clarify how exactly their use can become a problem and how to handle it. It also incorrectly pathologizes the device as a whole which is unreasonable and unproductive considering that ICTs have become an integral part of modern society and offer us many benefits.

Another facet of ICT use to consider is that there is significant variation in how different societies around the world conceptualize and handle problematic ICT use. For example, in some

parts of Asia, the problem is taken very seriously and there are multiple treatment centers for "Internet addicts" similar to those for substance addicts (Stone, 2009). The problem is often discussed with much stronger concern than it is in Western countries and much more dramatic measures are taken against it, most likely due to the great value put in Eastern countries on being a productive member of society, which often suffers with intense Internet use for recreational purposes. In the West, the problem is increasingly being seen as an issue which requires attention and concern, however the concern is far lower than in Asia and there are hardly any treatment centers such as those in Asian countries, nor is treatment normally offered to study participants who are determined to be "addicts". These cultural differences in the understanding of ICT addiction's harm potential is especially interesting when compared to traditional addiction such as that to substances, which affects people around the world more or less in the same way. It once again requires us to ask whether ICTs are inherently addictive in the true sense of addiction or if their problematic use is more of a side-effect of other primary disorders and/or unfulfilled needs (Starcevic, 2012; Kardefelt-Winther, 2014a). For example, Ito (2005) has argued that mobile phone use in Japan is so prevalent because the culture does not allow for much privacy or personal time, thereby making the personal mobile phone highly appealing.

The effects that ICT use has on an individual depends on their context, values, needs and motivations. For example, research has shown that SNSs can greatly benefit older people because it allows them to make and maintain social relationships which helps them overcome common problems for the elderly such as loneliness and stress, and gives them feelings of control and self-efficacy (Leist, 2013). Other research has shown that homeless people utilize SNSs to combat the extreme social isolation they experience and that the use of SNSs leads to higher self esteem and life satisfaction for them (Calvo, Carbonell, Turro, & Giralt, 2018). One of the most important contextual factors to consider in ICT research is culture since culture has a great influence on communication dynamics, values and needs. A study by Horst and Miller (2005) described how in low-income Jamaican communities mobile phones are primarily used for a unique type of communication called "link-up", defined as very short calls with social contacts that are not particularly close, but that one wants to maintain a good rapport with. This kind of behavior can be adaptive in certain communities since a wide social circle is a valuable resource in case of a hard times. Cross-cultural research on smartphone behaviors has shown that people in warmer southern European countries utilize the smartphone more for socializing,

whereas people in cooler northern European countries use it more for activities that are done alone (Lopez-Fernandez et al., 2017). These insights show that we cannot separate the manner of ICT use and its associated consequences from the sociocultural context of the user, because that context to a significant degree determines what ICT behaviors are engaged with in the first place.

In summary, the field of research on ICTs is fairly new, as are ICTs themselves, therefore there are still important gaps in the literature on the subject. This thesis work aims to take a step towards contributing relevant research on the following topics:

1. Whether addiction is the correct framework for problematic ICT use
2. What specific uses are conducted on ICTs and which of them can lead to problematic use
3. The cultural context of ICT users and how it can influence ICT behaviors

4.2. ICT-Specific Literature Reviews

For each of the ICTs addressed in this compendium – smartphones, SNS, and Internet – in the following specific literature review sections I will give a short overview of the existing research regarding each of the three aforementioned topics: the addiction framework, specific uses and their consequences, and the influence of cultural context. Afterwards, the objectives developed for this thesis work based on these three topics will be presented.

4.2.1. Smartphones

Smartphone addiction

Since smartphones appeared on the market 10-15 years ago, they have quickly become one of the most useful and versatile tools ever developed in the history of mankind. As such, they are often seen in people's hands and in front of their faces, leading to a rising fear about obsession with the devices and questions about what our intensive use of them doing to our minds and societies. Once again, this concern about the effects of smartphone use has been framed as a problem of addiction (Aljomaa et al., 2016; Bian & Leung, 2015; Chiu 2014; Darcin et al., 2016; Haug et al., 2015; Hawi & Samaha 2016; Van Deursen et al. 2015; Choi et al. 2015) even before the existence of sufficient research support for such a construct. Self-report questionnaires such as the Smartphone Addiction Scale (SAS) (Kwon et al., 2013) and the Smartphone Addiction Inventory (SPAI) (Lin et al., 2014) are most commonly used to identify smartphone addicts. Screening studies estimate that smartphone addiction ranges from anywhere between just above 0% and 35%, with one study reporting that 48% of undergraduate university students were smartphone addicted (Aljomaa et al., 2016), and the most frequent range being between 10% and 20% (see Billieux, Maurage, et al., 2015 for a review). However, most of these studies rely on the users' perceptions about their own use which is often inaccurate, and each study uses different methods and questionnaires to determine the existence of addiction. Clinical samples, case studies, experimental studies and longitudinal studies hardly exist in the literature.

Studies on specific smartphone behaviors

The addiction framework most often employed in the study of problematic smartphone use usually obscures the specific behaviors people engage in on the device. By addressing the problem as an addiction, the smartphone itself is pathologized and research often does not go deeper to identify what specific smartphone behaviors could be potentially problematic vs which generally do not pose much risk. That being said, some studies have investigated specific smartphone behaviors and their consequences and have found interesting results that will hopefully pave the way for other similar studies in the future.

Murdock (2013) found that interpersonal stress was significantly and negatively associated with emotional wellbeing for participants who had high daily texting behavior, leading her to conclude that texting is an unsuitable way to communicate when coping with interpersonal stress. Texting is an asynchronous communication method, meaning that responses are not necessarily received and responded to in real time as they are in face-to-face communication. This can lead to frustration and misunderstandings, especially in a confusing and complex scenario such as that of interpersonal conflict. Texting is also a poor medium for the communication of non-verbal information such as facial expressions, tone of voice and body movements, which are all important for the understanding and successful communication of a message. Therefore, texting is a one-dimensional communication medium which is not well suited to the resolution of complex communication challenges such as interpersonal conflicts and can therefore lead to heightened stress levels when employed to do so.

Regarding other specific smartphone uses and their effects, Thomée et al. (2010) found that feeling like one is highly accessible via the mobile phone's communication functions was associated with stress, sleep disturbances, and symptoms of depression for both men and women. Having a mobile phone means that everybody knows they can contact you at any moment and that you will see their outreach almost immediately. This creates a sense of responsibility for many users to respond to outreach in a timely manner so as not to offend the message sender or create a stressful situation. The pressure of constantly having to keep track of various communication channels and needing to respond fairly quickly so as not to cause conflict can be anxiety-provoking for people, especially those managing several ongoing conversations.

On the topic of other specific smartphone uses, Jeong et al. (2016) found that those who use smartphones to engage with SNS, games, and entertainment functions were more likely to develop problematic smartphone use. They identify parallels between these findings and the extensive research on problematic SNS use, video game addiction and television addiction. Elhai et al. (2017b) found that anxiety symptoms were more strongly associated with process smartphone use (using the device for news consumption, entertainment and relaxation) than with social smartphone use (using the device to message and access SNSs) and depression symptom severity was negatively related to greater social smartphone use. They interpret their findings by reasoning that anxious people may engage less in social activities on their devices and that activities such as news consumption and web surfing might be utilized for social avoidance by anxious people.

Studies on culture and smartphone use

Although little cross-cultural research has been conducted on problematic smartphone use, the studies that do exist offer interesting findings that will hopefully spur similar future studies. In one of the largest cross-cultural smartphone studies, Lopez-Fernandez et al. (2017) identified differences in mobile phone use according to European region and found that participants in Northern European countries showed a preference for solitary activities such as managing emails, browsing the Internet and gaming, whereas participants in Southern European countries showed preferences for interpersonal activities like chatting and social media use. These findings are in line with certain characteristic features of the North and South such as the higher sociability of Southern Europeans, developed in great part due to the warmer weather they enjoy. Leonardi et al. (2006) compared American, Latino and European mobile phone users and found that American students were most likely to use mobile phones to escape their peers' perception that they were alone or had nobody to communicate with, Latino participants used the mobile phones most heavily for group and family communication, and Ukrainian students were most likely to report the importance of the mobile phone as a status symbol.

A study comparing the smartphone use of Chinese and British students found two interesting differences in smartphone use between the participant groups (Yang et al. 2018). Firstly, Chinese students reported using many more applications on their smartphones than

British students such as apps for exercise, bike sharing, mobile paying, leisure reading, word memorization tools, online courses, academic tests, and other university required applications, whereas the British students reported mostly using social media functions and information searching. Some Chinese students also explained that the higher levels of freedom they encountered in university as compared to their much more controlled and restricted behaviors during high school allowed and encouraged higher smartphone use. In this case, the culturally-specific experience for the Chinese students of relief from the grip of high parental and academic pressure during high school years partially explained the higher levels of smartphone use as compared to British students. Studies such as this give valuable insight as to why certain groups of smartphone users engage in particular behaviors and consequently experience certain consequences from their use. Not taking into account culture's influence leads to a less comprehensive understanding of ICT behaviors.

Our Smartphone Studies

This compendium includes two studies on problematic smartphone use:

"*Is smartphone addiction really an addiction?"*

Our first study on smartphone use was developed with the objective of conducting a critical analysis of whether "addiction" is the correct term and framework to use for the problems associated with smartphone use. To do so, we read and analyzed the existing research on smartphone addiction, viewing and critiquing it through the lens of classical addiction criteria. The paper ends with a conclusion about the disputed existence of smartphone addiction based on our findings and suggestions for future research in the field.

"Specific Smartphone Uses and How They Relate to Anxiety and Depression in University Students: A Cross-Cultural Perspective."

After determining that the addiction framework was not the best one to use for the research and understanding of smartphone-related problems, we wanted to investigate what

specific smartphone behaviors were associated with psychological problems. Therefore, our second study on smartphone addiction had a 3-fold objective: to analyze what specific activities people engage in on their smartphones, to determine which of those activities are associated with depression and anxiety, and to see if any cross-cultural differences emerge in manner and consequence of smartphone use. To conduct the study, we used participants from universities in Barcelona, Spain, Ibagué, Colombia, and the Chicago region of the USA. We utilized the following questionnaires: CERM to measure problematic phone use, MASQ to measure depression and anxiety, and a Smartphone Uses questionnaire developed specifically for the study to identify which activities were most common in each sample.

4.2.2. Social Networking Sites

SNS addiction

SNS use is one of the most popular specific uses on the Internet/smartphones (Kemp, 2019). As such, it has also triggered fears about its addiction potential, especially among young people who are the highest users. SNSs, Facebook in particular, are highly appealing because they offer a platform for social connection that is free and accessible to all, unregulated by adult interference, and which allows for one to shape one's identity in the eyes of others in whatever way one pleases, thereby providing a sense of control over one's life. Some researchers have argued that this combination of appealing features and the consequent frequent, intensive, sometimes compulsive use of SNSs has developed into an addiction (See Kuss & Griffiths, 2011b and Chester, Reece & Xenos, 2014 for reviews). This use of the addiction framework to discuss problematic SNS use however does not have an agreed upon theoretical conceptualization and therefore may be leading to unfounded public concern and a misdirection of attention and resources. Griffiths (2012) has criticized the addiction framework for SNS use primarily because of the fact that SNSs, like smartphones and the Internet, are just platforms on which a variety of different uses can be conducted, some problematic but others not so.

Studies on specific SNS behaviors

Regarding the criticism that specific behaviors need to be analyzed and not just the use of the SNS platform as a whole, a few studies have investigated this issue. Smock et al. found that distinct SNS behaviors depended on the user's motivations (2011). They found that the motivation of expressive information sharing predicted the use of one-to-many communication features like status updates and Groups but not one-to-one communication behaviors like private messaging and chat, that the motive of social interaction positively predicted commenting, private messaging, chat, and Wall posts, the motive of companionship (the desire to avoid feelings of loneliness) predicted the use of comments, and the motivation of professional advancement was predicted by use of Wall posts and private messages. Shaw et al. (2015) found that social anxiety symptoms were related to spending more time on Facebook and particularly with the passive use of Facebook, defined as viewing content but not interacting. They found that the cognitive process of brooding mediated the relationship between social anxiety symptoms and passive Facebook use.

Rosen et al (2013) found that different Facebook uses predicted different types of psychopathology. Regarding mood disorders, Facebook general use, impression management and number of friends negatively predicted mania and having more friends predicted fewer signs of major depression and dysthymia. Regarding narcissistic and histrionic personality disorders, more general Facebook use, more Facebook use for impression management and more Facebook friends predicted more signs of the disorder. For the other disorders, more Facebook general use predicted more signs of antisocial disorder but fewer signs of compulsive disorder. More Facebook friends also predicted fewer signs of schizoid disorder. In addition, more daily use of other media predicted signs of some disorders including: more time spent online (more signs of major depression and schizoid disorder), talking on the telephone (fewer signs of major depression, dysthymia and schizoid disorder but more signs of compulsive disorder), listening to music (more signs of mania, antisocial disorder, and paranoid disorder). On the other hand, spending more time watching television, playing video games, using a computer as a tool for work or school, instant messaging (IM-ing) or chatting, sending and receiving email did not predict signs of any psychiatric disorders. Kırcaburun et al. (2018) found that certain motives were associated with problematic social media use, including the motive of wanting to meet new

people and socialize, wanting to express or show a more popular version of the self, and wanting to pass the time and use the SNS for entertainment.

Studies on culture and SNS use

As SNS use has been a global phenomenon manifesting in slightly different ways across populations, some research on cross-cultural SNS use has been conducted to identify how different people around the world utilize the medium. Rui and Stefanone (2013) found that Americans updated wall posts more frequently and Singaporeans shared more photos than Americans, perhaps for relationship maintenance and with the goal of in-group harmony. They also found that Americans engaged in more self-presentation protection via a greater management of unwanted photo tagging than Singaporeans. Regarding a concept they call "promiscuous friending" ie, friending people one has never met in person, they found that American promiscuous frienders are more concerned with attention seeking in general whereas Singaporean promiscuous frienders manage their public images more carefully in order to maintain positive public images while gaining public attention.

Similarly, Jackson and Wang (2013) found that Chinese participants used SNSs less than US participants and they theorized that the importance of the self in individualistic cultures and the value put on having a greater quantity of friends (as opposed to a small quantity of close friends) could be part of the reason for US participants' higher SNS use. Another study comparing the US and Korea confirms this finding. Kim, Sohn and Choi (2011) found that American college students' networks on SNSs tend to be much larger than the Korean students, which they also theorize relates to the cultural differences regarding the development and management of social relationships. However, regarding motives for using SNSs, the researchers find that they are more or less the same for US and Korean students – seeking friends, social support, entertainment, information, and convenience although Korean students put greater importance on getting social support from their social relationships and American students put greater emphasis on using SNSs for entertainment. Comparing US participants' SNS use with SNS use in a European collectivist country, Croatia, Sheldon et al. (2017) find that American students' Instagram behaviors mainly have individualistic motives such as self-

promotion and documentation whereas Croatian students' Instagram use has more collectivist motivations such as social interaction.

Our SNS study

"A critical consideration of social networking sites' addiction potential."

Considering the growing concern about SNS addiction without sufficient empirical proof to justify it, we decided to do an in-depth analysis of what exactly it is that defines a behavior as addictive and whether SNS use fulfilled those criteria. We investigated the criteria agreed upon for classical addiction then investigated research on SNS addiction through a critical lens. Our paper is a review of the literature on the subject culminating in a conclusion about the disputed existence of SNS addiction based on our findings and suggestions for future research in the field.

4.2.3. The Internet

Internet Addiction

There have been numerous papers on Internet addiction since Young introduced the concept in 1996. Most Internet Addiction studies use the IAT to identify addicts, although other measures used include The Compulsive Internet Use Scale – CIUS, The Chen Internet Addiction Scale – CIAS, The Problematic Internet Use Questionnaire – PIUQ and others (Laconi, Rodgers & Chabrol, 2014). Prevalence rates have been found to be between 2.6% and 10.9% and a global prevalence estimated at 6.0% (Cheng & Li, 2014). Studies have shown that Internet Addiction (IA) is associated with disorders such as anxiety (Ho et al., 2014; Lee & Stapinski, 2012; Younes, Halawi, Jabbour, El Osta, Karam, Hajj & Khabazz, 2016), depression (Orsala, Orsalb, Unsalc & Ozalp, 2013; Younes et al., 2016), stress (Pedrero-Pérez et al., 2018; Samaha & Hawi, 2016; Younes et al., 2016), low self-esteem (Bahrainian, Alizadeh, Raeisoon, Hashemi Gorji, & Khazaee, 2014; Bozoglan, Demirer & Sahin, 2013), loneliness (Bozoglan et al., 2013; Yao & Zhong, 2014), insomnia (Chen & Gau, 2016; Younes et al., 2016), suicidality (Lin et al., 2014), impulsivity (Lee, Choi, Shin, Lee, Jung & Kwon, 2012), substance abuse (Ho et al., 2014;

Lee, Han, Kim & Renshaw, 2015) and ADHD (Ho et al., 2014; Weinstein, Yaacov, Manning, Danon & Weizman, 2015), among others.

However, a few important arguments have arisen over the course of the study of Internet Addiction. The first is the question of addiction *to* the Internet vs addiction *on* the Internet (Griffiths et al., 2016) which asks the question of whether people are addicted to the Internet itself in some way or whether their other addictions simply manifest on the medium of the Internet, thereby existing as distinct problems not necessarily tied to the Internet (Starcevic & Aboujaoude, 2015). Some researchers argue that in situations where Internet addiction is suspected, there is usually a separate primary disorder and problematic Internet use is a side-effect of that (Billieux, 2012). This leads to the question of which is more prevalent and relevant to focus on in the discussion on problematic Internet use: generalized Internet addiction or specific problematic Internet uses (Laconi, Tricard & Chabrol, 2015; Montag, Bev & Sha et al., 2014). Generalized Internet addiction is defined as the problematic use of the Internet for a variety of Internet-related activities whereas specific Internet addiction relates to the problematic engagement with certain online activities like video gaming or SNS use (Montag et al., 2014). The majority of people experiencing problematic Internet use are those that engage in specific problematic behaviors/addictions on the medium of the Internet such as gambling, gaming, shopping, chatting and sex (Griffiths, 2014) which can be done offline as well. The online-only activities that have consistently been associated with problematic or addictive Internet use are those of social media use, text-chatting and online gaming such as MMORPGs (Kiraly et al., 2014), all of which share a strong social component. Therefore it would appear that problematic/addictive Internet use is often related to the search for social contact, most likely due to its insufficient presence in the Internet user's real life, thereby putting the Internet in the role of a compensatory tool.

This brings us to the argument of whether the addiction perspective is even fitting for the problems associated with Internet use. Kardefelt-Winther encourages the research on problematic ICT use to shift away from an addiction framework and towards an investigation of the way ICTs function in a compensatory way, filling unique needs and deficiencies for the individual user (Kardefelt-Winther, 2014a). He argues that excessive use may be more usefully framed and investigated as a coping strategy rather than a compulsive behavior (Kardefelt-Winther, 2014b). Starcevic (2012, p.93) argues that " 'new' disorders or patterns of behavior

may be no more than alternative expression of various psychopathological entities" and that it may be better to view problematic Internet behaviors as the modern-day manifestation of a combination of cognitive-emotional disorders (Starcevic, 2010) that also exist independently of the Internet (Davis, 2001).

Studies on specific Internet uses

The Internet can be used for a countless number of activities, however a few of those have been identified as the most popular. In their study on specific Internet uses, Pontes et al. (2015) found that the 6 most popular Internet uses in descending order of popularity were: 1. Acquiring general information, 2. Social networking, 3. Emailing/chatting, 4. Watching videos/films, 5. Playing games/gambling and 6. Listening to music. There are a few Internet activities which have been associated with significantly severe problems and those are online gambling (Gainsbury et al., 2014; Griffiths, 2010a; Tsitsika et al., 2011), online video gaming (Kuss & Griffiths, 2011a; Rooij et al., 2010; Pearcy, McEvoy & Roberts, 2017) and Internet sex addiction (Kuss & Griffiths, 2011c). Research has also suggested that the online activities which allow for the creation of an alternate persona that leads to more satisfaction than one's own identity can also lead to problems attributed to Internet use for that purpose (Burleigh et al., 2018; Griffiths et al., 2016).

