Multicomponent positive psychology interventions for promoting adolescents' mental health: An investigation from different methodological approaches

Claudia Tejada Gallardo

MULTICOMPONENT POSITIVE PSYCHOLOGY INTERVENTIONS FOR PROMOTING ADOLESCENTS' MENTAL HEALTH

AN INVESTIGATION FROM DIFFERENT METHODOLOGICAL APPROACHES

PhD in Psychology
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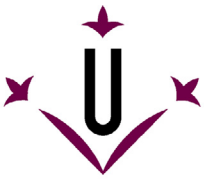
This thesis has received a grant for its linguistic revision from the Language Institute of the University of Lleida (2021 call).



Universitat de Lleida

TESI DOCTORAL

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Memòria presentada per optar al grau de Doctor per la Universitat de Lleida
Programa de Doctorat en Educació, Societat i Qualitat de Vida
2022

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“The days that make us happy make us wise”
John Masefield

ACKNOWLEDGMENTS

De repente me doy cuenta y ya estoy ahí, cerrando el documento final de la tesis y eso conlleva también dar las gracias a todas las personas que me han acompañado en este largo pero bonito camino. Llega este momento y, por unos instantes, los nervios se apoderan de mí. Probablemente os preguntéis cómo puede ser posible que el simple y fácil hecho de dar reconocimiento a todas las personas presentes durante esta etapa pueda desencadenar tal reacción. Y es que en un primer instante parecía la parte más fácil de la tesis, en la que solo te tienes *que dejar llevar* por las emociones que te han acompañado en este proceso y dejarlas ir, así de simple. Pero creedme que no, de hecho, ha sido un poco más difícil de lo que previamente esperaba. Aun así, tod@s os merecéis mi eterno agradecimiento y, está claro, voy a aprovechar la oportunidad.

Esta aventura no hubiera sido posible empezarla sin la Càtedra d'Innovació Social de la Universitat de Lleida, sin ella y sin las personas que la integran. Ell@s creyeron en mí, especialmente mi director y codirectora, Carles y Ana, sin vosotros este proceso no hubiera sido el mismo: los altibajos, las celebraciones, el estrés, los lloros, el crecimiento. Solo puedo decir que no he podido sentirme más arropada y apoyada por los dos en todo momento. *I Mònica, gràcies a tu també per fer-te teu aquest projecte compartit, per ajudar-nos a fer-lo créixer i per creure en el nostre equip*.

Estamos hechos de historias, cuyos actores y actrices son las personas que hacen nuestra vida más fácil. Cuando me pongo a pensar en todas ellas, me doy cuenta de que mi vida no hubiera sido la misma si no hubiera estado rodeada de esas personas y tampoco este pequeño proyecto que ha dado sentido a mis días durante los últimos años. A mi familia, Mamá, Marta, por acompañarme y "aguantarme" en este proceso a veces difícil de entender, pero sobre todo a ti Papá, por haber podido formar parte de él durante un tiempo (y de mi vida durante mucho), me has dado toda la fuerza que necesitaba y necesito para afrontar cualquier adversidad. *Joan, per ser el meu company de vida i amic, per complementar-me i entendre'm. Antonieta i Jaume, perquè també formeu part d'aquesta etapa i de la meva vida, donant-me suport sempre que ho he necessitat*. Wilma, por pasearme y distraerme todos los días (hayan sido bue-

nos o malos) y como no, a mi familia perruna de la protectora Amics dels Animals del Segrià, que (sin ellos saberlo) han sido terapéuticos, ayudando a evadirme y haciéndome disfrutar a su lado en todo momento.

Pero también a vosotr@s, amig@s, que estáis siempre que se os necesita: para dar un abrazo, un empujón, unas palabras de ánimo, sacar una sonrisa, compartir preocupaciones y buenas noticias. *Patri i Lourdes, per ser el clar exemple del que significa la paraula amistat*. Pablo, Jordi, Jaume, Rubén, por simplemente estar y hacerme reír en cualquier momento, la mejor medicina que hay. A mis *txikis*, Irene, Núria, Maddi, Amaia, aun en la distancia os he sentido siempre muy cerca. *Moni, Natàlia, Natalie, Ana, per la complicitat i per fer-me creure que l'amistat no és tan sols aquella de la infància*.