Studies on culture and Internet use

Although Internet use has been researched around the world, there is little cross-cultural research on the subject. In the cross-cultural studies that exist, the countries involved are simply named, but cultural factors are rarely discussed (Lopez-Fernandez, 2015). The findings of these studies are primarily about the difference in prevalence rates and most common Internet behaviors in the different participating countries. Durkee et al. (2012) found that the highest rate of maladaptive Internet use (18.2%) and pathological Internet use (11.8%) was found in Israel and the lowest rates were found in Italy (8.8% and 1.2%). They also found that when comparing metropolitan and micropolitan areas, adolescents living in metropolitan areas showed a higher risk for PIU. Tsitsika et al. (2014) found that prevalence rates of Internet Addictive Behavior

were higher in the Southern and Eastern/Middle European countries and lower in the Northern European countries. They found that the country with the highest rate of dysfunctional Internet behavior was Spain with a rate of 23% and the lowest was Iceland with 8%. These results contradict the results of another cross-cultural Internet study by Laconi et al. (2018) which compared problematic Internet use in Italy, Germany, France, Poland, Spain, Turkey, Hungary, England and Greece and found that the Spanish sample had one of the lowest rates of PIU.

Our Internet Study:

"Internet Addiction Test research through a cross-cultural perspective: Spain, USA and Colombia."

Since the majority of research on the problems associated with Internet use utilizes the IAT to determine Internet Addiction levels, we decided to analyze the IAT factor analysis studies conducted around the world in order to identify patterns and differences in the underlying constructs for IA cross-culturally. To do so, we analyzed the most recent meta-analysis on IAT factor analysis studies around the world (Moon, Hwang, Kim, Shin, Bae & Kim, 2018). We then gave the IAT to university students in the USA, Spain and Colombia, conducted factor analyses on the data, and compared the results with previous IAT factor analysis studies conducted in those regions to see if the results were replicated, therefore lending support to the theory that culture has an influence on the manner of Internet use.

5. Objectives of this thesis work

With the three research topics in mind, three main objectives were developed for this thesis work:

1. To investigate whether the addiction framework is the appropriate one to use in the study of the Internet, social media and smartphones
2. To take a closer look at specific uses on ICTs, specifically on smartphones
3. To explore ICT behaviors from a cross-cultural perspective in order to gain insight on the role of sociocultural context.

Objective 1 is addressed in the following articles:

Panova, T., & Carbonell, X. (2018). Is smartphone addiction really an addiction? *Journal of Behavioral Addictions,* 7(2), 252-259. Doi: 10.1556/2006.7.2018.49

Carbonell, X. & Panova, T. (2017): A critical consideration of social networking sites' addiction potential. *Addiction Research & Theory*, 25(1), 48-57. Doi: 10.1080/16066359.2016.1197915

Panova, T., Carbonell, X., Chamarro, A., Puerta-Cortés, D. (2019). Internet Addiction Test research through a cross-cultural perspective: Spain, USA and Colombia. *Adicciones*. (Under Review).

The first two articles are review papers that closely analyze existing research on the subject of smartphone and SNS addiction respectively, determining whether there is sufficient research support for the diagnosis of "addiction" to smartphones and SNSs at this time.

The third paper analyzed the use of the IAT around the world to compare the underlying components of Internet "addiction" in different countries and whether those underlying components are the same. In the discussion section, the findings of the comparison are utilized to make conclusions about the construct of Internet Addiction itself.

Objective 2 is addressed in the following article:

Panova, T., Carbonell, X., Chamarro, A., Puerta-Cortés, D. (2019). Specific Smartphone Uses and How They Relate to Anxiety and Depression in University Students: A Cross-Cultural Perspective. *Behaviour and Information Technology*.

In this paper we determined 5 of the most common and potentially problematic uses conducted on the smartphone: messaging, playing games, reading social content (like on Facebook and Twitter), posting social content (like on Facebook and Twitter) and browsing the Internet. We asked participants to rate how frequently they engaged with each of the behaviors and then looked for associations between those behaviors and depression and anxiety in order to identify which smartphone behaviors are potentially problematic for psychological wellbeing and which are not.

Objective 3 is addressed in the following articles:

Panova, T., Carbonell, X., Chamarro, A., Puerta-Cortés, D. (2019). Specific Smartphone Uses and How They Relate to Anxiety and Depression in University Students: A Cross-Cultural Perspective. *Behaviour and Information Technology*.

Panova, T., Carbonell, X., Chamarro, A., Puerta-Cortés, D. (2019). Internet Addiction Test research through a cross-cultural perspective: Spain, USA and Colombia. *Adicciones*. (Under Review).

In both of these papers, we conducted the study in three countries with distinct cultural profiles: Spain, Colombia and the USA. We wanted to see how problematic ICT use differs depending on culture so that we could gain insight on the role of sociocultural context on ICT behavior and the problems associated with it.

Since these objectives overlap and intersect within the four articles, the papers included in this compendium will be presented according to the ICT they focus on: the Internet, SNSs, or smartphones.

6. The Papers

Specific Contributions

This doctoral student contributed the greater part of the study design and writing for each of the papers included in this thesis. The student's specific contributions for papers 1 and 2 included: i) finding, reading and analyzing the relevant research, ii) structuring and composing the arguments, iii) writing up and editing the majority of each paper, iv) submitting the papers to journals and editing them post-review.

The student's specific contributions for papers 3 and 4 included: i) writing and translating the questionnaires and consent forms used, ii) organizing the gathering of participants, iii) coordinating the activities of the three countries involved, iv) participating in the data analysis, v) writing up and editing the majority of each paper, vi) submitting the papers to journals and editing them post-review

Paper 1

This paper cannot be included because it is protected by copyright.

Panova, T., & Carbonell, X. (2018). Is smartphone addiction really an addiction? *Journal of Behavioral Addictions*, 7(2), 252-259. doi: 10.1556/2006.7.2018.49

Paper 2

This paper cannot be included because it is protected by copyright.

Carbonell, X. & Panova, T. (2017). A critical consideration of social networking sites' addiction potential. *Addiction Research & Theory*, 25(1), 48-57. doi: 10.1080/16066359.2016.1197915

Paper 3

This paper cannot be included because it is protected by copyright.

Panova, T., Carbonell, X., Chamarro, A., Puerta-Cortés, D. (2019). Specific smartphone uses and how they relate to anxiety and depression in university students: A cross-cultural perspective. *Behaviour and Information Technology*

La investigación del Internet Addiction Test desde una perspectiva intercultural: España, Estados Unidos y Colombia

Internet Addiction Test research through a cross-cultural perspective: Spain, USA and Colombia

Tayana Panova*; Xavier Carbonell**; Andres Chamarro***; Diana Ximena Puerta-Cortés****

*****FPCEE Blanquerna, Universitat Ramon Llull

Address**:** Cister, 34, 08022 Barcelona, Spain

****** FPCEE Blanquerna, Universitat Ramon Llull

Address**:** Cister, 34, 08022 Barcelona, Spain

******* Universitat Autònoma de Barcelona

Address: B Building, Campus of Bellaterra, 08193 Cerdanyola del Valles, Barcelona, Spain

********Universidad de Ibagué

Carrera 22 Calle 67 B/Ambalá Ibagué, Colombia

Send Correspondence to: Tayana Panova; Cister, 34 Barcelona; tayana.panova@gmail.com

Resumen español

Los usuarios de Internet frecuentemente experimentan problemas relacionados con su uso de Internet y, aunque la cultura tiene una influencia importante en la forma en que las personas se comunican, en lo que valoran y, por lo tanto, en cómo utilizan Internet, las publicaciones sobre investigación intercultural del uso problemático de Internet son escasas. La herramienta más común para medir dicho uso, el Internet Addiction Test (IAT), se ha utilizado en varios países, por lo que en este estudio comparamos los resultados interculturales de las investigaciones más recientes sobre el análisis factorial del IAT. Encontramos que en países con dos o más estudios, los resultados a menudo se replican, lo que sugiere que el contexto cultural influye en los comportamientos en Internet. Luego llevamos a cabo nuestros propios estudios de análisis factorial del IAT en tres países (España, EE. UU y Colombia) con 1.273 participantes. Al comparar nuestros resultados con los de estudios previos en esos países, encontramos que nuestros resultados también fueron similares a los de estudios anteriores. El hallazgo más notable fue que todos los análisis factoriales de IAT que realizamos y los anteriores en las mismas regiones contenían un factor relacionado con la pérdida de control/problemas de gestión del tiempo y otro factor relacionado con problemas emocionales/psicológicos, lo que sugiere que el control de impulsos y las necesidades emocionales no satisfechas son componentes importantes en el desarrollo del uso problemático de Internet en todo el mundo. La investigación futura sobre el uso problemático de Internet debería centrarse en estos aspectos.

Keywords: Adicción a Internet, Uso problemático de Internet, Intercultural, Prueba de adicción a Internet, análisis factorial

English Abstract

Internet users around the world often experience problems related to their Internet use, and although culture has an important influence over how people communicate, what they value, and therefore how they use the Internet, there has been little cross-cultural research on the subject of problematic Internet use. The most common tool for measuring such use, the Internet Addiction Test (IAT), has been used in various countries, therefore in this study we compared and analyzed the cross-cultural results found in the most recent IAT factor analysis research. We found that in countries with 2 or more studies conducted, results are often replicated, suggesting the cultural context influences Internet behaviors. We then conducted our own IAT factor analysis studies in 3 countries – Spain, USA, and Colombia – with a total of 1,273 participants. We compared our results with those from previous studies in the same countries and found that the results were similar. The most notable finding was that all the IAT factor analyses we conducted and the previous ones in the same regions contained a factor related to loss of control/time management problems and another factor related to emotional/psychological problems, thereby suggesting that impulse control problems and unfulfilled emotional needs are the most important components in the development of problematic Internet use around the world. Future research on problematic Internet use should focus on these aspects.

Keywords: Internet addiction, Problematic Internet Use, Cross-Cultural, Internet Addiction Test, factor analysis

Although Internet use is a global phenomenon, there has been little research on the topic of problematic Internet use from a cross-cultural perspective. This is a weakness in the literature that should be addressed because people from different cultural backgrounds have very different communication practices, values and motivations, and therefore have different Internet behaviors as well. Consequently, when they experience problems associated with Internet use, the nature of those problems also differs depending on their sociocultural context.

Psychometric analyses such as factorial analysis of Internet addiction questionnaires show different results in almost every country studied, and the majority of studies comment that this variation probably exists in part due to cultural differences. However, very few studies have taken a cross-cultural approach to the study of Internet addiction and little attention is given to culture in the problematic Internet use research in general. Taking a cross-cultural approach to this subject could help identify culture's influence on problematic Internet behaviors, which would facilitate the development of customized evaluation tools and treatment practices for problematic Internet users in different populations.

Problematic Internet Use and Internet Addiction

Problematic Internet Use (PIU) is an important problem to study as half the world's population uses the Internet regularly and the popularization of the smartphone has made Internet access even easier and more frequent (Stevens, 2018). Studies have shown that Internet Addiction (IA) is associated with disorders such as anxiety (Ho et al., 2014; Lee & Stapinski, 2012; Younesetal., 2016), depression (Orsala, Orsalb, Unsalc & Ozalp, 2013; Younes et al., 2016), stress (Pedrero-Pérez et al., 2018; Samaha & Hawi, 2016; Younes et al., 2016), low self-esteem (Bahrainian, Alizadeh, Raeisoon, Hashemi, & Khazaee, 2014; Bozoglan, Demirer & Sahin, 2013), loneliness (Bozoglan, Demirer & Sahin, 2013; Yao & Zhong, 2014), insomnia (Chen & Gau, 2016; Younes et al., 2016), suicidality (Lin et al., 2014), impulsivity (Lee, Choi, Shin, Lee, Jung & Kwon, 2012), substance abuse (Ho et al., 2014; Lee, Han, Kim & Renshaw, 2015) and ADHD (Ho et al., 2014; Weinstein, Yaacov, Manning, Danon & Weizman, 2015), among others. That being said, it is still under discussion whether problematic Internet use can be labeled as an addiction (Kardefelt-Winther, 2014; Sánchez-Carbonell, Beranuy, Castellana & Chamarro, 2008; Starcevic, 2013; Widyanto & Griffiths, 2006), and Internet addiction is not included in the DSM-V (Petry & O'Brien, 2013) nor in the ICD-11 (Bobes, Flórez & Bobes, 2019) although specific problematic activities done online such as gambling and video gaming are included. The reluctance to definitively confirm the existence of an Internet Addiction disorder is due to issues with its theoretical development, methodology and conceptualization across studies, and because the levels of severity of problems associated with Internet

"addiction" are usually not comparable with the severity of problems caused by other confirmed addictions.

The focus on an addiction framework may have contributed to problems with diagnosis and treatment of problematic Internet use because the leading tool for diagnosis, the Internet Addiction Test, has unstable structural validity. The IAT was developed by Young (1998), based on the DSM-IV (American Psychiatric Association, 1994) criteria for pathological gambling and has been the most widely used measure for the study of problematic Internet use around the world. It was designed to have unidimensional structure, however, it has been found to have varying numbers of factors, ranging from 1 to 6 (Laconi, Rodgers & Chabrol, 2014). Although its reliability is consistently strong (Laconi, Rodgers & Chabrol, 2014; Panayides & Walker, 2012), its factorial structure differs in almost every study, thus making it difficult to identify which components of problematic Internet use are more relevant to address in diagnosis and treatment. Many of the studies in the IAT factor analysis literature mention the potential role of culture in the psychometric differences found across studies, however IAT research with a cross-cultural perspective is scarce.

Culture

Although there have been few studies on the subject of Internet Addiction/Problematic Internet Use (PIU) with a cultural focus (Lopez-Fernandez, 2015), those that exist have found interesting cultural differences in Internet use.

Durkee et al. (2012) studied pathological Internet use in the countries Austria, Estonia, France, Germany, Hungary, Ireland, Israel, Italy, Romania, Slovenia, Spain, and Sweden and found that the highest rate of maladaptive Internet use (18.2%) and pathological Internet use (11.8%) was found in Israel and the lowest rates were found in Italy (8.8% and 1.2%). They also found that when comparing metropolitan and micropolitan areas, adolescents living in metropolitan areas showed a higher risk for PIU. They highlighted the importance of this finding and indicated that there must be a significant difference in metropolitan vs micropolitan culture which should be further investigated.

Tsitsika et al. (2014) found that prevalence rates of Internet Addictive Behavior were higher in the Southern and Eastern/Middle European countries and lower in the Northern European countries. More specifically, they found that the country with the highest rate of dysfunctional Internet behavior was Spain with a rate of 23% and the lowest was Iceland with 8%. These results contradict the results of another cross-cultural Internet study by Laconi et al. (2018) which compared problematic Internet use in Italy, Germany, France, Poland, Spain, Turkey, Hungary, England and Greece and found that the Spanish sample had one of the lowest rates of PIU.

Seabra et al. (2017) found an interesting paradox in their comparison between Portuguese and Brazilian Internet users. They expected to find more problematic use among

Portuguese users as they had more Internet users per capita and easier access to the Internet than the Brazilians. However, they found that Brazilian users had higher levels of Internet Addiction, thereby demonstrating that ease of access and usage prevalence in a country are not sufficient to predict problematic Internet use.

To facilitate cross-cultural comparison of IAT factor analysis research from around the world, we organized the latest meta-analysis findings on IAT's factor analysis (Moon et al., 2018) according to geographical region and identified similarities/differences of interest (Table 1). One aspect of the research we found interesting to note was the different ways that research teams labeled the factors they identified. There is no standard for factor naming, therefore the factor names selected by each team indicate how they summarized the combination of items within that factor. This offers insight on how the teams from different countries interpret the factors and what aspect of them they see as most significant.

Table 1 About here [Chart of International IAT Factor Analysis Studies]. (Note to editors and reviewers: this Table can be deleted if the editors/reviewers decide it is not necessary to include. We created it to make it easier for the reader to visualize the global data on this topic, but it is not required to understand the section).

Comparison of IAT factor analysis studies around the world

Asia and Europe had the highest number of IAT factor analysis studies, so we compared their factors to identify if there were interesting similarities and/or differences. There were a couple of things to note about the factor names themselves. Firstly, Asia was the only continent in which the word "withdrawal" (in the sense of withdrawing from people) was used in the labeling of factors and 50% of the studies contained a mention of "neglect of work/duty" whereas only one other study in all the other papers around the world mentioned such a construct (Tsimtsiou et al., 2014). From a cultural perspective, these two differences may be because of the collectivist nature of most Asian communities. Being an active part of society is very important and highly valued, therefore withdrawing from the group or neglecting one's role in the community is seen as a sign of a problem. On the other hand, in the European studies, the word "emotion/mood" was used in the factor labeling of almost 60% of the studies, whereas it was not used at all in the factor labeling of Asian studies. This could be because the personal, internal experience of the individual receives more attention in European countries, which tend to be more individualistic, than it does in Asian countries (Hofstede, 1983). There is not enough data to make conclusions in this regard, therefore more research is recommended to explore these potential cultural differences more in depth.

There was too much variation in the results among studies to make reliable conclusions about broader geographical regions, and since it is unwise to rely on any single study to accurately represent a population, we instead examined countries for which two or more IAT factor analysis studies had been conducted in order to see if results were replicated, which would add support to the theory that cultural context influences Internet behaviors. We identified the three countries from the meta-analysis in which two or more studies were conducted – South Korea, Italy, and Turkey – and we compared their findings to see how closely the results were replicated.

In the South Korean studies the findings were similar: both studies had a primary factor centered around time management, with almost all the items from Sung, Shin and Cho's (2014) Factor 1 included in Lee et al.'s (2013) Factor 1. Both studies also had a Withdrawal factor, with all of the items in Lee et al.'s Withdrawal factor included in Sung et al.'s Withdrawal Factor. The studies had different samples, with Sung et al. using teenage participants aged 13-15 and Lee et al. using university students. This age difference may be an important contributor to the findings that they did not share such as that Sung et al. found four factors and Lee et al. found three.

The three studies from Italy (Faraci et al., 2013; Fioravanti & Casale, 2015; Servidio, 2017) all showed nearly the same findings. Each study used university students in the sample (Fiorvanti & Casale used university students as well as high school students), and each had a two factor structure with the primary and secondary factors containing almost the same items across all studies; one factor was related to emotional/psychological problems and the other factor was related to loss of control of time and interference with daily life.

The results from Turkey (Boysanetal., 2017; Kaya, Delen & Young, 2016) were different: although both studies explained nearly the same percent variance (46% in Kaya et al. and 45% in Boysan et al.), Boysan et al. found a unidimensional structure whereas Kaya et al. identified four separate factors. As the samples were very similar culturally and demographically, differences may be attributed to the fact that different statistical analyses were used.

Present study

Hypothesis

Considering that two of the IAT factor analysis replication studies within-country showed very similar results (Korea and Italy) and one replication study did not show similar results as the original (Turkey), we wanted to further investigate whether IAT factor analysis results would be replicated within-country. Considering that IAT factor analyses are so different between countries with number of factors found ranging from 1 to 5, our hypothesis was that if IAT factor analysis studies within-country show very similar results, this adds support to the claim that

culture influences IAT behaviors. We selected three countries in which IAT factor analyses had been conducted previously and which are substantially diverse in geographic region, socioeconomic status and culture: USA (Midwest region), Spain (Barcelona) and Colombia (Ibagué).

Why USA, Spain and Colombia?

Each of the countries used in this study is special in Internet use research; the USA is one of the top three countries in the world as regards Internet penetration, Colombia has Internet use rates that are representative of all of South America as its Internet penetration rates are exactly at the average level of all Latin American countries (Economic Commission for Latin America and the Caribbean, 2017), and Spain is representative of European Internet use because its penetration rates are exactly at the average of all European countries ("Netherlands Leads Europe," 2018). We conducted IAT factor analyses for a sample of university students in each country to see if the results would be similar to the results of the factor analysis study previously done in that country. We used university students because the previous studies were conducted with university samples (The previous Colombian study was conducted with a general populations sample, however the average age was 20.93, and the vast majority of participants were university-age).

Methods

Participants

The participants were 1,516 university students from 3 universities, one in each country, who filled out an online questionnaire. After dropping the incomplete responses, 451 were left from the USA, 467 from Spain and 355 from Colombia. The American participants were 64.9% female, the Spanish participants were 240 females 79.2% female and the Colombian students were 64.2% female. The mean age of American students was 19.59 (SD = 1.43; range 18-30), the mean age of Spanish students was 21.45 (SD = 2.41; range 18-30), and the mean age of Colombian student was 19.95 (SD = 2.00; range 18-30). The Spanish participants were slightly older than the other two groups ($F=111.05$; $p<.001$).

Measures

Internet Addiction Test (Young, 1998): a 20-item self-report questionnaire based on the DSM-IV criteria for pathological gambling. Respondents are asked to rate items on a 5-point

Likert scale covering the degree to which their Internet use affects their daily routine, social life, productivity, sleeping pattern, and feelings. The minimum score is 20 and the maximum is 100. The higher the score, the greater the problems that the Internet causes. Young suggested that a score ranging from 20 to 39 is a typical online user who has no problems with their Internet usage. A score ranging from 40 to 69 signifies frequent problems due to Internet usage. Finally, a score ranging from 70 to 100 signifies that the Internet is causing significant problems for the user. The IAT was designed as a unidimensional instrument, however, subsequent studies have found between one and six factors (see Moon et al. 2018). In online applications, reliability varies between 0.83 and 0.91(Korkeila, Karlaas, Jääskeläinen, Vahlberg & Taiminen, 2010; Barke, Nyenhuis & Kröner-Herwig; Jelenchik, Becker & Moreno, 2012). The reliability (Cronbach's Alpha) for the present study was .91.

Procedure

In the universities in Spain and Colombia, students were emailed by the researchers requesting participation in the study, and participants were recruited via the University of Illinois Subject Pool website in the United States (used by students to find and participate in research projects). Participants who chose to complete the study clicked the link provided to them either from the email or the Subject Pool website (USA) and were redirected to the questionnaires on the web host Qualtrics. When a participant accessed the questionnaire, they were presented with a document explaining the study and were asked to provide their informed consent in order to continue. No identifying information was collected from the participants and their responses were encoded as a set of random numbers and letters. IP numbers were not tracked. Some data collected were not related to the Internet focus of the current study and will therefore be presented elsewhere.

Data Analysis

Principal components analysis with Varimax rotation was used for factor extraction. Prior to exploratory factor analysis, data were inspected to ensure items were significantly correlated, using Bartlett's Test of Sphericity. In addition, in order to evaluate whether items shared sufficient variance to justify factor extraction, KMO's Test of Sampling Adequacy was used. Factor loadings resulting from the Varimax rotation were evaluated using the threshold of 0.40. If an item loads on more than one factor, then it is bonded with the factor with the highest loading unless there is a compelling reason to attach it to another factor in order to improve factor interpretability. The IAT factor structure that emerged from exploratory factor analysis was verified using confirmatory factorial analysis (CFA Least Square, which is applicable when data do not meet the assumption of multivariate normality, was selected as the procedure for estimation). Model fit was evaluated based on the comparative fit index (CFI), Tucker-Lewis index (TLI), root-mean-square error of approximation (RMSEA), and standardized root mean square residual (SRMR). CFI and TLI > .90, RMSEA < .08 and SRMR < .1 typically reflect acceptable fit, and CFI and TLI > .95, RMSEA < .06 and SRMR < .08 indicate excellent fit

(Brown, 2006). In addition, descriptive and correlational analyses were performed. To test country and sex differences in the study, a bifactorial (sex by country) analysis of variance (General Linear Model procedure) was performed. When main effects were significant, post-hoc comparisons (with Bonferroni adjustment for multiple comparisons) were computed. SPSS 19.0 was used for descriptive statistics, General Linear Model and exploratory factor analysis. EQS 6.1 (Bentler, 2006) was used for CFA.

Results

Descriptive analysis

In the total sample, 72% of respondents showed scores ranging from 20 to 39, meaning no problems with their Internet usage. 27% scored from 40 to 69, meaning frequent problems due to Internet usage, and 1% scored from 70 to 100, for whom the Internet may be a significant problem. Regarding country differences, Spanish participants showed lower scores on the IAT (Mean = 33.50; DT = 9.44) than USA participants (Mean = 36.82; DT = 10.82) and Colombian participants (Mean = 36.70; DT = 11.05). Differences were statistically significant (F = 12.55; p = .000).

Factor Analysis

The KMO's Test of Sampling Adequacy was .94 and Bartlett's Test of Sphericity (χ =9490.9) was significant (P=.000), indicating that the IAT items were appropriate for a factor analysis. For both USA and Spain, this criterion resulted in a three-factor solution whereas in the case of Colombia there were two underlying factors. Table 1 shows the factor loadings of the items for the USA, Spain, and Colombia respectively.

For the USA, the three factors explained 51.91% of the variance (see Table 1). Factor 1 (twelve items) accounted for 25.65 % of the variance and appeared to measure psychological conflict. Factor 2 (five items) accounted for 16.67% of the variance and appeared to measure inability to control use. Factor 3 (three items) accounted for 9.66% of the variance and appeared to measure social and work dysfunctions. The fit of this model was excellent (CFI= .985; TLI= .983, RMSEA= .027; SRMR= .042). For Spain, the three factors explained 46.68% of the variance. Factor 1 (7 items) accounted for 18.16% of the variance and measured social/work dysfunctions and difficulties with time management. Factor 2 (8 items) accounted for 15.55 % of variance and measured psychological conflicts related to Internet use. Factor 3 (4 items) accounted for the 13.14% of variance and measured affective reaction. Item 14 did not charge at any factor. The fit of this model was excellent (CFI= .989; TLI= .987, RMSEA= .023; SRMR= .040). For Colombia, the two factors explained 54.7% of the variance. Factor 1 (11 items) accounted for 30.72% of variance and measured psychological conflicts. Factor 2 (8 items) accounted for 23.97% of variance and measured inability to control Internet use. Item 7 didn't charge at any factor. The fit of this model was acceptable (CFI= .978; TLI= .975, RMSEA= .033; SRMR= .049).

In Summary:

Below we have included the simplified and full name of the factors for each country.

USA
Factor 1: Emotional Need (Satisfaction of Emotional Needs and Dependence): 3, 4, 5, 9, 10, 11, 12, 13, 15, 18, 19, 20
Factor 2: Loss of Control (Inability to Control use and Neglect of Important Activities): 1, 2, 14, 16, 17
Factor 3: Neglect of Duty (Neglect of Duties in Favour of the Internet): 6, 7, 8

Spain
Factor 1: Loss of Control (Inability to Control Use and Neglect of Duties): 1, 2, 6, 7, 8, 16, 17
Factor 2: Emotional Need (Satisfaction of Emotional Needs): 3, 4, 9, 10, 13, 18, 19, 20
Factor 3: Dependence**:** 5, 11, 12, 15

Colombia
Factor 1: Emotional Need (Satisfaction of Emotional Needs and Dependence): 3, 4, 9, 10, 11, 12, 13, 15, 18, 19, 20
Factor 2: Loss of Control (Inability to Control use and Neglect of Duties): 1, 2, 5, 6, 8, 14, 16, 17

[Table 2 About Here]

Discussion

Comparing the IAT factor analyses

When we compare our findings to the previous IAT factor analyses in the same countries, we see many similarities. We found three factors in the US sample: 1. Satisfaction of Emotional Needs and Dependence, 2. Inability to Control Use and Neglect of Important Activities and 3. Neglect of Duties in Favour of the Internet. The previous IAT factor analysis in the US (Jelenchick et al., 2012) found two factors, titled 1. “Dependent Use” and 2. “Excessive use.” When we compare our findings to theirs, we find that both studies have an identical Factor 1 and very similar Factor 2 (all the items from our study’s Factor 2 were included in Jelenchick’s Factor 2). The main difference was that the three additional items in Jelenchick’s Factor 2 appeared as a separate Factor in our study – those items that related to neglect of work or studies in favour of the Internet. The shared items in the Emotional Need factor relate to dependence on the Internet for positive affect and preference for the Internet over reality. The shared items in

the Loss of Control factor relate to inability to control time online and prioritization of Internet time over other tasks.

We found three factors in our Spanish sample as well: 1. Inability to Control Use and Neglect of Duties, 2. Satisfaction of Emotional Needs, and 3. Dependence. The previous IAT factor analysis in Spain (Fernández-Villa et al., 2015) found two factors titled: 1. "Emotional Investment" and 2. "Performance and Time Management." When we compare our results to theirs, we again see similarities. Nearly all of the items in our Factor 2 were included in Fernández-Villa et al.'s Factor 1, although their Factor 1 had an additional 4 items, 3 of which composed our Factor 3. Additionally, our Factor 1 was almost identical to Fernández-Villa et al.'s Factor 2. Although the two factors are in switched positions for the two studies, their similarities are important to note; as in the US sample, one factor common in both studies was centered around psychological/emotional problems and the other common factor was centered around loss of control/time management problems. The shared items in the Emotional Need factor primarily related to dependence on the Internet for positive affect. The shared items in the Loss of Control factor related to inability to control time online and neglect of important duties in favor of the Internet.

We found two factors in our Colombian sample: 1. Satisfaction of Emotional Needs and Dependence, and 2. Inability to Control use and Neglect of Duties. The previous IAT factor analysis in Colombia (Puerta-Cortes et al., 2012) found three factors, titled 1. "Consequences of Internet use," 2. "Cognitive-Emotional Dimension" and 3. "Time control." Once again, when we compare our findings to theirs, we see many similarities. Puerta-Cortes' Factor 2 and our Factor 1 are nearly identical, with only one item difference. Puerta-Cortes' Factor 1 also shares a majority of its items with our Factor 2. The shared items in the Emotional Need factor were nearly the same as those in the US sample, related to dependence on the Internet for positive affect and preference for the Internet over reality. The shared items in the Loss of Control factor related to excessive time spent online and neglect of important duties in favour of the Internet.

Considering that all of our IAT factor analysis replications showed very similar findings to the previous studies conducted in those countries, our hypothesis was supported - since within-country replication of IAT factor analyses are similar whereas between-country analyses around the world often differ, it appears that culture has an influence over how problematic Internet use manifests. We must therefore keep culture in mind when we research Internet use and we should conduct further research on how culture influences ICT behaviors. However, it is also important to note that in all three countries we studied, we found the same two fundamental categories present, indicating a universal pattern that underlies problematic Internet use.

The Shared Factors and Implications for IA Research

All of our samples and the studies we compared them to contained one of their top two factors focused on loss of control/time management problems and the other of the top two factors focused on emotional/psychological problems, although these factors manifested somewhat differently between countries. This finding confirms the finding from Moon et al.'s meta-

analysis (2018) which determined that when considering only the studies that strictly follow the factor analysis guidelines, the IAT most likely has one or two real factors. Two items in Loss of Control factor were shared among all six studies: questions 1 and 2. Six items in the Emotional Need factor were shared among all six studies: questions 3, 9, 10, 13, 19 and 20.

The Italian studies all showed these same two factors and so did the Korean studies (despite the fact that Lee et al. (2012) found four factors and Sung et al. found three (2014). Therefore, we can conclude that although there are differences in the IAT factor analysis findings around the world with factors ranging from 1-5 in the most recent meta-analysis (Moon et al., 2018), there are usually two primary factors that emerge: one related to emotional problems/dependence and another related to loss of control/time management problems regarding the Internet. Future diagnosis and treatment efforts should focus on these two factors if more detailed information is not available about the specific population being studied. Additionally, considering the plausibility of a two factor structure, future studies using modern statistical analysis, such as Exploratory Structural Equation Modeling (ESEM; Asparouhov & Muthen, 2009), that allows for the possibility of cross-loadings (i.e., that an item can be an indicator of two latent factors), should be used to test the structure and the cross-cultural invariance of the IAT.

On the topic of the disputed existence of Internet Addiction as a disorder, judging from the two most common factors identified in the IAT, it appears that there are two primary underlying components of problematic Internet use – impulse control problems and the presence of unsatisfied emotional needs that the Internet is employed to satisfy. It would appear that the comorbidity of these two components manifests as problematic Internet use in the modern technological age. With this in mind, it may be more beneficial from a diagnostic and treatment perspective to focus on these two cognitive-emotional components rather than on "Internet Addiction" as a single construct, which continues to be a somewhat vague concept with various interpretations. As Starcevic (2012, p.93) argues, "'New' disorders or patterns of behaviour may be no more than alternative expression of various psychopathological entities."

As seen from the factor analyses conducted around the world, although the IAT may have been designed as a unidimensional measure, this unidimensionality has not been proven. Therefore, perhaps Internet Addiction should also not be considered as a single construct, but rather problematic Internet behaviours should be viewed as the modern-day manifestation of a combination of cognitive-emotional disorders (Starcevic, 2010) that manifested in different ways before the existence of the Internet, but maintain the same basic constructs independently of it. As "Internet Addiction" has been difficult to describe psychometrically due to the instability in diagnostic measures, since problematic Internet use presents differently in people around the world, and since clinical cases of Internet addicts are scarce, perhaps there is insufficient support for the diagnosis of Internet "addiction" at this time. It may benefit the prevention, diagnosis and treatment of those suffering from problematic Internet use more if research explores what cognitive-emotional profiles are susceptible to Internet use problems and why, what motivations problematic users have for their use, and what benefits people receive from their Internet use

which reinforces it so much that it leads to its prioritization over other aspects of daily life (Grande, Martínez & Fernández, 2019; Kardefelt-Winther, 2014).

Limitations

This study is not without limitations. Firstly, the IAT is a self-report measure which means results may not be fully accurate, as respondents often have a mistaken perception of their own Internet behaviors. Secondly, in all samples the participants were university students, which means caution should be taken when generalizing results to a more diverse population. Third, as factorial invariance has not been verified, conclusions about differences in countries must be taken with caution. There exists the possibility that the factorial structure of the IAT may not be comparable across countries because there is not a common structure.

Regarding the comparative analysis of Moon et al.'s IAT meta- analysis (2018), this paper did not aim to analyze the statistical procedures associated with each study included in that paper, therefore some of the differences found between or within countries could be attributed to different statistical procedures used, not culture.

One must also take into account how the passage of time may have affected the effectiveness of the IAT to measure problems with Internet use. The IAT was developed in 1998 before the extensive use of the Internet around the world. These past 22 years of development have probably affected the relevance of the questionnaire and the importance of certain items. Therefore, it would benefit the literature on this subject if the IAT, being the most popular questionnaire in the field, was updated to better reflect Internet behaviors that are popular and problematic today.

Conclusion

The findings of our three factor analysis studies, in the USA, Spain and Colombia, showed similar results as the previous findings in those same regions. In the USA we found 3 factors: 1. Emotional Need (Satisfaction of Emotional Needs and Dependence), 2. Loss of Control (Inability to Control use and Neglect of Important Activities) and 3. Neglect of Duty (Neglect of Duties in Favour of the Internet). In Spain we also found 3 factors: 1. Loss of Control (Inability to Control Use and Neglect of Duties), 2. Emotional Need (Satisfaction of Emotional Needs), and 3. Dependence. And in Colombia we found 2 factors: 1. Emotional Need (Satisfaction of Emotional Needs and Dependence), and 2. Loss of Control (Inability to Control Use and Neglect of Duties). Spanish participants were found to have the lowest IAT scores among the three countries studied, consistent with a previous study by Laconi et al. (2018).

All factor analyses contained a factor related to emotional/psychological problems and another factor related to loss of control/time management problems, thereby suggesting that impulse control problems and unfulfilled emotional needs are the most important components in the development of problematic Internet use around the world. We therefore suggest a move away from the addiction framework in problematic Internet use research, which puts the focus on the Internet as a kind of addiction-causing entity like a drug, and instead shift the focus onto the motivations and gratifications of Internet users when engaging with the Internet, and re-

conceptualizing PIU as the technological age's manifestation of an interaction between impulse-control problems and unfulfilled emotional needs.

Conflicts of Interest

The authors declare no conflict of interest

References

Ahmad, M., Alzayyat, A. & Al-Gamal, E. (2015). The factor structure of the Internet Addiction Tool with university students in Jordan. *Issues in Mental Health Nursing, 36*(9), 725– 731. doi: 10.3109/01612840.2015.1033041.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Bell, C. C.

Bahrainian, S. A., Alizadeh, K. H., Raeisoon, M., Hashemi, G, O. & Khazaee, A. (2014).

Relationship of Internet addiction with self-esteem and depression in university students. *Journal of Preventive Medicine and Hygiene*, *55*(3), 86-89.

Barke, A., Nyenhuis, N. & Kroner-Herwig, B. (2012). The German version of the Internet Addiction

Test: A validation study. *Cyberpsychology, Behavior and Social Networking*, *15*(10), 534–542. doi: 10.1089/cyber.2011.0616

Bentler, P. M. (2006). *EQS 6 structural equations program manual*. Encino: Multivariate Software

Bobes, B. M. T., Flórez, G., Seijo, P. & Bobes García, J. (2019). Does ICD-11 improve the epidemiological and nosological purposes of mental, behavioral and developmental disorders? Adicciones, 31, 183-188. doi:10.20882/adicciones.1368.

Boysan, M., Kuss, D. J., Barut, Y., Ayköse, N., Güleçe, M. & Özdemir, O. (2017). Psychometric properties of the Turkish version of the Internet Addiction Test (IAT). *Addictive Behaviors*, *64*, 247–252. doi: 10.1016/j.addbeh.2015.09.002

Bozoglan, B., Demirer, V. & Sahin, I. (2013). Loneliness, self-esteem, and life satisfaction as predictors of Internet addiction: A cross-sectional study among Turkish university students. *Scandinavian Journal of Psychology, 54*, 313-319. doi: 10.1111/sjop.12049

Brown, T.A. (2006). *Confirmatory factor analysis for applied research*. New York: Guilford Press.

Chen, Y-L. & Gau, S. S-F. (2016). Sleep problems and Internet addiction among children and

adolescents: A longitudinal study. *Journal of Sleep Research*, *25*(4), 458-465. doi: 10.1111/jsr.12388.

Conti, M. A., Jardim, A.P., Hearst, N., Táki, A. C., Tavares, H. & Nabuco de Abreu, C. (2012). Evaluation of semantic equivalence and internal consistency of a Portuguese version of the Internet Addiction Test (IAT). *Revista de Psiquiatria Clinica*, *39*(3), 106–110. doi: 10.1590/S0101-60832012000300007

Dhir, A., Che, S. & Nieminen, M. (2015). Psychometric validation of Internet Addiction Test with Indian adolescents. *Journal of Educational Computing Research, 53*(2), 15–31. doi: 10.1177/0735633115597491

Durkee, T., Kaess, M., Carli, V., Parzer, P., Wasserman, C., Floderus, B., Apter, A., ... Wasserman, D. (2012). Prevalence of pathological Internet use among adolescents in Europe: Demographic and social factors. *Addiction*, *107*(12), 2210-2222. doi:10.1111/j.1360-0443.2012.03946.x.

Economic Commission for Latin America and the Caribbean. (2017). *State of broadband in Latin America and the Caribbean: 2017*. Retrieved from: https://repositorio.cepal.org/bitstream/handle/11362/43670/1/S1800532_en.pdf

Faraci, P., Craparo, G., Messina, R. & Severino, S. (2013). Internet Addiction Test (IAT): Which is the best factorial solution? *Journal of Medical Internet Research, 15*(10), 220–230. doi: 10.2196/jmir.2935.

Fernández-Villa, T., Molina, A. J., García-Martín M, Llorca, J., Delgado-Rodríguez, M. & Martín, V. (2015). Validation and psychometric analysis of the Internet Addiction Test in Spanish among college students. *BMC Public Health, 15*(1), 1-9. doi: 10.1186/s12889-015-2281-5

Fioravanti, G. & Casale S. (2015). Evaluation of the psychometric properties of the Italian Internet Addiction Test. *Cyberpsychology, Behavior, and Social Networking*, *18*(2), 120–128. doi: 10.1089/cyber.2014.0493.

Grande Gosende, A., Martínez Loredo, V. & Fernández Hermida, J.R. (2019). Gambling Motives Questionnaire validation in adolescents: Differences based on gambling severity and activities. *Adicciones, 31*, 212-220. doi:10.20882/adicciones.1057.

Guan, N. C., Isa S. M., Hashim, A. H., Pillai, S. K. & Harbajan Singh, M. K. (2015). Validity of the Malay version of the Internet Addiction Test: A study on a group of medical students in Malaysia. *Asia-Pacific Journal of Public Health*, 27(2). NP2210-NP2219. doi: 10.1177/1010539512447808.