Por último, pero no por ello menos importante, quiero dar las gracias a las instituciones escolares que han formado parte de este proyecto y que sin ellas no hubiera sido posible llevarlo a cabo: INS Maria Rúbies, INS Ronda, Col·legi Sagrada Família y a tod@s las adolescentes que se involucraron en el programa. *M'agradaria, però, fer una menció especial al Claudi, l'Alba i l'Anna per la gran feina que fan i per haver-nos fet sentir sempre com a casa. I would also like to express my gratitude to the Oradea team, especially to Professor Sergiu Bălțătescu, for treating me as part of the research group.*

Es fácil en estos momentos dejarme gente atrás, pero a todas esas personas, os agradezco que hayáis formado parte de este proyecto y que forméis parte de mi vida.

LIST OF ACRONYMS

CFA: Confirmatory Factor Analysis
DASS: Depression, Anxiety, and Stress Scale
EMA: Ecological Momentary Assessment
EWB: Emotional Well-Being
LPA: Latent Profile Analysis
LTA: Latent Transition Analysis
MHC–SF: Mental Health Continuum–Short Form
MPPI: Multicomponent Positive Psychology Intervention
NA: Network Analysis
PPI: Positive Psychology Intervention
PWB: Psychological Well-Being
RCT: Randomized Controlled Trial
SDG: Sustainable Development Goals
SIC: Social Innovation Chair
SNA: Social Network Analysis
SoWB: Social Well-Being
SWB: Subjective Well-Being
UdL: Universitat de Lleida
WHO: World Health Organization

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ABSTRACT

Adolescence is a transitional stage involving many developmental changes, including biological, physical, and psychological challenges that can affect mental health. From the perspective of the dual-factor model, mental health involves the presence of well-being indicators and the absence of psychological distress indicators. According to this model, promotion programs aimed at increasing well-being and reducing psychological distress, namely multicomponent positive psychology interventions (MPPIs), are an effective strategy to endorse adolescents' mental health. Indeed, the endorsement of adolescents' mental health has become a primary concern among educational institutions and a fundamental priority for public policies during the last decade. However, the introduction of MPPIs as a tool to promote mental health in the school context has been scarce. Bearing these considerations in mind, the objectives of the present thesis are: to review studies that assess the effectiveness of MPPIs in the school setting and to broaden the study of adolescents' mental health by introducing the phenomenon of time attitudes (Section 1); and to investigate the impact of an MPPI program on adolescents' mental health and time attitudes using different methodological approaches (Section 2). To accomplish these objectives, we conducted a systematic review and meta-analysis, a cross-sectional study, and two experimental and longitudinal studies. The general results suggest that MPPIs have a positive effect on subjective well-being in the short term and on psychological well-being and depression symptoms in the short and in the long term. Time attitudes offered new possibilities in the study of adolescents' mental health. Adolescents with a positive time attitude profile reported higher scores for well-being indicators and lower scores for psychological distress indicators (Section 1). The implementation of the MPPI program also helped adolescents engage in positive attitudes towards the past, present, and future, which subsequently enhanced well-being. More specifically, the intervention program had an impact on transition probabilities from more detrimental profiles to optimal profiles of time attitudes. Similarly, structural changes in the subjective assessment of mental

health were observed after the intervention program, highlighting the role of stress during this period (Section 2). A more detailed discussion of the results and future research lines are developed in the thesis.