Hawi, N. S. (2013). Arabic validation of the Internet Addiction Test. *Cyberpsychology, Behavior, and Social Networking*, *16*, 200–204. doi: 10.1089/cyber.2012.0426

Hawi, N. S., Blachnio, A. & Przepiorka, A. (2015). Polish validation of the Internet Addiction Test. *Computers in Human Behavior*, *48*, 548–553. doi: 10.1016/j.chb.2015.01.058

Ho, R. C., Zhang, M. W. B., Tsang, T.Y., Toh, A. H., Pan, F., Lu, Y., Cheng, C., ... Mak, K-K. (2014). The association between internet addiction and psychiatric co-morbidity: a meta-analysis. *BMC Psychiatry, 14*(1), 183. doi: 10.1186/1471-244X-14-183

Hofstede, G. (1983). National cultures in four dimensions: A research based theory of cultural differences among nations. International Studies of Management & Organization, 13(1-2), 46-74. doi: 10.1080/00208825.1983.11656358

Jelenchick, L. A., Becker, T. & Moreno, M. A. (2012). Assessing the psychometric properties of the Internet Addiction Test (IAT) in US college students. *Psychiatry Research*, *196*(2-3), 296–301. doi: 10.1016/j.psychres.2011.09.007.

Kardefelt-Winther, D. (2014). A conceptual and methodological critique of internet addiction research: Towards a model of compensatory internet use. *Computers in Human Behavior, 31*, 351–354. doi:10.1016/j.chb.2013.10.059

Karim, R. & Nigar, N. (2014). The Internet Addiction Test: Assessing its psychometric properties in Bangladeshi culture. *Asian Journal of Psychiatry, 10*, 75–83. doi: 10.1016/j.ajp.2013.10.011.

Kaya, F., Delen, E. & Young, K. S. (2016). Psychometric properties of the Internet Addiction Test in Turkish. *Journal of Behavioral Addictions, 5*(1),130–134. doi: 10.1556/2006.4.2015.042.

Korkeila, J., Kaarlas, S., Jääskeläinen, M., Vahlberg, T., & Taiminen, T. (2010). Attached to the web – harmful use of the Internet and its correlates. *European Psychiatry, 25*(4), 236–241. doi: 10.1016/j.eurpsy.2009.02.008

Laconi, S., Kaliszewska-Czeremska, K.. Gnisci, A., Sergi, A., Barke, A., Jeromin, F., Groth, J., ...Kuss, D. J. (2018). Cross-cultural study of Problematic Internet Use in nine European countries, *Computers in Human Behavior, 84*, 430-440. doi.org/10.1016/j.chb.2018.03.020.

Laconi, S., Rodgers, R. F., Chabrol, H. (2014). The measurement of Internet addiction: A critical review of existing scales and their psychometric properties. *Computers in Human Behavior, 21*, 190-202. doi: 10.1016/j.chb.2014.09.026

Lai, C. M., Mak, K. K., Watanabe, H., Ang, R. P., Pang, J. S. & Ho, R. C. (2013). Psychometric properties of the Internet addiction test in Chinese adolescents. *Journal of Pediatric Psychology, 38*(7), 794–807. doi: 10.1093/jpepsy/jst022.

Lee, B. W. & Stapinski, S. L. (2012). Seeking safety on the internet: Relationship between social anxiety and problematic internet use. *Journal of Anxiety Disorders, 26*(1), 197-205. doi: 10.1016/j.janxdis.2011.11.001.

Lee, H. W., Choi, J-S., Shin, Y-C., Lee, J-Y., Jung, H. Y. & Kwon, J. S. (2012). Impulsivity in Internet Addiction: A Comparison with Pathological Gambling. *Cyberpsychology, Behavior, and Social Networking, 15*(7), 373 – 377. doi: 10.1089/cyber.2012.0063

Lee, K., Lee H-K., Gyeong H., Yu, B. & Kim, D. (2013). Reliability and validity of the Korean version of the Internet Addiction Test among college students. *Journal of Korean Medical Science, 28*(5), 763–768. doi: 10.3346/jkms.2013.28.5.763.

Lee, Y. S., Han, D. H., Kim, S. M. & Renshaw, P. F. (2015). Substance abuse precedes Internet addiction. *Addictive Behaviors, 38*(4), 2022-2025. doi: 10.1016/j.addbeh.2012.12.024.

Lin, I-H., Ko, C-H., Chang, Y-P., Liu, T-L., Wang, P-W, Lin, H-C., Huang, M-F., ... Yen, C-F. (2014). The association between suicidality and Internet addiction and activities in Taiwanese adolescents. *Comprehensive Psychiatry, 55*(3), 504-510. doi:10.1016/j.comppsych.2013.11.012.

Lopez-Fernandez, O. (2015). Cross-cultural research on Internet addiction: A systematic review. *International Archives of Addiction Research and Medicine, 1*(11). doi: 10.23937/2474-3631/1510011

Mohammadsalehi N, Mohammadbeigi, A., Jadidi, R., Anbari, Z., Ghaderi, E. & Akbari, M. (2015). Psychometric properties of the Persian language version of Yang Internet Addiction Questionnaire: an explanatory factor analysis. *International Journal of High Risk Behaviors and Addiction*, *4*(3), e21560. doi: 10.5812/ijhrba.21560.

Moon, M. S., Hwang, J. S., Kim, J. Y., Shin, A. L., Bae, S. M., & Kim, J. W. (2018). Psychometric properties of the Internet Addiction Test: A systematic review and meta-analysis. *Cyberpsychology, Behavior, and Social Networking, 21*(8). doi: 10.1089/cyber.2018.0154.

Orsala, O., Orsalb, O., Unsalc, A., Ozalp, S. S. (2013). Evaluation of Internet addiction and depression among university students. *Procedia - Social and Behavioral Sciences, 82,* 445-454. doi: 10.1016/j.sbspro.2013.06.291

Panayides, P. & Walker, M. J. (2012). Evaluation of the psychometric properties of the Internet Addiction Test (IAT) in a sample of Cypriot high school students: The Rasch Measurement Perspective. *Europe's Journal of Psychology, 8*(3), 327-351. doi: 10.5964/ejop.v8i3.474

Pedrero-Pérez, E. J., Ruiz-Sánchez de León, J. M., Rojo-Mota, G, Llanero-Luque, M., Pedrero-Aguilar, J. Morales-Alonso, S., Puerta-García, C. (2018), Tecnologías de la Información y la Comunicación (TIC): Uso problemático de Internet, videojuegos, teléfonos móviles, mensajería instantánea y redes sociales mediante el MULTICAGE-TIC. *Adicciones, 30*(1), 19-32. doi: 10.20882/adicciones.806

Pontes, H. M., Patrão, I, M. & Griffiths, M. D. (2014). Portuguese validation of the Internet Addiction Test: An empirical study. *Journal of Behavioral Addictions, 3*(2), 107–114. doi: 10.1556/JBA.3.2014.2.4.

Puerta-Cortés, D. X., Carbonell, X. & Chamarro, A. (2012). Analysis of the psychometric properties of the Spanish version of Internet Addiction Test. *Trastornos Adictivos, 14*(4), 99– 104. doi: 10.1016/S1575-0973(12)70052-1

Samaha, M. & Hawi, N. S. (2016). Relationships among smartphone addiction, stress, academic performance, and satisfaction with life. *Computers in Human Behavior, 57,* 321-325. doi: 10.1016/j.chb.2015.12.045

Sánchez-Carbonell, X., Beranuy, M., Castellana, M., Chamarro, A. (2008). La adicción a Internet y al móvil. ¿Moda o trastorno? *Adicciones, 20*(2), 149-160. doi: 10.20882/adicciones.279

Seabra, L., Loureiro, M., Pereira, H., Monteiro, S., Afonso, R. M. & Esgalhado, G. (2017). Relationship between Internet addiction and self-esteem: Cross-cultural study in Portugal and Brazil. *Interacting with Computers, 29*(5), 767–778. doi:10.1093/iwc/iwx011.

Servidio, R. (2017). Assessing the psychometric properties of the Internet Addiction Test: a study on a sample of Italian university students. *Computers in Human Behavior, 68*, 17–29. doi:

10.1016/j.chb.2016.11.019

Starcevic, V. (2010). Problematic Internet use: a distinct disorder, a manifestation of an underlying

psychopathology, or a troublesome behaviour? World Psychiatry, 9(2): 92–93. doi: 10.1002/j.2051-5545.2010.tb00280.x

Starcevic, V. (2013). Is Internet addiction a useful concept? *Australian & New Zealand Journal of Psychiatry, 47*(1), 16–19. doi:10.1177/0004867412461693

Stevens, J. (2018, December 17). Internet Stats & Facts for 2019. *Hosting Facts*. Retrieved from https://hostingfacts.com/internet-facts-stats/

Sung, M., Shin, Y. M. & Cho, S. M. (2014). Factor structure of the Internet Addiction Scale and its associations with psychiatric symptoms for Korean adolescents. *Community Mental Health Journal, 50,* 612–618. doi: 10.1007/s10597-013-9689-0.

The Netherlands leads Europe in Internet access (2018, February 3). Retrieved from:

https://www.cbs.nl/en-gb/news/2018/05/the-netherlands-leads-europe-in-internet-access

Tsimtsiou, Z., Haidich, A. B., Kokkali, S., Dardavesis, T., Young, K. S. & Arvanitidou, M. (2014). Greek version of the Internet Addiction Test: A validation study. *Psychiatric Quarterly*, *85*(2), 187–

195. doi: 10.1007/s11126-013-9282-2.

Tsitsika, A., Janikian, M., Schoenmakers, T. M., Tzavela, E. C., Ólafsson, K., Wójcik, S., Macarie, G. F., ... Richardson, C. (2014). Internet addictive behavior in adolescence: A cross-sectional study in seven European countries, *Cyberpsychology, Behavior, and Social Networking, 17*(8), 528-535. doi: 10.1089/cyber.2013.0382

Waqas, A., Farooq, F., Raza, M., Javed, S. T., Khan, S., Ghumman, M. E., Naveed, S. & Haddad, M. (2017). Validation of the Internet Addiction Test in students at a Pakistani medical and dental school. *Psychiatric Quarterly, 89*(1), 235–247. doi: 10.1007/s11126-017-9528-5.

Watters, C. A., Keefer, K. V., Kloosterman, P. H., Summerfeldt, L. J. & Parker, J. D. A. (2013). Examining the structure of the Internet Addiction Test in adolescents: a bifactor approach. *Computers in Human Behavior,* 29(6), 2294–2302. doi: 10.1016/j.chb.2013.05.020

Weinstein, A., Yaacov, Y., Manning, M., Danon, P. & Weizman, A. (2015). Internet Addiction and Attention Deficit Hyperactivity Disorder among schoolchildren. The Israel Medical Association Journal, 17(12), 731-734.

Widyanto, L., & Griffiths, M. (2006). "Internet Addiction": A critical review. *International Journal of Mental Health and Addiction, 4*(1), 31–51. doi:10.1007/s11469-006-9009-9

Widyanto, L., Griffiths, M. D. & Brunsden, V. A. (2011). Psychometric comparison of the Internet Addiction Test, the Internet-related problem scale, and self-diagnosis. *Cyberpsychology, Behavior, and Social Networking, 14*(3), 141–149. doi: 10.1089/cyber.2010.0151

Yao, M. Z. & Zhong, Z. (2014). Loneliness, social contacts and Internet addiction: A cross-lagged panel study. *Computers in Human Behavior, 30, 164-170.* doi: 10.1016/j.chb.2013.08.007

Younes,F., Halawi , G., Jabbour, H., El Osta, N., Karam, L., Hajj, A., Khabbaz, L. R. (2016). Internet addiction and relationships with insomnia, anxiety, depression, stress and self-esteem in university students: A Cross-Sectional Designed Study. *PLoS ONE, 11*(9), e0161126. doi:10.1371/journal.pone.0161126

Young, K. (1998). *Caught in the net*. New York: John Wiley

7. Findings

Study 1 – Smartphone Addiction Study

After analyzing the state of research on Smartphone Addiction through the perspective of addiction definitions and criteria, we determined that the weakness of screening and correlational studies, the scarcity of case, experimental and longitudinal studies, the vague definitions of the criteria for smartphone addiction, the lack of standardization in measures and methods for diagnosis, and the lack of severe psychological or physical consequences associated with it do not support the existence of smartphone addiction at this time.

Although certain parallels exist between classically defined addiction and high use of the smartphone, the levels of severity for smartphone use are much lower, an important fact since severity of impairment is one of the primary criteria for distinguishing between addiction and problematic behavior. Although it's understandable when the media and people use the term "addiction" to describe the strong attachment to smartphones as they do not need to abide by rigid rules of terminology, it is important that in scientific research we are careful not to diagnose maladaptive or problematic behavior or the side effects of a different primary disorder as an addiction in order to avoid generating false epidemics of misidentified pseudopatients (Frances & Widiger, 2012) and pathologizing common behaviors (Kardefelt-Winther et al., 2017).

That being said, research does show that smartphone use is associated with various problems. In correlational studies, overuse of the smartphone is associated with various mental health concerns, such as anxiety, depression, stress, and low self-esteem (for a review, see Elhai et al., 2016; Panova & Lleras, 2016) among others. We therefore recommend continued research on how smartphones and psychology interact in order to understand the nature of these relationships, but to move away from the addiction framework.

Study 2 – SNS Addiction Study

After analyzing the state of research on SNS Addiction through the perspective of addiction definitions and criteria, we determined that there is insufficient support for the existence of an SNS addiction at this time. SNSs are primarily used for socializing,

communicating and maintaining social contacts, which are natural human needs. Often, SNS use is seen as excessive in adolescence because adolescents are in a developmental state during which social contacts and networks are particularly important and they therefore tend to sacrifice other important aspects of life such as responsibilities and academics in favor of spending more time in contact with their friends and peers (Griffiths, 2013). This kind of prioritization and high engagement with social contacts among adolescents existed long before SNSs and is a natural characteristic of the age group.

Many disorders such as depression, low self-esteem, personality disorders, anxiety, etc. can find an outlet on technological platforms such as SNSs. This does not imply that those platforms themselves are inherently addictive or problematic (Starcevic, 2012) but that they provide a modern forum for the expression of certain behaviors which can usually be attributed to other, often pre-existing, psychological problems (Rosen et al., 2013). This means that the specific ways one uses SNSs can be an indicator for the user's psychological or interpersonal state and can therefore contribute to a deeper understanding of the primary disorder.

Study 3 – Smartphone uses study

Specific smartphone uses had different effects on mental health for young people depending on their country which suggests that different values, interests and sociocultural contexts can determine how a particular technology-related behavior affects the individuals who take part in it. In some communities, one behavior may indicate a problem whereas in other communities, it may be adaptive. Additionally, it is not enough to simply measure something like 'game play' or 'Internet browsing' or 'SNS use' as a general category; it is important to understand what kind of game play – e.g. social or solitary – and what kind of browsing – e.g. reading the news or looking through funny websites - etc. is being engaged with in order to understand the effects of the behavior and its influences on mental health.

Although there were differences between cultures regarding specific smartphone uses and their effects on mental health, in all of the countries problematic mobile phone use (CERM) showed the same relationship with mental health – it had a very significant contributing effect to anxiety in all countries and no influence on depression in any of them. We may therefore say that, while specific smartphone uses and their consequences on the user might vary in part

depending on cultural context, problematic mobile phone use appears to be associated with higher anxiety regardless of culture.

Study 4 – Internet Addiction Study

The findings of this study suggest that there are two primary underlying components of problematic Internet use as measured by the IAT – time management/impulse control problems and the presence of unsatisfied emotional needs and a dependence on the Internet for positive affect. It would appear that the comorbidity of these two components manifests as "addictive" Internet use. With this in mind, it may be beneficial from a diagnostic and treatment perspective to focus on these two cognitive-emotional components more so than on "Internet Addiction" as a single construct, which continues to be a somewhat vague concept with various interpretations (Griffiths, 2018). It may be more beneficial to those suffering from problematic Internet use if research in the field explores the motivations behind the problematic Internet behaviors and what compensatory role the Internet plays for problematic users, often to such a degree that the dependence to it leads to serious problems and the prioritization of it over other aspects of daily life (Kardefelt-Winther, 2014a).

8. General Discussion

The aim of this thesis project was to gain a deeper understanding of how ICT use can become problematic for people's wellbeing by investigating and critically analyzing the state of ICT psychology research at the current moment and by carrying out a set of studies to take a deeper look at how exactly people in different cultural contexts are using their ICTs.

After critically analyzing the research on ICT "addictions" through the lens of addiction criteria, we determined that there is not sufficient support for smartphone and SNS addiction at this time and that Internet addiction may also benefit from being discussed and researched through a different framework. The reasons for this conclusion are the following.

Firstly, smartphones, the Internet and SNSs are not uniform entities that are used in the same way and exert the same effects on their users in the way that drugs do. They are analogous not to pills and shots, but to doorways and stages – entryways to a variety of different behaviors and platforms for the expression of a variety of different motivations, interests, desires and needs (Kardefelt-Winther, 2014a). Upon critical reflection, saying that the Internet or the smartphone is addictive does not make much sense because the question that naturally follows is "which part is addictive?" Is it the email checking, the Facebook using, the self-taking, the online banking, the über ordering, the note writing, the alarm setting, the GPS navigating, the text messaging, the package buying, the news reading, the game playing, the video watching, or something else? Which of these or countless other possible online behaviors is the culprit that gets people "addicted" and leads to negative consequences for wellbeing? The answer is still unclear because at this moment few studies are asking this question. Studies in this field are more often focused on measuring the prevalence rates of ICT "addiction" in a particular participant sample and finding the associated comorbid disorders or personality features of the "addicts".

Every person uses ICTs in a different way in order to fulfill a set of needs and desires and to satisfy a set of motivations that is unique to them. Those needs, desires and motivations are in turn shaped by people's social and personal lives, their psychological profiles, their experiences, their values, their interests and their cultural influences. Therefore, the effects of their ICT use also manifests in unique ways which can only be truly understood by considering all of those factors in context. Studying and addressing the problems associated with ICT use as an addiction is, in a sense, an over-simplification (Smock et al., 2011) because addiction becomes

an umbrella term that disguises all the possible variations and pathways of use and misuse. ICTs are the world's modern tools for communication, information gathering, identity crafting, entertainment seeking, creativity expression, professional development and more. Therefore, the way we think about and research their use and the consequences received from that use should match the level of complex analysis that other tools for the aforementioned purposes have received in the past.

Secondly, in order for a behavior to be considered an addiction, it must fulfill a certain set of criteria, the foremost of which is the experience of severe negative effects due to the behavior. Yes, high levels of ICT use has been associated with lower academic performance (Chen & Peng, 2008; Hawi & Samaha, 2016), interpersonal conflict (Chen et al., 2016), sleep problems (Demirci et al., 2015; Thomée et al., 2011), and various other issues. However, these problems are usually at a much lower level of severity than the kind associated with serious psychopathology, and if the harm caused by a behavior is not significantly severe, the disorder is better classified as problematic or maladaptive use or else considered as a side effect/manifestation of a separate primary disorder (Davis, 2001). Furthermore, we are still not clear as to whether ICTs cause the aforementioned problems in the first place. Most of the associations between ICTs and negative consequences such as anxiety (Murdock, 2013; Panova & Lleras, 2016; Pierce, 2009), depression (Augner & Hacker, 2012; Panova & Lleras, 2016; Sanchez-Martinez & Otero, 2009) and others have been correlational, meaning that their causation is still under question. It may be that people already experiencing psychological issues use ICTs in a more problematic way or that certain types of ICT use exacerbate predispositions for certain psychological problems. It is also likely that the pre-existence of a certain psychological problem leads to problematic use which then exacerbates the problem, leading to a kind of unhealthy cyclical relationship (Panova &Lleras, 2016). In other cases, people with psychological problems may use ICTs in a way that seems excessive or "addictive" but that helps alleviate their problems to some degree and is therefore beneficial. The causation of problematic ICT use and psychological problems is therefore still unclear and does not yet permit us to make conclusions in this regard. Often times, problematic ICT use is a side effect of a primary disorder and the problems associated with the ICT use are better explained by that primary disorder (Davis, 2001; Griffiths et al., 2016).

In order to distinguish between serious psychopathology such as addiction and other kinds of problematic use, it may also be necessary to revise the terminology that is used on this subject. At this time, "addiction" is used because it is a common word that seems most analogous to the negative effects observed from certain types of intense ICT use. However, just because two concepts or behaviors are similar in some ways does not mean that they are the same. The media and the general public can use whatever words or metaphors they feel best fit their experience because they are not held to a high standard of technical and scientific accuracy, however researchers need to be careful to utilize correct terminology so that we do not accidentally manufacture a more severe problem than truly exists, lead to public panic that is unwarranted, and invest energy, time, money and resources in an incorrectly conceptualized issue. Addiction is a serious disorder and we should use caution when labeling behaviors as addictive, especially ones that we engage in to fulfill basic human needs such as communication. Instead, it may be better to use terms such as problematic, maladaptive or excessive ICT use to describe the manner of ICT use that current research finds to be correlated with negative effects, instead of "addictive ICT use."

Although the research of this thesis work argues that there is insufficient support for ICT addictions at this time, there is sufficient support that the use of ICTs is leading to/exacerbating certain unhealthy patterns of thinking and behavior that need to be further researched, addressed and prevented when possible. One of the most significant ICT-related problems is the utilization of ICTs as tools for escapism/avoidance coping when faced with stressors or a lack of external stimulation (Grellhesl & Punyanunt-Carter, 2012; Kardefelt-Winther, 2014c; Kuss & Lopez-Fernandez, 2016; Panova & Lleras, 2016). Reaching for the ICT to avoid a stressful/uncomfortable situation or negative emotion, which for many has become a reflex, can rob people of opportunities to internally handle stressors using their own devices, work through them cognitively and emotionally and develop healthy coping mechanisms, through practice, for future stress management. It can also lead to missed opportunities for social connection since, in times of stress, bonding with others over the shared experience of stress and working together on resolving or alleviating it often leads to satisfying emotional and social experiences and higher resilience to stress (Hikichi, 2016). However, when people turn to their devices instead of each other, these valuable opportunities for social connection and community building are missed.

Similarly, reaching for the ICT to fend off boredom, often before it even sets in, can strip people of opportunities to develop boredom-alleviating strategies such as creativity and imagination (Bench & Lench, 2013; Zomorodi, 2015) and engage in social interactions. It also leads people to lose valuable moments of cognitive "downtime", ie moments when the brain is not actively engaged with something, which are necessary for the processing of one's thoughts and emotions and for the development of socioemotional skills (Immordino-Zang et al., 2012). In a sense, by engaging in such patterns of escapist ICT behavior, we are limiting our exposure to opportunities for cognitive, emotional and social growth which can be significantly detrimental to our personal and societal development. Further research is needed to better understand how this may come about and its long-term consequences.

Regarding SNSs, the biggest problem at this time appears to be the social comparison that many people engage in which leads to lower life satisfaction, lower self-esteem and depression (Appel et al., 2016; Vogel et al., 2014). Since people post primarily the highlights of their lives on SNSs and also often exaggerate those moments to seem even more appealing, SNS users that see these posts receive an unrealistic perception of how interesting their peers' lives are and a consequent dissatisfaction with their own lives which they see in full (all the tedious and difficult moments included). This can cause a sense of anxiety that one does not measure up to one's peers, a fear of missing out on a better reality and even depression. Social comparison can also negatively affect self image. Many people, especially young women, experience lower body satisfaction and unhappiness when comparing themselves to photos that their peers post to SNSs which are often carefully crafted to appear much better than reality (Kleemans & Dalmaans, 2016) leading to various unhealthy outcomes.

Other ICT-related problems that merit further attention and research include the stress of constant availability, ie feeling like one needs to respond to outreach from various channels in a timely manner (Thomée et al., 2010), the stress exacerbated by text-communication in situations such as interpersonal stress for which texting is an unsuitable mode of communication (Murdock, 2013), interpersonal conflicts caused by "phubbing" people (ignoring them in order to focus on the phone) (Roberts & David, 2016), and the development of a cognitive dependence on constant, varied content (such as videos, photos, games, online humor, etc.) in order to keep oneself stimulated while simultaneously losing the ability for deeper and more complex processing (Carr, 2010).

In summary, although certain behaviors on ICTs appear analogous to addiction, there does not appear to be sufficient research at this time to support the existence of addiction to ICTs, especially because ICT-related problems are not currently at the level of severity that would qualify them as consequences of addiction and because there are still problems regarding its conceptualization and measurement. However, even though problematic ICT use may not be accurately termed as addictive use at this time, various problems have been associated with smartphone, Internet and SNS use that should be further researched. Therefore, the suggestion of this thesis work is to move away from an addiction framework when studying problematic ICT use as it often detracts our attention from a deeper, more detailed understanding about the mechanisms that lead to ICT-related problems and how to address them (Smock et al., 2011). Instead, I recommend focusing on the interplay of motivations, specific uses and gratifications, the psychological profile of the user and their sociocultural context in order to understand how problematic use of ICTs can arise and how to effectively handle it.

With the aim of taking a closer look at specific ICT behaviors and how they are related to psychopathology across cultures, the research in this thesis work led to a couple of valuable findings. The first finding is that some aspects of ICT use differ in important ways around the world and the second finding is that other aspects of ICT use are more or less constant in many countries.

When we analyzed the smartphone uses of participants in Spain, USA and Colombia, we found that a use that was problematic in one country could be adaptive in another country or might have no significant contribution to wellbeing in that country at all. This indicated to us that the sociocultural context of the user is important to consider when determining which ICT behaviors are problematic and which are not. If this context is not aptly discussed, taken into account and incorporated into study design and analysis of findings, it may lead to incorrect reasoning and conclusions and mistaken overgeneralizations. For example, a paper written in a certain geographical region such as Sweden may design an ICT intervention based on findings from a different geographical region such as China that do not apply to the population of the Swedish study, thereby leading to incorrect findings and ineffective solutions.

At this time very few studies discuss culture's impact on ICT use (Lopez-Fernandez, 2015), even though the use of the Internet, smartphones and SNSs is different depending on values, interests, and motivations which in turn are influenced by the society and culture that one

lives in. This omission of important contextual information leads to the obfuscation of complex threads of values, motivations and objectives that interplay to influence the manner of ICT use and the way in which it can sometimes become problematic. The development of a problem of wellbeing is influenced not only by the self but also by the society in which an individual functions and by their network of contacts. To separate the problem from its context is therefore to understand it incompletely. We must take a more holistic perspective in ICT use research in order to gain true insight on how ICTs can benefit as well as harm.

On the other hand, certain ICT behaviors/consequences of use seem to be true across different countries. In our study on smartphone uses we found that the top three uses on the smartphone were the same in all three countries: messaging, using SNSs, and browsing the Internet. We also found that in all three countries, problematic use of the smartphone (as measured by the CERM questionnaire) was significantly associated with anxiety. This led us to conclude that although the impact of specific behaviors on wellbeing appears to vary across cultures, problematic use of smartphones in general has a consistent relationship with anxiety. In our Internet Addiction study we also found similarities across cultures. Mainly, we found that the underlying factorial construct of "Internet Addiction" was similar in very different cultures. The two main factors in each of the studies we looked at were related to 1. Time management/impulse control problems and 2. Using the Internet to satisfy emotional needs and the dependence on the Internet for positive affect. From this finding we concluded that perhaps instead of thinking about Internet use problems under the umbrella term of addiction, which, as already mentioned, can conceal important details about the way the problematic behavior manifests, it may be better from a diagnostic and treatment perspective to focus on the interplay of these two underlying psychological constructs and how they can lead to problematic Internet use.

The studies within this compendium were not without limitations. The studies "*Is smartphone addiction really an addiction?"* and *"A critical consideration of social networking sites' addiction potential"* had very similar structures and therefore very similar limitations, which were the following. Firstly, both studies were critical reviews of the literature, meaning that they analyzed existing studies and did not contribute any new research, therefore the information included was limited to the scope of existing research and its respective limitations and weaknesses. Secondly, our papers did not have as a specific aim to critically analyze the

methodologies of the individual papers discussed, so there may be inaccuracies in those component papers or their claims of which we are not aware.

The study *"Internet Addiction Test research through a cross-cultural perspective: Spain, USA and Colombia"* had three main limitations. Firstly, the IAT is a self-report measure which means results may not be fully accurate as respondents often have a mistaken perception of their own Internet behaviors. Secondly, in all samples the participants were university students, which means caution should be taken when generalizing results to a more diverse population. Thirdly, regarding the comparative analysis of Moon et al.'s IAT meta- analysis (2018), their paper did not aim to analyze the statistical procedures associated with each study included, therefore some of the differences found between or within countries could be attributed to different statistical procedures used, not culture.

In the study *"Internet Addiction Test research through a cross-cultural perspective: Spain, USA and Colombia"* five limitations were identified. Firstly, this was a cross-sectional survey; thus, causal relationships between the variables should be interpreted with caution. Secondly, this study used self-report methods for data collection, however participants' own perceptions of their technology use may not be fully accurate. Thirdly, we aimed to view smartphone use through a multi-cultural perspective and therefore focused on three distinct cultural regions, however this geographical scope is limited and may not have captured some of the most relevant culturally-dependent smartphone usage differences. Fourthly, we did not account for cultural variation within each sample. That being said, our cultural analysis was developed to account for homogenous vs heterogeneous communities and this distinction played an important role in the formulated theories. Nevertheless, future research in this field should account for within-sample cultural variation. Lastly, the differences we found in our results may be owed to factors apart from culture that were not measured.

9. General Conclusions and Future Directions

To summarize, there are four basic conclusions to take away from this thesis work. Firstly, after a critical analysis of existing research, the addiction framework appears to not be the most appropriate one to use when addressing and researching the problems associated with ICT use. "Addiction", when applied to ICT problems, is a term that masks the complex interplay of motivations, specific uses, gratifications and context that influence the manner and consequences of ICT use which varies significantly from person to person. ICTs have become an important part of our daily functioning and the way our world works, therefore even when they are used for what seems an excessive amount of time, this may not be indicative of a problem if they are utilized to conduct certain behaviors that the user would otherwise do using other means (ex. Sending emails, contacting friends and family members, reading the news, listening to music, etc.), if the use of the ICT is accepted, appropriate and effective in that user's context and if the use does not cause severe negative consequences. That being said, ICT use can cause or be associated with various problems when used in certain ways such as for avoidance coping, social isolation, texting while stressed, social comparison, and engaging in risky or unhealthy online behaviors, therefore the negative consequences of ICT use should continue to be explored.

Secondly, whether ICT use is problematic for a user or not depends on a variety of factors - their motivations and values, their psychological profile and disorders, the specific behaviors they engage in on the ICT, the gratifications received from those behaviors, the cost-benefit balance of the ICT use in the short and long term (what is gained vs what is lost when engaging with the ICT) and the user's sociocultural context. The Internet, smartphone and SNS are not homogenous entities that have the same negative effects on users like a drug, they are entryways to a variety of different activities that each user interacts with in a unique way. Some specific behaviors on ICTs have been found to be associated with negative consequences whereas other behaviors have not, therefore it is not correct to pathologize the ICT in its entirety, especially considering that ICTs provide us with many benefits and their use is generally adaptive and even necessary in modern society.

Thirdly, specific ICT uses and their consequences vary depending on the culture of the participants. In some cultural contexts a certain behavior is adaptive whereas in other contexts it

can contribute to problems or might have no significant impact on wellbeing at all. The effects of particular uses are influenced by the values, social dynamics, and encouraged/discouraged behaviors within the environment that the user lives in. Therefore, we must consider and describe the sociocultural context of the participants when designing research in this field and discussing their results. Not doing so can lead to incorrect conclusions and ineffective solutions.

Fourthly, although the consequences associated with specific ICT uses and behaviors are different around the world, the problematic use of and over-attachment to ICTs in general can have similar psychological outcomes independently of culture, although further cross-cultural research is needed to determine to what extent this is true. In our studies, problematic smartphone use was associated with anxiety and problematic Internet use had a very similar underlying factorial structure in all studied countries.

With these conclusions in mind, I recommend the following directions for future research. First, it would benefit the research in this field to move away from an addiction framework and towards the study of specific ICT uses/behaviors. Even though research does not reliably support the existence of ICT addictions at this time, there are still various problems that have been associated with ICT use which should be investigated. In order to do so, a richer approach than the addiction framework would be to analyze the motivations of people who use ICTs in problematic ways and the gratifications those ICTs provide them with, to take a closer look at the specific behaviors people engage in on their ICTs and which of those behaviors have the potential to be problematic and why, to explore how different sociocultural contexts influence ICT use and consequences thereof, and to identify what kind of psychological profiles are more prone to developing problematic ICT use and what compensatory function those ICTs serve for them which reinforce that use.

Another recommendation for the future of ICT research is more longitudinal studies. At this time, there is hardly any research that shows how ICTs influence users over time and how ICT use changes. Indeed, one of the criteria of addiction is also its persistence over time (Billieux, 2015). Much of the problems associated with ICTs might only manifest over a period of continued use, meaning that there is much we still do not know about their potentially negative effects. Therefore, longitudinal research is necessary to truly understand the potential risks of ICT use.

A third suggestion for future research would be the development of more experiments in this field. Most of the research in this field has a correlational design, however, this does not inform us about how ICT use can lead to certain behaviors, emotions or thoughts. Very few experiments with controlled variables exist in the literature, however they contribute valuable information about the nature of the problem and how it develops. Therefore, more experimental research needs to be conducted to investigate the causation of problems that have so far only been associated with ICT use.

Finally, the use of ICTs may be changing the way we think and react to various situations, therefore we need to research the effects of ICT use on our cognitive processes and even our neurological structures, especially during development and over the course of time.

10. References

Aboujaoude, E., Koran, L. M., Gamel, N., Large, M. D., & Serpe, R. T. (2006). Potential markers for problematic Internet use: A telephone survey of 2,513 adults. *CNS Spectrums, 11*(10), 750–755. doi: 10.1017/S1092852900014875

Ahmad, M., Alzayyat, A., & Al-Gamal, E. (2015). The factor structure of the Internet Addiction Tool with university students in Jordan. *Issues in Mental Health Nursing, 36*(9), 725–731. doi: 10.3109/01612840.2015.1033041.

Aljomaa, S. S., Mohammad, M. F., Albursan, I. S., Bakhiet, S. F., & Abduljabbar, A. S. (2016). Smartphone addiction among university students in the light of some variables. *Computers in Human Behavior, 61*, 155–164. doi:10.1016/j.chb.2016.03.041

American Psychiatric Association. (1994). *Diagnostic and Statistical Manual of Mental Disorders (4th ed.).* Washington, DC: Bell, C. C.

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)*. Arlington, VA: American Psychiatric Association.

Andreassen, C. S., Billieux, J., Griffiths, M. D., Kuss, D. J., Demetrovics, Z., Mazzoni, E., & Pallesen, S. (2016). The relationship between addictive use of social media and video games and symptoms of psychiatric disorders: A large-scale cross-sectional study. *Psychology of Addictive Behaviors, 30*(2), 252-262. doi:10.1037/adb0000160

Andreassen, C. S., Griffiths, M. D., Gjertsen, S. R., Krossbakken, E., Kvam, S., & Pallesen, S. (2013). The relationships between behavioral addictions and the five-factor model of personality. *Journal of Behavioral Addictions, 2*(2), 90–99. doi:10.1556/JBA.2.2013.003

Andreassen, C. S., Torsheim, T., Brunborg, G. S., & Pallesen, S. (2012). Development of a Facebook Addiction Scale. *Psychological Reports, 110*(2), 501–517. doi:10.2466/02.09.18.PR0.110.2.501-517

Appel, H., Gerlach, A. L., & Crusius, J. (2016). The interplay between Facebook use, social comparison, envy, and depression. *Current Opinion in Psychology, 9*, 44–49. doi:10.1016/j.copsyc.2015.10.006

Arpaci, I., Cetin, Y., & Turetken, O. (2015). A cross-cultural analysis of smartphone adoption by Canadian and Turkish organizations. *Journal of Global Information Technology Management, 18*(3), 214-238. doi: 10.1080/1097198X.2015.1080052

Atroszko, P. A., Andreassen, C. S., Griffiths, M. D., & Pallesen, S. (2015). Study addiction – A new area of psychological study: Conceptualization, assessment, and preliminary empirical findings. *Journal of Behavioral Addictions*, *4*(2), 75–84. http://doi.org/10.1556/2006.4.2015.007

Augner C., & Hacker G. W. (2012). Associations between problematic mobile phone use and

psychological parameters in young adults. *International Journal of Public Health*, *57*(2), 437–441. doi:10.1007/s00038-011-0234-z

Bahrainian, S. A., Alizadeh, K. H., Raeisoon, M., Hashemi Gorji, O., & Khazaee, A. (2014). Relationship of Internet addiction with self-esteem and depression in university students. *Journal of Preventive Medicine and Hygiene, 55*(3), 86-89.

Balta, S., Kircaburun, K. & Griffiths, M.D. (2018). Neuroticism, trait-fear of missing out, and phubbing: The mediating role of state-fear of missing out and problematic Instagram use. *International Journal of Mental Health and Addiction,* in press. doi: 10.1007/s11469-018-9959-8

Baker, Z. G., Krieger, H., & LeRoy, A. S. (2016). Fear of missing out: Relationships with depression, mindfulness, and physical symptoms. *Translational Issues in Psychological Science, 2*(3), 275–282. doi:10.1037/tps0000075

Balakrishnan, J., & Griffiths, M. D. (2018). Perceived addictiveness of smartphone games: A content analysis of game reviews by players. *International Journal of Mental Health and Addiction*. http://doi.org/10.1007/s11469-018-9897-5

Barke, A., Nyenhuis, N. & Kroner-Herwig, B. (2012). The German version of the Internet Addiction Test: A validation study. *Cyberpsychology, Behavior and Social Networking*, *15*(10), 534–542. doi: 10.1089/cyber.2011.0616

Bentler, P. M. (2006). *EQS 6 structural equations program manual*. Encino: Multivariate Software

Beranuy, M., Oberst, U., Carbonell, X., & Chamarro, A. (2009). Problematic internet and mobile phone use and clinical symptoms in college students: the role of emotional intelligence. *Computers in Human Behavior*, *25*, 1182-1187. doi: 10.1016/j.chb.2009.03.001

Bernal, C., & Angulo, F. (2013). Interacciones de los jóvenes andaluces en las redes sociales. *Comunicar*, *20*, 25–30. doi:http://dx.doi.org/10.3916/C40-2013-02-02

Bian, M., & Leung, L. (2015). Linking loneliness, shyness, smartphone addiction symptoms, and patterns of smartphone use to social capital. *Social Science Computer Review*, *33*(1), 61–79. doi:10.1177/0894439314528779

Bianchi, A., & Phillips, J. G. (2005). Psychological predictors of problem mobile phone use. *CyberPsychology & Behavior*, *8*(1), 39–51. doi:10.1089/cpb.2005.8.39

Billieux, J., Maurage, P., Lopez-Fernandez, O., Kuss, D. J., & Griffiths, M. D. (2015). Can disordered mobile phone use be considered a behavioral addiction? An update on current evidence and a comprehensive model for future research. *Current Addiction Reports*, *2*, 156–162. http://doi.org/10.1007/s40429-015-0054-y

Billieux, J., Philippot, P., Schmid, C., Maurage, P., De Mol, J., & Van der Linden, M. (2014). Is

Dysfunctional Use of the Mobile Phone a Behavioural Addiction? Confronting Symptom-Based Versus Process-Based Approaches. *Clinical Psychology and Psychotherapy*. http://doi.org/10.1002/cpp.1910

Billieux, J., Schimmenti, A., Khazaal, Y., Maurage, P., & Heeren, A. (2015). Are we overpathologizing everyday life? A tenable blueprint for behavioral addiction research. *Journal of Behavioral Addictions*, *4*(3), 119–123. http://doi.org/10.1556/2006.4.2015.009

Billieux, J., Van der Linden, M., Khazaal, Y., Zullino, D., & Clark, L. (2012). Trait gambling cognitions predict near-miss experiences and persistence in laboratory slot machine gambling. *British Journal of Psychology*, *103*(3), 412–427. doi:10.1111/j.2044-8295.2011.02083.x

Billieux, J., Van der Linden, M., & Rochat, L. (2008). The role of impulsivity in actual and problematic use of the mobile phone. *Applied Cognitive Psychology*, *22*, 1195–1210. http://doi.org/10.1002/acp.1429

Blalock, J. A., & Joiner, T. E., Jr. (2000). Interaction of cognitive avoidance coping and stress in predicting depression/anxiety. *Cognitive Therapy and Research*, *24*(1), 47-65. doi: 10.1023/A:1005450908245

Bostrom, R. N., & Harrington, N. G. (1999). An exploratory investigation of characteristics of compulsive talkers. *Communication Education*, *48*, 73–80. doi:10.1080/03634529909379154

Boyd, D. M. (2014). *It's complicated: The social lives of networked teens*. New Haven: Yale University Press.

Boyd, D. M., & Ellison, N. B. (2007). Social network sites: Definition, history, and scholarship. *Journal of Computer-Mediated Communication*, *13*(1), 210–230. doi:10.1111/j.1083 6101.2007.00393.x

Boysan, M., Kuss, D. J., Barut, Y., Ayköse, N., Güleçe, M. & Özdemir, O. (2017). Psychometric properties of the Turkish version of the Internet Addiction Test (IAT). *Addictive Behaviors*, *64*, 247–252. doi: 10.1016/j.addbeh.2015.09.002

Bozoglan, B., Demirer, V., & Sahin, I. (2013). Loneliness, self-esteem, and life satisfaction as predictors of Internet addiction: A cross-sectional study among Turkish university students. *Scandinavian Journal of Psychology*, *54*, 313-319. doi: 10.1111/sjop.12049

Brand, M., Laier, C., & Young, K. S. (2014). Internet addiction: coping styles, expectancies, and treatment implications. *Frontiers in Psychology*, *5*(November), 1–14. doi:10.3389/fpsyg.2014.01256

Brand, M., Young, K. S., & Laier, C. (2014). Prefrontal control and internet addiction: a theoretical model and review of neuropsychological and neuroimaging findings. *Frontiers in Human Neuroscience*, *8*(375), 1–13. doi:10.3389/fnhum.2014.00375

Bromet, E., Andrade, L. H., Hwang, I., Sampson, N. A., Alonso, J., De Girolamo, G., … Kessler, R. C. (2011). Cross-national epidemiology of DSM-IV major depressive episode. *BMC Medicine, 9,* (90). doi: 10.1186/1741-7015-9-90

Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York: Guilford

Brown, Z. & Tiggemann, M. (2016). Attractive celebrity and peer images on Instagram: Effect on women's mood and body image. *Body Image, 19,* 37-43, doi: 10.1016/j.bodyim.2016.08.007

Burleigh, T.L., Stavropoulos, V., Liew, L.W.L. Adams, B.L.M, & Griffiths, M.D. (2018). Depression, Internet Gaming Disorder, and the moderating effect of the gamer-avatar relationship: An exploratory longitudinal study. *International Journal of Mental Health and Addiction,* 16, 102-124. doi: 10.1007/s11469-017-9806-3

Calvo, F., Carbonell, X., Turro, O., & Giralt, C. (2018). Connected in the street: the relation between online social networks, self-esteem and satisfaction with life among individuals experiencing homelessness. *Aloma, 36*(1), 21-28.

Caplan, S. E. (2003). Preference for online social interaction: A theory of problematic Internet use and psychosocial well-being. *Comumunication Research, 30*(6), 625–648. doi: 10.1177/0093650203257842

Carbonell, X., Chamarro, A., Griffiths, M., Oberst, U., Cladellas, R., & Talarn, A. (2012). Problematic internet and cell phone use in Spanish teenagers and young students. *Anales de Psicología*, 28(3), 789-796. doi: 10.6018/analesps.28.3.156061

Carbonell, X., Chamarro, A., Oberst, U., Rodrigo, B., Prades, M. (2018). Problematic use of the Internet and smartphones in university students: 2006-2017. *International Journal of Environmental Research and Public Health, 15*(3), 1-13. doi:10.3390/ijerph15030475

Carbonell, X., Guardiola, E., Fuster, H., Gil, F., & Panova, T. (2016). Trends in scientific literature on addiction to the internet, video games, and cell phones from 2006 to 2010. *International Journal of Preventive Medicine, 7*(1), 63. http://doi.org/10.4103/2008-7802.179511

Carbonell, X., & Panova, T. (2017). A critical consideration of social networking sites' addiction potential. *Addiction Research & Theory, 25*(1), 48–57. http://doi.org/10.1080/16066359.2016.1197915

Carpenter, C. (2012). Narcissism on Facebook: self-promotional and anti-social behavior. *Personality and Individual Differences, 52*(4), 482-486. doi: 10.1016/j.paid.2011.11.011

Carr, N. G. (2010). *The shallows: what the Internet is doing to our brains*. New York: W.W. Norton.

Charlton, J. P., & Danforth, I. D. W. (2007). Distinguishing addiction and high engagement in the context of online game playing. *Computers in Human Behavior, 23,* 1531–1548. doi:10.1016/j.chb.2005.07.002

Cheever, N., Rosen, L., Carrier, L. M., & Chavez, A. (2014). Out of sight is not out of mind: The impact of restricting wireless mobile device use on anxiety levels among low, moderate and high users. *Computers in Human Behavior, 37*, 290–297. doi: 10.1016/j.chb.2014.05.002

Chen, Y-L. & Gau, S. S-F. (2016). Sleep problems and Internet addiction among children and adolescents: A longitudinal study. *Journal of Sleep Research, 25*(4), 458-465. doi: 10.1111/jsr.12388.

Cheng, C., & Li, A. Y. (2014). Internet addiction prevalence and quality of (real) life: A Meta-Analysis of 31 nations across seven world regions. *Cyberpsychology, Behavior, and Social Networking, 17*(12), 755–760. doi:10.1089/cyber.2014.0317

Chiu, S.-I. (2014). The relationship between life stress and smartphone addiction on Taiwanese university student: A mediation model of learning self-efficacy and social self-efficacy. *Computers in Human Behavior, 34*, 49–57. http://doi.org/10.1016/j.chb.2014.01.024

Chóliz, M. (2010). Mobile phone addiction: A point of issue. *Addiction, 105*(2), 373–374. http://doi.org/10.1111/j.1360-0443.2009.02854.x

Clark, R. E., & Sugrue, B. M. (1988). Research on instructional media, 1878–1988. In D. Ely, B. Broadbent, & R. K. Wood (Eds.), *Educational media and technology yearbook, Vol. 14* (pp. 19–36). Englewood CO: Libraries Unlimited.

Conti, M. A., Jardim, A.P., Hearst, N., Táki, A. C., Tavares, H. & Nabuco de Abreu, C. (2012). Evaluation of semantic equivalence and internal consistency of a Portuguese version of the Internet Addiction Test (IAT). *Revista de Psiquiatria Clinica, 39*(3), 106–110. doi: 10.1590/S0101-60832012000300007

Darcin, A. E., Kose, S., Noyan, C. O., Nurmedov, S., Yılmaz, O., & Dilbaz, N. (2016). Smartphone addiction and its relationship with social anxiety and loneliness. *Behaviour and Information Technology, 35*(7), 520–525. doi:10.1080/0144929X.2016. 1158319

Dare, P. A. S., & Derigne, L. (2010). Denial in alcohol and other drug use disorders: A critique of theory. *Addiction Research & Theory, 18*(2), 181-193. doi:10.3109/16066350902770441.

Davis, R. A. (2001). A cognitive–behavioral model of pathological Internet use. *Computers in Human Behavior, 17*(2), 187–195. doi:10.1016/S0747-5632(00)00041-8

De-Sola Gutiérrez, J., Rodríguez de Fonseca, F., & Rubio, G. (2016). Cell-phone addiction: A review. *Frontiers in Psychiatry,7*. doi:10.3389/fpsyt.2016.00175

Demirci, K., Akgönül, M., & Akpinar, A. (2015). Relationship of smartphone use severity with sleep quality, depression, and anxiety in university students. *Journal of Behavioral Addictions, 4*(2), 85–92. doi:10.1556/2006.4.2015.010

Dhir, A., Che, S. & Nieminen, M. (2015). Psychometric validation of Internet Addiction Test with Indian adolescents. *Journal of Educational Computing Research, 53*(2), 15–31. doi: 10.1177/0735633115597491

Dufour, M., Brunelle, N., Tremblay, J., Leclerc, D., Cousineau, M., Khazaal, Y., … Berbiche, D. (2016). Gender difference in internet use and internet problems among quebec high school students. *The Canadian Journal of Psychiatry, 61*(10), 663-668. doi: 10.1177/0706743716640755

Durkee, T., Kaess, M., Carli, V., Parzer, P., Wasserman, C., Floderus, B., ... Wasserman, D. (2012). Prevalence of pathological Internet use among adolescents in Europe: Demographic and social factors. *Addiction, 107*(12), 2210-2222. doi:10.1111/j.1360-0443.2012.03946.x.

Echeburúa, E., & Corral, P. de. (2010). Adicción a las nuevas tecnologías y a las redes sociales en jóvenes: un nuevo reto. *Adicciones, 22*(2), 91–96. doi: 10.20882/adicciones.196

Eftekhar, A., Fullwood, C., & Morris, N. (2014). Capturing personality from Facebook photos and photo-related activities: How much exposure do you need? *Computers in Human Behavior, 37*, 162–170. doi: 10.1016/j.chb.2014.04.048

Elhai, J. D., Dvorak, R. D., Levine, J. C., & Hall, B. J. (2017a). Problematic smartphone use: A conceptual overview and systematic review of relations with anxiety and depression psychopathology. *Journal of Affective Disorders, 207*, 251-259. doi:10.1016/j.jad.2016.08.030

Elhai, J. D., Levine, J. C., Dvorak, R. D., & Hall, B. J. (2016). Fear of missing out, need for touch, anxiety and depression are related to problematic smartphone use. *Computers in Human Behavior, 63*, 509-516. doi: 10.1016/ j.chb.2016.05.079

Elhai, J. D., Levine, J. C., Dvorak, R. D., & Hall, B. J. (2017b). Non-social features of smartphone use are most related to depression, anxiety and problematic smartphone use. *Computers in Human Behavior, 69, 75–82.*doi:10.1016/j.chb.2016.12.023

Faraci, P., Craparo, G., Messina, R. & Severino, S. (2013). Internet Addiction Test (IAT):Which is the best factorial solution? *Journal of Medical Internet Research, 15*(10), 220–230. doi: 10.2196/jmir.2935.

Fardouly, J., & Vartanian, L. R. (2016). Social media and body image concerns: Current research and future directions. *Current Opinion in Psychology, 9*, 1-5. doi: 10.1016/j.copsyc.2015.09.005

Ferguson, C. J., & Olson, C. K. (2013). Friends, fun, frustration and fantasy: Child motivations for video game play. *Motivation and Emotion, 37*(1), 154-164. doi:10.1007/s11031-012-9284-7

Fernandez-Guerrero, I. M. (2014). "WhatsAppitis." *The Lancet, 383*(14), 1040.

http://doi.org/10.1016/S0140-6736(14)60519-5

Fernandez-Villa, T., Molina, A. J., García-Martín M, Llorca, J., Delgado-Rodríguez, M., & Martín, V. (2015). Validation and psychometric analysis of the Internet Addiction Test in Spanish among college students. *BMC Public Health, 15*(1), 1-9. doi: 10.1186/s12889-015-2281-5

Fioravanti, G. & Casale S. (2015). Evaluation of the psychometric properties of the Italian Internet Addiction Test. *Cyberpsychology, Behavior, and Social Networking*, *18*(2), 120–128. doi: 10.1089/cyber.2014.0493.

Floros, G., & Siomos, K. (2013). The relationship between optimal parenting, Internet addiction and motives for social networking in adolescence. *Psychiatry Research*, *209*(3), 1–6. doi:10.1016/j.psychres.2013.01.010

Fox, J., & Moreland, J. J. (2015). The dark side of social networking sites: An exploration of the relational and psychological stressors associated with Facebook use and affordances. *Computers in Human Behavior*, *45*, 168–176. doi:10.1016/j.chb.2014.11.083

Frances, A. J., & Widiger, T. (2012). Psychiatric diagnosis: lessons from the DSM-IV past and cautions for the DSM-5 future. *Annual Review of Clinical Psychology*, *8*, 109–130. http://doi.org/10.1146/annurev-clinpsy-032511-143102

Fu Yuan, H., Chiu, S.-I., & Huang, D.-H. (2012). A model of the relationship between psychological characteristics, mobile phone addiction and use of mobile phones by Taiwanese university female students. *Computers in Human Behavior*, *28*(6), 2152–2159. http://doi.org/10.1016/j.chb.2012.06.020

Fuster, H., Chamarro, A., Carbonell, X., & Vallerand, R. J. (2014). Relationship between passion and motivation for gaming in players of Massively Multiplayer Online Role-Playing Games. *Cyberpsychology, Behavior and Social Networking*, *17*(5), 292–297. doi:10.1089/cyber.2013.0349

Fuster, H., Oberst, U., Griffiths, M. D., Carbonell, X., Chamarro, A., & Talarn, A. (2012). Psychological motivation in online role-playing games: A study of Spanish World of Warcraft players. *Anales de Psicología, 28*(1), 274–280.

G. D. (2019, March 28). 60+ Smartphone Statistics in 2019. Retrieved from https://techjury.net/stats-about/smartphone-usage/

Goodman, M. D. (1990). Addiction: Definition and implications. *British Journal of Addictions, 85*(1), 1403–1408. http://doi.org/10.1111/j.1360-0443.1990.tb01620.x

Grant, J. E., Potenza, M. N., Weinstein, A., & Gorelick, D. A. (2010). Introduction to behavioral addictions. *The American Journal of Drug and Alcohol Abuse*, *36*(5), 233–241. doi:10.3109/00952990.2010.491884

Greenberg, B. S., Sherry, J., Lachlan, K., Lucas, K., & Holmstrom, A. (2008). Orientations to

video games among gender and age groups. *Simulation & Gaming.* Advance online publication. doi:10.1177/ 1046878108319930

Grellhesl, M., & Punyanunt-Carter, N. M. (2012). Using the uses and gratifications theory to understand gratifications sought through text messaging practices of male and female undergraduate students. *Computers in Human Behavior, 28*(6), 2175-2181. doi: 10.1016/j.chb.2012.06.024

Griffiths, M. D. (1995). Technological addictions. *Clinical Psychology Forum, 76,* 14–19.

Griffiths, M. D. (2005). A "components" model of addiction within a biopsychosocial framework. *Journal of Substance Use, 10,* 191–197. doi: 10.1080/14659890500114359

Griffiths, M.D. (2010a). Gambling addiction on the Internet. In K. Young & C. Nabuco de Abreu (Eds.), *Internet Addiction: A Handbook for Evaluation and Treatment*. pp. 91-111. New York: Wiley.

Griffiths, M. D. (2010b). The role of context in online gaming excess and addiction: Some case study evidence. *International Journal of Mental Health and Addiction*, *8*(1), 119–125. doi:10.1007/s11469-009-9229-x

Griffiths, M. D. (2012). Facebook addiction: Concerns, criticism, and recommendations. A response to Andreassen and colleagues. *Psychological Reports, 110*(2), 518–520. doi:10.2466/01.07.18.PR0.110.2.518-520

Griffiths, M.D. (2013). Adolescent mobile phone addiction: A cause for concern? *Education and Health*, 31, 76-78.

Griffiths, M. D. (2014). Internet Addiction Disorder and Internet Gaming Disorder are Not the Same. *Journal of Addiction Research & Therapy, 5*(04). doi:10.4172/2155-6105.1000e124

Griffiths, M. D. (2015). Problematic technology use during adolescence: Why don't teenagers seek treatment? *Education and Health, 33*(1), 6–9.

Griffiths, M.D., Kuss, D.J., Billieux J. & Pontes, H.M. (2016). The evolution of internet addiction: A global perspective. *Addictive Behaviors, 53,* 193–195.

Griffiths, M. D., van Rooij, A. J., Kardefelt-Winther, D., Starcevic, V., Király, O., Pallesen, S., … Demetrovics, Z. (n.d.). Is there really an international consensus on assessing Internet Gaming Disorder? A response to Petry et al. (2014). *Addiction.*

Griffiths, M.D. (2018). Conceptual issues concerning internet addiction and internet gaming disorder. *International Journal of Mental Health and Addiction,* 16, 233-239. doi: 10.1007/s11469-017-9818-z

Guan, N. C., Isa S. M., Hashim, A. H., Pillai, S. K. & Harbajan Singh, M. K. (2015). Validity of the Malay version of the Internet Addiction Test: A study on a group of medical students in Malaysia. *Asia-Pacific Journal of Public Health,* 27(2). NP2210-NP2219. doi: 10.1177/1010539512447808.

Haagsma, M. C., Caplan, S. E., Peters, O., & Pieterse, M. E. (2013). A cognitive-behavioral model of problematic online gaming in adolescents aged 12–22 years. *Computers in Human Behavior, 29*(1), 202–209. doi:10.1016/j.chb.2012.08.006

Haug, S., Castro, R. P., Kwon, M., Filler, A., Kowatsch, T., & Schaub, M. P. (2015). Smartphone use and smartphone addiction among young people in Switzerland. *Journal of Behavioral Addictions, 4*(4), 299–307. doi:10.1556/2006.4.2015.037

Harris, M. B. (2000). Correlates and characteristics of boredom proneness and boredom. *Journal of Applied Social Psychology, 30*(3), 576–598. doi:10.1111/j.1559-1816.2000.tb02497.x

Hawi, N. S. (2013). Arabic validation of the Internet Addiction Test. *Cyberpsychology, Behavior, and Social Networking, 16*, 200–204. doi: 10.1089/cyber.2012.0426

Hawi, N. S., Blachnio, A. & Przepiorka, A. (2015). Polish validation of the Internet Addiction Test. *Computers in Human Behavior, 48*, 548–553. doi: 10.1016/j.chb.2015.01.058

Hawi, N. S., & Samaha, M. (2016). To excel or not to excel: Strong evidence on the adverse effect of smartphone addiction on academic performance. *Computers & Education, 98*, 81–89. doi:10.1016/j.compedu.2016.03.007

Higgins, E. T., Horwitz, E. K., Horwitz, M. B., Cope, J., Horwitz, E. K., Horwitz, M. B., & Cope, J. (1987). Selfdiscrepancy: a theory relating self and affect. *Psychological Review*, 94(3), 319–340. https://doi.org/10.1037 /0033-295X.94.3.319

Ho, R. C., Zhang, M. W. B., Tsang, T.Y., Toh, A. H., Pan, F., Lu, Y., Cheng, C., ... Mak, K-K. (2014). The association between internet addiction and psychiatric co-morbidity: a meta-analysis. *BMC Psychiatry*,14, 183. doi: 10.1186/1471-244X-14-183

Hofstede, G. (1983). National cultures in four dimensions: A research based theory of cultural differences among nations. *International Studies of Management & Organization, 13*(1-2), 46-74. doi: 10.1080/00208825.1983.11656358

Holahan, C. J., Moos, R. H., Holahan, C. K., Brennan, P. L., & Schutte, K. K. (2005). Stress generation, avoidance coping, and depressive Symptoms: A 10-year model. *Journal of Consulting and Clinical Psychology, 73*(4), 658-666. doi: 10.1037/0022-006X.73.4.658

Hormes, J. M., Kearns, B., & Timko, C. A. (2014). Craving Facebook? Behavioral addiction to online social networking and its association with emotion regulation deficits. *Addiction, 109*(12), 2079–2088. doi:10.1111/add.12713

Horst, H., & Miller, D. (2005). From kinship to link-up: Cell phones and social networking in Jamaica. *Current Anthropology, 46*(5), 755–778. doi:10.1086/432650

Horvath, C. W. (2010). Measuring television addiction. *Journal of Broadcasting & Electronic Media, 48*(3), 378–498. doi:10.1207/s15506878jobem4803_3

Hussain, Z., Griffiths, M. D., & Sheffield, D. (2017). An investigation in to PSU: The role of narcissism, anxiety, and personality factors. *Journal of Behavioral Addictions, 6*(3), 378–386. doi: 10.1556/2006.6.2017.052

Immordino-Yang, M. H., Christodoulou, J. A., & Singh, V. (2012). Rest is not idleness: Implications of the brain's default mode for human development and education. *Perspectives on Psychological Science, 7*(4), 352–364: doi.org/10.1177/1745691612447308

Ito, M. (2005). Mobile phones, Japanese youth, and the re-placement of social contact. In R. Ling & P. Pedersen (Eds.), *Mobile communications: Re-negotiation of the social sphere* (pp. 131– 148). London: Springer

Jackson, L. A., & Wang, J.-L. (2013). Cultural differences in social networking site use: A comparative study of China and the United States. Computers in Human Behavior, 29(3), 910–921. doi:10.1016/j.chb.2012.11.024

Jelenchick, L. A., Becker, T., & Moreno, M. A. (2012). Assessing the psychometric properties of the Internet Addiction Test (IAT) in US college students. *Psychiatry Research*, *196*(2-3), 296–301. doi: 10.1016/j.psychres.2011.09.007.

Jeong, S. H., Kim, H., Yum, J. Y., & Hwang, Y. (2016). What type of content are smartphone users addicted to?: SNS vs. games. *Computers in Human Behavior, 54*, 10–17. http://doi.org/10.1016/j.chb.2015.07.035

Jones, C. M., Scholes, L., Johnson, D., Katsikitis, M., & Carras, M. C. (2014). Gaming well: Links between videogames and flourishing mental health. *Frontiers in Psychology*, 5(260), 1-8. doi:10.3389/fpsyg.2014.00260

Kaptsis, D., King, D. L., Delfabbro, P. H., & Gradisar, M. (2016). Withdrawal symptoms in internet gaming disorder: A systematic review. Clinical Psychology Review, 43, 58–66. http://doi.org/10.1016/j.cpr.2015.11.006

Karaiskos, D., Tzavellas, E., Balta, G., & Paparrigopoulos, T. (2010). P02-232 - Social network addiction: A new clinical disorder? *European Psychiatry*, *25*, 855. doi:10.1016/S0924-9338(10)70846-4

Kardefelt-Winther, D. (2014a). A conceptual and methodological critique of internet addiction research: Towards a model of compensatory internet use. *Computers in Human Behavior*, *31*, 351–354. doi:10.1016/j.chb.2013.10.059

Kardefelt-Winther, D. (2014b). Problematizing excessive online gaming and its psychological predictors. *Computers in Human Behavior*, *31*, 118–122. doi:10.1016/j.chb.2013.10.017

Kardefelt-Winther, D. (2014c). The moderating role of psychosocial well-being on the relationship between escapism and excessive online gaming. *Computers in Human Behavior*, *38*, 68-74. doi: 10.1016/j.chb.2014.05.020

Kardefelt-Winther, D. (2015a). A critical account of DSM-5 criteria for internet gaming disorder. *Addiction Research & Theory*, *23*(2), 93–98. doi:10.3109/16066359.2014.935350

Kardefelt-Winther, D. (2015b). Commentary on: Are we overpathologizing everyday life? A tenable blueprint for behavioral addiction research. Problems with atheorical and confirmatory research approaches in the study of behavioral addictions. Journal of Behavioral Addictions, 4(3), 126–129. http://doi.org/10.1556/2006.4.2015.019

Kardefelt-Winther, D., Heeren, A., Schimmenti, A., van Rooij, A., Maurage, P., Carras, M., … Billieux, J. (2017). How can we conceptualize behavioural addiction without pathologizing common behaviours? Addiction, 112(10), 1709–1715. doi: 10.1111/add.13763

Kaya, F., Delen, E. & Young, K. S. (2016). Psychometric properties of the Internet Addiction Test in Turkish. *Journal of Behavioral Addictions*, *5*(1),130–134. doi: 10.1556/2006.4.2015.042

Kemp, S. (2017, January 24). Digital in 2017: Global Overview. Retrieved from https://wearesocial.com/special-reports/digital-in-2017-global-overview

Kemp, S. (2019). The global state of digital in 2019 report [Report]. Retrieved from https://hootsuite.com/pages/digital-in-2019

Kim, D., Lee, Y., Lee, J., Nam, J. K., & Chung, Y. (2014). Development of Korean Smartphone Addiction Proneness Scale for youth. *PLoS ONE*, *9*(5). http://doi.org/10.1371/journal.pone.0097920

Kim, Y., Sohn, D., & Choi, S. M. (2011). Cultural difference in motivations for using social network sites: A comparative study of American and Korean college students. *Computers in Human Behavior*, 27(1), 365–372. doi:10.1016/j.chb.2010.08.015

King, A. L., Valença, A. M., Silva, A. C., Baczynski, T., Carvalho, M. R., & Nardi, A. E. (2013). Nomophobia: Dependency on virtual environments or social phobia? *Computers in Human Behavior*, *29*(1), 140–144. http://doi.org/10.1016/j.chb.2012.07.025

King, D. L., Haagsma, M. C., Delfabbro, P. H., Gradisar, M., & Griffiths, M. D. (2013). Toward a consensus definition of pathological video-gaming : A systematic review of psychometric assessment tools. *Clinical Psychology Review*, *33*, 331–342. doi:10.1016/j.cpr.2013.01.002

King, D. L., Herd, M. C. E., & Delfabbro, P. H. (2018). Motivational components of tolerance in Internet gaming disorder. *Computers in Human Behavior*, *78*, 133–141. doi: 10.1016/j.chb.2017.09.023

Király, O., Griffiths, M. D., Urbán, R., Farkas, J., Kökönyei, G., Elekes, Z., … Demetrovics, Z. (2014). Problematic Internet use and problematic online gaming are not the same: Findings from a large nationally representative adolescent sample. *Cyberpsychology, Behavior and Social Networking*, *17*(12), 749–754. doi: 10.1089/cyber.2014.0475

Kırcaburun, K., Alhabash, S., Tosuntaş, S.B. & Griffiths, M.D. (2018). Uses and gratifications of problematic social media use among university students: A simultaneous examination of the Big Five of personality traits, social media platforms, and social media use motives. *International Journal of Mental Health and Addictions*. doi: 10.1007/s11469-018-9940-6

Kırcaburun, K., & Griffiths, M. D. (2018). Problematic Instagram Use: The Role of Perceived Feeling of Presence and Escapism. International Journal of Mental Health and Addiction. doi:10.1007/s11469-018-9895-7

Kirschner, P. A., & Karpinski, A. C. (2010). Facebook® and academic performance. *Computers in Human Behavior, 26*(6), 1237–1245. doi:10.1016/j.chb.2010.03.024

Kleemans, M., Dalmaans, S., Carbaat, I., & Anschütz, D. (2016). Picture perfect: The direct effect of manipulated Instagram photos on body image in adolescent girls. *Media Psychology, 21*(1), 93-110. 10.1080/15213269.2016.1257392

Koc, M., & Gulyagci, S. (2013). Facebook addiction among Turkish college students: The role of psychological health, demographic, and usage characteristics. *Cyberpsychology, Behavior, and Social Networking*, *16*(4), 279–284. doi:10.1089/cyber.2012.0249

Konkolÿ Thege, B., Woodin, E. M., Hodgins, D. C., & Williams, R. J. (2015). Natural course of behavioral addictions: A 5-year longitudinal study. *BMC Psychiatry*, *15*(1), 4. doi:10.1186/s12888-015-0383-3

Korkeila, J., Kaarlas, S., Jääskeläinen, M., Vahlberg, T., & Taiminen, T. (2010). Attached to the web – harmful use of the Internet and its correlates. *European Psychiatry, 25*(4), 236–241. doi: 10.1016/j.eurpsy.2009.02.008

Körmendi, A., Brutóczki, Z., Végh, B. P., & Székely, R. (2016). Smartphone use can be addictive? A case report. *Journal of Behavioral Addictions*, *5*(3), 548–552. doi: 10.1556/2006.5.2016.033

Kuss, D.J. & Griffiths, M.D. (2011a). Internet gaming addiction: A systematic review of empirical research. *International Journal of Mental Health and Addiction.* doi: 10.1007/s11469-011-9318-5

Kuss, D. J., & Griffiths, M. D. (2011b). Online social networking and addiction - A review of the psychological literature. *International Journal of Environmental Research and Public Health*, *8*(9), 3528–3552. doi:10.3390/ijerph8093528

Kuss, D.J. & Griffiths, M.D. (2011c). Internet sex addiction: A review of empirical research. *Addiction Research and Theory*. doi: 10.3109/ 16066359.2011.588351

Kuss, D. J., & Griffiths, M. D. (2012a). Internet and gaming addiction: A systematic literature review of neuroimaging studies. *Brain Sciences, 2*(3), 347–74. doi:10.3390/brainsci2030347

Kuss, D. J., & Griffiths, M. D. (2012b). Internet gaming addiction: A systematic review of empirical research. *International Journal of Mental Health and Addiction*, *10*(2), 278–296. doi:10.1007/s11469-011-9318-5

Kuss, D., Harkin, L., Kanjo, E., & Billieux, J. (2018). Problematic smartphone use: Investigating contemporary experiences using a convergent design. *International Journal of Environmental Research and Public Health, 15*(1), 142. doi:10.3390/ijerph15010142

Kuss, D. J., Kanjo, E., Crook-Rumsey, M., Kibowski, F., Wang, G. Y., & Sumich, A. (2018). Problematic mobile phone use and addiction across generations: The roles of psychopathological symptoms and smartphone use. *Journal of Technology in Behavioral Science*. doi: 10.1007/s41347-017-0041-3

Kwon, M., Lee, J. Y., Won, W. Y., Park, J. W., Min, J. A., Hahn, C., … Kim, D. J. (2013). Development and validation of a Smartphone Addiction Scale (SAS). *PLoS ONE*, *8*(2). doi: 10.1371/journal.pone.0056936

Laconi, S., Kaliszewska-Czeremska, K., Gnisci, A., Sergi, I., Barke, A., Jeromin, F., … Kuss, D.J. (2018). Cross-cultural study of problematic Internet use in nine European countries. *Computers in Human Behavior*, *84*, 430-440. doi: 10.1016/j.chb.2018.03.020

Laconi, S., Rodgers, R. F., & Chabrol, H. (2014). The measurement of Internet addiction: A critical review of existing scales and their psychometric properties. *Computers in Human Behavior*, *21*, 190-202. doi: 10.1016/j.chb.2014.09.026

Lai, C. M., Mak, K. K., Watanabe, H., Ang, R. P., Pang, J. S., & Ho, R. C. (2013). Psychometric properties of the Internet addiction test in Chinese adolescents. *Journal of Pediatric Psychology*, *38*(7), 794–807. doi: 10.1093/jpepsy/jst022.

Lee, B. W. & Stapinski, S. L. (2012). Seeking safety on the internet: Relationship between social anxiety and problematic internet use. *Journal of Anxiety Disorders, 26*(1), 197-205. doi: 10.1016/j.janxdis.2011.11.001.

Lee, H. W., Choi, J-S., Shin, Y-C., Lee, J-Y., Jung, H. Y., & Kwon, J. S. (2012). Impulsivity in Internet Addiction: A Comparison with Pathological Gambling. *Psychology, Behavior, and Social Networking, 15*(7), 373 – 377. doi: 10.1089/cyber.2012.0063

Lee, K., Lee H-K., Gyeong H., Yu, B., & Kim, D. (2013). Reliability and validity of the Korean version of the Internet Addiction Test among college students. *Journal of Korean Medical Science, 28*(5), 763–768. doi: 10.3346/jkms.2013.28.5.763.

Lee, Y. S., Han, D. H., Kim, S. M., & Renshaw, P. F. (2015). Substance abuse precedes Internet addiction. *Addictive Behaviors, 38*(4), 2022-2025. doi: 10.1016/j.addbeh.2012.12.024.

Leist, A. K. (2013). Social media use of older adults: A mini-review. *Gerontology*, *59*, 378-384. doi: 10.1159/000346818

Leonardi, P., Leonardi, M. E., & Hudson, E. (2006). Culture, organization, and contradiction in the social construction of technology: Adoption and use of the cell phone across three cultures. In A. Kavoori & N. Arceneaux (Eds.), *The cell phone reader: Essays in social transformation* (pp. 205–225). New York, NY: Peter Lang.

Leung, L. (2007). Leisure boredom, sensation seeking, self-esteem, addiction symptoms and patterns of mobile phone use. *Mediated Interpersonal Communication*, (April), 359–398.

Leung, L. (2011). Loneliness, social support, and preference for online social interaction: the mediating effects of identity experimentation online among children and adolescents. *Chinese Journal of Communication, 4*(4), 381–399. doi:10.1080/17544750.2011.616285

Levine, D. G. (1974). "Needle Freaks": Compulsive self-injection drug users. *The American Journal of Psychiatry, 131*(3), 297–300. doi:10.1176/ajp.131.3.297

Lin, Y. H., Chang, L. R., Lee, Y. H., Tseng, H. W., Kuo, T. B. J., & Chen, S. H. (2014). Development and validation of the Smartphone Addiction Inventory (SPAI). PLoS One, 9(6), e98312. doi:10.1371/journal.pone.0098312

Lin, I-H., Ko, C-H., Chang, Y-P., Liu, T-L., Wang, P-W, Lin, H-C., Huang, M-F., ... Yen, C-F. (2014). The association between suicidality and Internet addiction and activities in Taiwanese adolescents. *Comprehensive Psychiatry*, *55*(3), 504-510. doi: 10.1016/j.comppsych.2013.11.012.

Lopez-Fernandez, O. (2015). Cross-cultural research on Internet addiction: A systematic review. *International Archives of Addiction Research and Medicine, 1*(11). Doi: 10.23937/2474-3631/1510011

Lopez-Fernandez, O. (2015). Short version of the Smartphone Addiction Scale adapted to Spanish and French: Towards a cross-cultural research in problematic mobile phone use. *Addictive Behaviors*, 64, 275-280. doi:10.1016/j.addbeh.2015.11.013

Lopez-Fernandez, O., Kuss, D., Romo, L., Morvan, Y., Kern, L., Graziani, P., … Billieux, J. (2017). Self-reported dependence on mobile phones in young adults: A European cross-cultural empirical survey. *Journal of Behavioral Addictions, 6*(2), 168–177. doi:10.1556/2006.6. 2017.020

Lopez-Fernandez, O., Männikkö, N., Kääriäinen, M., Griffiths, M. D., & Kuss, D. J. (2018). Mobile gaming and problematic smartphone use: A comparative study between Belgium and Finland. *Journal of Behavioral Addictions, 7*(1), 1–12. doi:10.1556/2006.6.2017.080

Maraz, A., Király, O., & Demetrovics, Z. (2015). The diagnostic pitfalls of surveys: If you score positive on a test of addiction, you still hava a good chance not to be addicted. *Journal of Behavioral Addictions*, *4*(3), 151–154. doi:10.1556/2006.4.2015.026

Marlatt, G. A., & Gordon, J. R. (1985). *Relapse prevention*. Nueva York: Guilford.

Marsh, H. W., Morin, A. J. S., Parker, P., & Kaur, G. (2014). Exploratory structural equation modeling: an integration of the best features of exploratory and confirmatory factor analysis. *Annual Review of Clinical Psychology, 10*, 85–110. doi: 10.1146/annurev-clinpsy-032813-153700

Masur, P. K., Reinecke, L., Ziegele, M., & Quiring, O. (2014). The interplay of intrinsic need

satisfaction and Facebook specific motives in explaining addictive addictive behavior on Facebook. *Computers in Human Behavior*, *39*, 376-386. doi: 10.1016/j.chb.2014.05.047

McCroskey, J. C., & Richmond, V. P. (1995). Correlates of compulsive communication: Quantitative and qualitative characteristics. *Communication Quarterly*, *43*(1), 1–8. 10.1080/01463379509369954

Meerkerk, G.-J., Eijnden, R. J. J. M., & Garretsen, H. F. L. (2006). Predicting Compulsive Internet Use: It's All about Sex! *CyberPsychology & Behavior, 9*(1), 95–103. doi:10.1089/cpb.2006.9.95

Mohammadsalehi N, Mohammadbeigi, A., Jadidi, R., Anbari, Z., Ghaderi, E., & Akbari, M. (2015). Psychometric properties of the Persian language version of Yang Internet Addiction Questionnaire: an explanatory factor analysis. *International Journal of High Risk Behaviors and Addiction*, *4*(3), e21560. doi: 10.5812/ijhrba.21560.

Montag, C., Bey, K., Sha, P., Li, M., Chen, Y.-F., Liu, W.-Y., … Reuter, M. (2014). Is it meaningful to distinguish between generalized and specific Internet addiction? Evidence from a cross-cultural study from Germany, Sweden, Taiwan and China. *Asia-Pacific Psychiatry*, *7*(1), 20–26. doi:10.1111/appy.12122

Moon, M. S., Hwang, J. S., Kim, J. Y., Shin, A. L., Bae, S. M., & Kim, J. W. (2018). Psychometric properties of the Internet Addiction Test: a systematic review and meta-analysis. *Cyberpsychology, Behavior, and Social Networking*, *21*(8). doi: 10.1089/cyber.2018.0154.

Moreau, A., Laconi, S., Delfour, M., & Chabrol, H. (2015). Psychopathological profiles of adolescent and young adult problematic Facebook users. *Computers in Human Behavior*, *44*, 64–69. doi:10.1016/j.chb.2014.11.045

Muñiz, J., Elosua, P., & Hambleton, R. K. (2013). Directrices para la traducción y adaptación de los tests: segunda edición. *Psicothema*, *25*(2), 151-157. doi: 10.7334/psicothema2013.24

Muñoz-Miralles, R., Ortega-González, R., Batalla-Martínez, C., López-Morón, M. R., Manresa, J. M., & Torán-Monserrat, P. (2014). Acceso y uso de nuevas tecnologías entre los jóvenes de educación secundaria, implicaciones en salud. Estudio JOITIC. *Atencion Primaria*, *46*(2), 77-88. doi: 0.1016/j.aprim.2013.06.001

Murdock, K. K. (2013). Texting while stressed: Implications for students' burnout, sleep, and well-being. *Psychology of Popular Media Culture, 2*(4), 207–221. doi:10.1037/ppm0000012

Murphy, D. (2017, April 28). 2.4bn smartphone users in 2017, says eMarketer. Retrieved from https://mobilemarketingmagazine.com/24bn-smartphone-users-in-2017-says-emarketer

Nehra, R., Kate, N., Grover, S., Khenra, N., & Basu, D. (2012). Does the excessive use of mobile

phones in young adults reflect an emerging behavioral addiction? *Journal of Postgraduate Medicine, Education and Research, 46*(4), 177-182. doi: 10.5005/jp-journals-100280-1040

Nitschke, J. B., Heller, W., Imig, J. C., McDonald, R. P., & Miller, G. A. (2001). Distinguishing dimensions of anxiety and depression. *Cognitive Therapy and Research, 25*(1), 1-22. doi: 10.1023/A:1026485530405

Nixon, P. (2017, May 18). Colombian smartphone penetration reaches 34% in 2016. Retrieved from https://www.bnamericas.com/en/news/ict/colombian-smartphone-penetration-reaches-34-in-2016

Nolan, B. V, & Feldman, S. R. (2009). Ultraviolet tanning addiction. *Dermatologic Clinics, 27*(2), 109–112. doi:10.1016/j.det.2008.11.007

Oberst, U., Wegmann, E., Stodt, B., Brand, M. & Chamarro, A. (2017). Negative consequences from heavy social networking in adolescents: The mediating role of fear of missing out. *Journal of Adolescence, 55*, 51-60. doi: 10.1016/j.adolescence.2016.12.008

Orsala, O., Orsalb, O., Unsalc, A., Ozalp, S. S. (2013). Evaluation of Internet addiction and depression among university students. *Procedia - Social and Behavioral Sciences, 82*, 445-454. doi: 10.1016/j.sbspro.2013.06.291

Panayides, P., & Walker, M. J. (2012). Evaluation of the psychometric properties of the Internet Addiction Test (IAT) in a sample of Cypriot high school students: The Rasch measurement perspective. *Europe's Journal of Psychology, 8*(3), 327-351. doi: 10.5964/ejop.v8i3.474

Panova, T., & Carbonell, X. (2018). Is smartphone addiction really an addiction? *Journal of Behavioral Addictions, 7*(2), 252-259. doi: 10.1556/2006.7.2018.49

Panova, T., & Lleras, A. (2016). Avoidance or boredom: Negative mental health outcomes associated with use of information and communication technologies depend on users' motivations. *Computers in Human Behavior, 58*, 249–258. doi:10.1016/j. chb.2015.12.062

Pedrero, E. J., Rodríguez, M. T., & Ruiz, J. M. (2012). Adicción o abuso del teléfono móvil. Revisión de la literatura. *Adicciones, 24*(2), 139–152. doi: 10.20882/adicciones.107

Pedrero-Pérez, E. J., Ruiz-Sánchez de León, J. M., Rojo-Mota, G, Llanero-Luque, M., Pedrero-Aguilar, J. Morales-Alonso, S., Puerta-García, C. (2018), Tecnologías de la Información y la Comunicación (TIC): uso problemático de Internet, videojuegos, teléfonos móviles, mensajería instantánea y redes sociales mediante el MULTICAGE-TIC. *Adicciones, 30*(1), 19-32. doi: 10.20882/adicciones.806

Petry, N. M., & O'Brien, C. P. (2013). Internet gaming disorder and the DSM-5. *Addiction, 108*(7), 1186–1187. doi:10.1111/add.12162

Petry, N. M., Rehbein, F., Gentile, D. A., Lemmens, J. S., Rumpf, H. J., Mößle, T., … O'Brien, C. P. (2014). An international consensus for assessing Internet Gaming Disorder using the new DSM-5 approach. *Addiction, 109*(9), 1399–1406. doi:10.1111/add.12457

Pierce, T. (2009). Social anxiety and technology: face-to-face communication versus technological communication among teens. *Computers in Human Behavior, 25*(6), 1367-1372. doi: 10.1016/j.chb.2009.06.003

Pontes, H. M., Király, O., Demetrovics, Z., & Griffiths, M. D. (2014). The conceptualisation and measurement of DSM-5 Internet Gaming Disorder: The development of the IGD-20 Test. *PloS ONE, 9*(10), e110137. doi:10.1371/journal.pone.0110137

Pontes, H. M., Patrão, I, M. & Griffiths, M. D. (2014). Portuguese validation of the Internet Addiction Test: an empirical study. *Journal of Behavioral Addictions*, *3*(2), 107–114. doi: 10.1556/JBA.3.2014.2.4.

Pontes, H. M., Szabo, A., & Griffiths, M. D. (2015). The impact of Internet-based specific activities on the perceptions of Internet addiction, quality of life, and excessive usage: A cross-sectional study. *Addictive Behaviors Reports*, *1*, 19–25. doi: 10.1016/j.abrep.2015.03.002

Poushter, J. (2016, February 22). Smartphone ownership and Internet usage continues to climb in emerging economies. Retrieved from http://www.pewglobal.org/2016/02/22/smartphone-ownership-and-internet-usage-continues-to-climb-in-emerging-economies/

Puerta-Cortés, D. X., Carbonell, X. & Chamarro, A. (2012). Analysis of the psychometric properties of the Spanish version of Internet Addiction Test. *Trastornos Adictivos*, *14*(4), 99– 104. doi: 10.1016/S1575-0973(12)70052-1

Puerta-Cortés, D. X., Panova, T., Carbonell, X., & Chamarro, A. (2017). How passion and impulsivity influence a player's choice of videogame, intensity of playing and time spent playing. *Computers in Human Behavior, 66*, 122–128. doi:10.1016/j.chb.2016.09.029

Reid, D. J., & Reid, F. J. (2007). Text or talk? Social anxiety, loneliness, and divergent preferences for cell phone use. *Cyberpsychology & Behavior*, *10*(3), 424-435. doi: 10.1089/cpb.2006.9936

Renau, V., Oberst, U., & Carbonell, X. (2013). Construcción de la identidad a través de las redes sociales online. *Anuario de Psicología*, *43*(2), 159–170.

Rezaul Karim, A. K. M. & Nigar, N. (2014). The Internet Addiction Test: Assessing its psychometric properties in Bangladeshi culture. *Asian Journal of Psychiatry*, *10*, 75–83. doi: 10.1016/j.ajp.2013.10.011.

Roberts, J. A., & David, M. E. (2016). My life has become a major distraction from my cell phone: Partner phubbing and relationship satisfaction among romantic partners. *Computers in Human Behavior, 54*, 134–141. doi:10.1016/j.chb.2015.07.058

Roberts, J. A., & David, M. E. (2017). Put down your phone and listen to me: How boss phubbing undermines the psychological conditions necessary for employee engagement. *Computers in Human Behavior, 75,* 206–217. doi:10.1016/j.chb.2017.05.021

Roberts, J. A., Pullig, C., & Manolis, C. (2015). I need my smartphone: A hierarchical model of personality and cell-phone addiction. *Personality and Individual Differences, 79,* 13–19. http://doi.org/10.1016/j.paid.2015.01.049

Rodríguez-Llera, M. C., Domingo-Salvany, A., Brugal, M. T., Silva, T. C., Sánchez-Niubó, A., & Torrens, M. (2006). Psychiatric comorbidity in young heroin users. *Drug and Alcohol Dependence, 84*(1), 48–55. doi:10.1016/j.drugalcdep.2005.11.025

Rosen, L. D., Whaling, K., Rab, S., Carrier, L. M., & Cheever, N. A. (2013). Is Facebook creating ‘‘iDisorders’’? The link between clinical symptoms of psychiatric disorders and technology use, attitudes and anxiety. *Computers in Human Behavior, 29*(3), 1243-1254. doi: 10.1016/j.chb.2012.11.012

Rounsaville, B. J. (1982). Heterogeneity of psychiatric diagnosis in treated opiate addicts. *Archives of General Psychiatry*, *39*(2), 161. doi:10.1001/archpsyc.1982.04290020027006

Rouse, M. (July, 2019). ICT (information and communications technology, or technologies). Retrieved from https://whatis.techtarget.com/definition/ICT-information-and-communications-technology-or-technologies

Ryan, R. M., Rigby, S. C., & Przybylski, A. (2006). The motivational pull of video games: A self-determination theory approach. *Motivation and Emotion, 30*(4), 344-360. doi: 10.1007/s11031-006-9051-8

Rudski, J. M., Segal, C., & Kallen, E. (2009). Harry Potter and the end of the road: Parallels with addiction. *Addiction Research & Theory*, *17*(3), 260–277. http://doi.org/10.1080/16066350802334595

Rui, J., & Stefanone, M. A. (2013). *Strategic self-presentation online: A cross-cultural study. Computers in Human Behavior, 29*(1), 110–118.doi:10.1016/j.chb.2012.07.022

Ryan, T., Chester, A., Reece, J., & Xenos, S. (2014). The uses and abuses of Facebook: A review of Facebook addiction. *Journal of Behavioral Addictions*, *3*(3), 133–148. doi:10.1556/JBA.3.2014.016

Salehan, M., & Negahban, A. (2013). Social networking on smartphones: When mobile phones become addictive. *Computers in Human Behavior*, *29*(6), 2632–2639. doi:10.1016/j.chb.2013.07.003

Samaha, M., & Hawi, N. S. (2016). Relationships among smartphone addiction, stress, academic performance, and satisfaction with life. *Computers in Human Behavior, 57,* 321-325. doi: 10.1016/j.chb.2015.12.045

Sánchez-Carbonell, X., Beranuy, M., Castellana, M., Chamarro, A., & Oberst, U. (2008). La adiccion a Internet y al móvil: Moda o trastorno? *Adicciones, 20*(2), 149–160. doi: 10.20882/adicciones.279

Sánchez-Carbonell, X., Guardiola, E., Bellés, A., & Beranuy, M. (2005). European Union scientific production on alcohol and drug misuse (1976-2000). *Addiction, 100*(8), 1166–1174. doi: 10.1111/j.1360-0443.2005.01135.x

Sanchez-Martinez, M., & Otero, A. (2009). Factors associated with cell phone use in adolescents in the community of Madrid (Spain). *Cyberpsychology & Behavior, 12*(2), 131-137. doi:10.1089/cpb.2008.0164

Saunders, J. B., Hao, W., Long, J., King, D. L., Mann, K., Fauth-Bühler, M., … Poznyak, V. (2017).Gaming disorder: Its delineation as an important condition for diagnosis, management, and prevention. *Journal of Behavioral Addictions*, *6*(3), 1–9. doi: 10.1556/2006.6.2017.039

Seabra, L., Loureiro, M., Pereira, H., Monteiro, S., Afonso, R. M., & Esgalhado, G. (2017). Relationship between Internet addiction and self-esteem: Cross-cultural study in Portugal and Brazil. *Interacting with Computers, 29*(5), 767–778. doi:10.1093/iwc/iwx011.

Servidio, R. (2017). Assessing the psychometric properties of the Internet Addiction Test: A study on a sample of Italian university students. *Computers in Human Behavior, 68*, 17–29. 10.1016/j.chb.2016.11.019

Shaw A. M., Timpano K. R., Tran T. B., & Joormann J. (2015). Correlates of Facebook usage patterns: The relationship between passive Facebook use, social anxiety symptoms, and brooding. *Computers in Human Behavior, 48*, 575-580. doi: 10.1016/j.chb.2015.02.003

Sheldon, P., Rauschnabel, P. A., Antony, M. G., & Car, S. (2017). A cross-cultural comparison of Croatian and American social network sites: Exploring cultural differences in motives for Instagram use. *Computers in Human Behavior, 75*, 643–651. doi:10.1016/j.chb.2017.06.009

Sherlock, M., & Wagstaff, D. L. (2018). Exploring the relationship between frequency of Instagram use, exposure to idealized images, and psychological well-being in women. *Psychology of Popular Media Culture.* Advance online publication. doi: 10.1037/ppm0000182

Skierkowski, D., & Wood, R. M. (2012). To text or not to text? the importance of text messaging among college-aged youth. *Computers in Human Behavior, 28*(2), 744–756. http://doi.org/10.1016/j.chb.2011.11.023

Smock, A. D., Ellison, N. B., Lampe, C., & Wohn, D. Y. (2011). Facebook as a toolkit: A uses and gratification approach to unbundling feature use. *Computers in Human Behavior, 27*(6), 2322–2329. doi:10.1016/j.chb.2011.07.011

Stall, R., & Biernacki, P. (1986). Spontaneous remission from the problematic use of substances: An inductive model derived from a comparative analysis of the alcohol, opiate, tobacco, and food/obesity literatures. *International Journal of the Addictions*, *21*(1), 1–23. doi: 10.3109/10826088609063434

Starcevic, V. (2010). Problematic Internet use: A distinct disorder, a manifestation of an underlying psychopathology, or a troublesome behaviour? *World Psychiatry*, *9*(2): 92–93. doi: 10.1002/j.2051-5545.2010.tb00280.x

Starcevic, V. (2013). Is Internet addiction a useful concept? *Australian & New Zealand Journal of Psychiatry*, *47*(1), 16–19. doi:10.1177/0004867412461693

Stavropoulos, V., Griffiths, M.D., Burleigh, T.L., Kuss, D.J., Doh, Y.W. & Gomez, R. (2018). Flow on the Internet: A longitudinal study of internet addiction symptoms in adolescence. *Behavior and Information Technology*, 37, 159-172. doi: 10.1080/0144929X.2018.1424937

Stevens, J. (2018, December 17). Internet Stats & Facts for 2019. *Hosting Facts*. Retrieved from https://hostingfacts.com/internet-facts-stats/

Stone, R. (2009). China reins in wilder impulses in treatment of "Internet Addiction". *Science*, *324*(5935), 1630–1631.doi:10.1126/science.324_1630

Suissa, A. J. (2008). Addiction to cosmetic surgery: Representations and medicalization of the body. *International Journal of Mental Health and Addiction*, *6*, 619–630. doi:10.1007/s11469-008-9164-2

Sung, M., Shin, Y. M. & Cho, S. M. (2014). Factor structure of the Internet Addiction Scale and its associations with psychiatric symptoms for Korean adolescents. *Community Mental Health Journal*, *50*, 612–618. doi: 10.1007/s10597-013-9689-0.

Surrat, C. G. (1999). *Netaholics?: The creation of a pathology*. New York: Nova Science.

Sussman, S., & Moran, M. B. (2013). Hidden addiction: Television. *Journal of Behavioral Addictions*, *2*(3), 125–132. doi:10.1556/JBA.2.2013.008

Targhetta, R., Nalpas, B., & Perney, P. (2013). Argentine tango: Another behavioral addiction? *Journal of Behavioral Addictions*, *2*(3), 179–186. doi:10.1556/JBA.2.2013.007

Thomée, S., Dellve, L., Harenstam, A., & Hagberg, M. (2010). Perceived connections between information and communication technology use and mental symptoms among young adults – A qualitative study. *BMC Public Health*, *10*(1), 66. doi:10.1186/1471-2458-10-66

Thomée, S., Härenstam, A., & Hagberg, M. (2011). Mobile phone use and stress, sleep disturbances, and symptoms of depression among young adults – A prospective cohort study. *BMC Public Health*, *11*(1), 66. doi:10.1186/1471-2458-11-66

Tsimtsiou, Z., Haidich, A. B., Kokkali, S., Dardavesis, T., Young, K. S. & Arvanitidou, M. (2014). Greek version of the Internet Addiction Test: a validation study. *Psychiatric Quarterly, 85*(2), 187–195. doi: 10.1007/s11126-013-9282-2.

Tsitsika, A., Critselis, E., Janikian, M., Kormas, G., & Kafetzis, D. A. (2010). Association between Internet gambling and problematic Internet use among adolescents. *Journal of Gambling Studies, 27*(3), 389–400. doi:10.1007/s10899-010-9223-z

Tsitsika, A., Janikian, M., Schoenmakers, T. M., Tzavela, E. C., Ólafsson, K., Wójcik, S., Macarie, G. F., ... Richardson, C. (2014). Internet addictive behavior in adolescence: A cross-sectional study in seven European countries, *Cyberpsychology, Behavior, and Social Networking, 17*(8), 528-535. doi: 10.1089/cyber.2013.0382

Turel, O., He, Q., Xue, G., Xiao, L., & Bechara, A. (2014). Examination of neural systems sub-serving Facebook "Addiction". *Psychological Reports, 115*(3), 675–695. doi:10.2466/18.PR0.115c31z8

Twohig, M. P., Crosby, J. M., & Cox, J. M. (2009). Viewing Internet pornography: For whom is it problematic, how, and why? *Sexual Addiction & Compulsivity, 16*(4), 253–266. doi:10.1080/10720160903300788

Vallerand, R. J. (2008). On the psychology of passion: In search of what makes people's lives most worth living. *Canadian Psychology/Psychologie Canadienne, 49*(1), 1–13. doi:10.1037/0708-5591.49.1.1

Van Deursen, A. J. A. M., Bolle, C. L., Hegner, S. M., & Kommers, P. A. M. (2015). Modeling habitual and addictive smartphone behavior. The role of smartphone usage types, emotional intelligence, social stress, self-regulation, age, and gender. *Computers in Human Behavior, 45*, 411–420. doi:10.1016/j.chb.2014.12.039

Van Gundy, K. T., Stracuzzi, N. F., Rebellon, C. J., Tucker, C. J., & Cohn, E. S. (2011). Perceived community cohesion and the stress process in youth. *Rural Sociology*, 76(3), 293–318. doi:10.1111/j.1549-0831.2011.00050.x

Van Rooij, A. J., Schoenmakers, T. M., van de Eijnden, R. J. J. M., & van de Mheen, D. (2010). Compulsive Internet use: The role of online gaming and other Internet applications. *Journal of Adolescent Health, 47*(1), 51–57. doi:10.1016/j.jadohealth.2009.12.021

Verdejo-García, A., Fernandez-Serrano, M. J., & Tirapu-Ustarroz, J. (2013). Denial and lack of awareness in substance dependence: Insights from the neuropsychology of addiction. In P. M. Miller, S. A. Ball, M. E. Bates, A. W. Blume, K. M. Kampman, D. J. Kavanagh, … P. De Witte (Eds.), *Comprehensive addictive behaviors and disorders* (pp. 77–86). San Diego, CA, US: Elsevier Academic Press.

Vogel, E. A., Rose, J. P., Roberts, L. R., & Eckles, K. (2014). Social comparison, social media, and self-esteem. *Psychology of Popular Media Culture, 3*(4), 206–222. doi:10.1037/ppm0000047

Walters, G. D. (2000). Spontaneous remission from alcohol, tobacco, and other drug abuse:

Seeking quantitative answers to qualitative questions. *The American Journal of Drug and Alcohol Abuse*, *26*(3), 443–60. doi: 10.1081/ADA-100100255

Wang, C.-W., Ho, R. T. H., Chan, C. L. W., & Tse, S. (2015). Exploring personality characteristics of Chinese adolescents with internet-related addictive behaviors: Trait differences for gaming addiction and social networking addiction. *Addictive Behaviors, 42*, 32–35. doi:10.1016/j.addbeh.2014.10.039

Waqas, A., Farooq, F., Raza, M., Javed, S.T., Khan, S., Ghumman, M. E., Naveed, S., & Haddad, M. (2017). Validation of the Internet Addiction Test in students at a Pakistani medical and dental school. *Psychiatric Quarterly*, *89*(1), 235–247. doi: 10.1007/s11126-017 9528-5.

Watson, D., & Clark, L. A. (1995). Testing a tripartite Model: I. Evaluating the convergent and discriminant validity of anxiety and depression symptom scales. Jou*rnal of Abnormal Psychology, 104*(1), 3-14. doi: 10.1037/0021-843X.104.1.3

Watson, D., Clark, L.A., Weber, K., Assenheimer, J.S., Strauss, M.E., & McCormick, R.A. (1995). Testing a tripartite model: II. Exploring the symptom structure of anxiety and depression in student, adult, and patient samples. *Journal of Abnormal Psychology, 104*, 15-25. doi: 10.1037/0021-843X.104.1.15

Watters, C. A., Keefer, K. V., Kloosterman, P. H., Summerfeldt, L. J., & Parker, J. D. A. (2013). Examining the structure of the Internet Addiction Test in adolescents: a bifactor approach. *Computers in Human Behavior,* 29(6), 2294–2302. doi: 10.1016/j.chb.2013.05.020

Wegmann, E., Stodt, B., & Brand, M. (2015). Addictive use of social networking sites can be explained by the interaction of Internet use expectancies, Internet literacy, and psychopathological symptoms. *Journal of Behavioral Addictions*, *4*(3), 155–162. doi:10.1556/2006.4.2015.021

Weinstein, A., Yaacov, Y., Manning, M., Danon, P., & Weizman, A. (2015). Internet Addiction and Attention Deficit Hyperactivity Disorder among schoolchildren. *The Israel Medical Association Journal*, *17*(12), 731-734.

Widyanto, L., & Griffiths, M. (2006). "Internet Addiction": A critical review. *International Journal of Mental Health and Addiction, 4*(1), 31–51. doi:10.1007/s11469-006-9009-9

Widyanto, L., Griffiths, M. D. & Brunsden, V. A. (2011). Psychometric comparison of the Internet Addiction Test, the Internet-related problem scale, and self-diagnosis. *Cyberpsychology, Behavior, and Social Networking, 14*(3), 141–149. doi: 10.1089/cyber.2010.0151

Wolniczak, I., Cáceres-DelAguila, J. A., Palma-Ardiles, G., Arroyo, K. J., Solís-Visscher, R., Paredes-Yauri, S., … Bernabe-Ortiz, A. (2013). Association between Facebook dependence and poor sleep quality: A study in a sample of undergraduate students in Peru. *PLoS ONE*, *8*(3), e59087. doi:10.1371/journal.pone.0059087

Wood, R. T. A., Griffiths, M. D., & Parke, A. (2007). Experiences of time loss among videogame players: An empirical study. *Cyberpsychology & Behavior, 10*(1), 38–44. doi:10.1089/cpb.2006.9994

Wright, M. F. (2014). Predictors of anonymous cyber aggression: The role of adolescents' beliefs about anonymity, aggression, and the permanency of digital content. *Cyberpsychology, Behavior, and Social Networking, 17*(7), 431–438. doi:10.1089/cyber.2013.0457

Yang, Z., Griffiths, M.D., Asbury, K. (2018). Do Chinese and British university students use smartphones differently? A cross-cultural mixed methods study. *International Journal of Mental Health and Addiction*. doi: 10.1007/s11469-018-0024-4

Yao, M. Z. & Zhong, Z. (2014). Loneliness, social contacts and Internet addiction: A cross-lagged panel study. *Computers in Human Behavior, 30, 164-170.* doi: 10.1016/j.chb.2013.08.007

Younes,F., Halawi , G., Jabbour, H., El Osta, N., Karam, L., Hajj, A., & Khabbaz, L. R. (2016). Internet addiction and relationships with insomnia, anxiety, depression, stress and self-esteem in university students: A Cross-Sectional Designed Study. *PLoS ONE, 11*(9), e0161126. doi:10.1371/journal.pone.0161126

Young, K. (1998). *Caught in the net.* New York: John Wiley

Young, K. S. (1998). Internet Addiction: The emergence of a new clinical disorder. *Cyberpsychology & Behavior, 1*(3), 237–244. doi: 10.1089/cpb.1998.1.237

Young, K. S. (2013). Treatment outcomes using CBT-IA with Internet-addicted patients. *Journal of Behavioral Addictions, 2*(4), 209–215. doi:10.1556/JBA.2.2013.4.3

Yudes-Gómez, C., Baridon-Chauvie, D., & González-Cabrera, J. (2018). Ciberacoso y uso problemático de Internet en Colombia, Uruguay y España: Un estudio transcultural. *Comunicar, 26*(56), 49-58. doi: 10.3916/C56-2018-05

Zaremohzzabieh, Z., Samah, B. A., Omar, S. Z., Bolong, J., Akhtar, N., & Kamarudin, N. A. (2014). Addictive Facebook use among university students. *Asian Social Science, 10*(6), 107–116. doi:10.5539/ass.v10n6p107