RESUMEN

La adolescencia es una etapa de transición con muchos cambios en el desarrollo, los cuales incluyen desafíos biológicos, físicos y psicológicos que pueden afectar la salud mental. A partir del modelo de dos factores, la salud mental se concibe como la presencia de indicadores de bienestar y la ausencia de indicadores de angustia psicológica. Según este modelo, los programas de promoción destinados a aumentar el bienestar y reducir la angustia psicológica, es decir, las intervenciones de múltiples componentes basadas en la psicología positiva, son una estrategia eficaz para respaldar la salud mental de los adolescentes. De hecho, el respaldo a la salud mental de los adolescentes se ha convertido en una preocupación primordial entre las instituciones educativas y una prioridad fundamental de las políticas públicas durante la última década. Sin embargo, la introducción de estas intervenciones como herramienta para promover la salud mental en el contexto escolar es escasa. Teniendo en cuenta estas consideraciones, los objetivos de la presente tesis son: revisar los estudios que evalúan la efectividad de las intervenciones con múltiples componentes en el ámbito escolar y ampliar el estudio de la salud mental de los adolescentes introduciendo el fenómeno de las actitudes frente al tiempo (Sección 1); y, por otro lado, investigar el impacto que un programa de intervención con múltiples componentes tiene en la salud mental y las actitudes temporales de los adolescentes utilizando diferentes enfoques metodológicos (Sección 2). Para lograr estos objetivos, realizamos una revisión sistemática y un meta-análisis, un estudio transversal y dos estudios experimentales y longitudinales. Los resultados generales sugieren que las intervenciones con múltiples componentes tienen un efecto positivo en el bienestar subjetivo a corto plazo y también en el bienestar psicológico y los síntomas de depresión a corto y largo plazo. Las actitudes temporales ofrecen nuevas posibilidades en el estudio de la salud mental de los adolescentes. De hecho, los adolescentes con un perfil de actitud positiva frente al tiempo obtuvieron puntuaciones más altas en los indicadores de bienestar y puntuaciones más bajas en los indicadores de angustia psicológica (Sección 1). La implementación del programa de intervención también ayudó a los adolescentes a tener actitudes más positivas hacia el pasado, presente y futuro, que posteriormente

mejoraron su bienestar. Más específicamente, el programa de intervención tuvo un impacto en las probabilidades de transición de perfiles más perjudiciales a perfiles más óptimos de actitudes temporales. Del mismo modo, se observaron cambios estructurales en la evaluación subjetiva de la salud mental después del programa de intervención, destacando el papel del estrés durante este período (Sección 2). En la tesis se desarrolla una discusión más detallada de los resultados y de las futuras líneas de investigación.

RESUM

L'adolescència és una etapa de transició amb molts canvis en el desenvolupament, els quals inclouen desafiaments biològics, físics i psicològics que poden afectar la salut mental. A partir del model de dos factors, la salut mental s'entén com la presència d'indicadors de benestar i l'absència d'indicadors d'angoixa psicològica. Segons aquest model, els programes de promoció destinats a augmentar el benestar i reduir l'angoixa psicològica, és a dir, les intervencions de múltiples components basades en la psicologia positiva són una estratègia eficaç per donar suport a la salut mental dels adolescents. De fet, el suport a la salut mental dels adolescents ha esdevingut una preocupació primordial entre les institucions educatives i una prioritat fonamental de les polítiques públiques durant la darrera dècada. Tot i això, la introducció d'aquestes intervencions com a eina per promoure la salut mental en el context escolar és escassa. Tenint en compte aquestes consideracions, els objectius de la present tesi són: revisar els estudis que avaluen l'efectivitat de les intervencions amb múltiples components a l'àmbit escolar i ampliar l'estudi de la salut mental dels adolescents introduint el fenomen de les actituds davant del temps (Secció 1); i, d'altra banda, investigar l'impacte que té un programa d'intervenció amb múltiples components en la salut mental i les actituds temporals dels adolescents utilitzant diferents enfocaments metodològics (Secció 2). Per assolir aquests objectius, realitzem una revisió sistemàtica i una metanàlisi, un estudi transversal i dos estudis experimentals i longitudinals. Els resultats generals suggereixen que les intervencions amb múltiples components tenen un efecte positiu en el benestar subjectiu a curt termini i també en el benestar psicològic i els símptomes de depressió a curt i llarg termini. Les actituds temporals obren un nou camí en l'estudi de la salut mental dels adolescents. De fet, els adolescents amb un perfil d'actitud positiva davant del temps van obtenir puntuacions més altes als indicadors de benestar i puntuacions més baixes als indicadors d'angoixa psicològica (Secció 1). La implementació del programa d'intervenció també va ajudar els adolescents a tenir actituds més positives cap al passat, present i futur, que posteriorment van millorar el benestar. Més específicament, el programa d'intervenció va tenir un impacte en les probabilitats de transició de perfils més perjudicials

a perfils òptims d'actituds temporals. De la mateixa manera, es van observar canvis estructurals a l'avaluació subjectiva de la salut mental després del programa d'intervenció, destacant el paper de l'estrès durant aquest període (Secció 2). A la tesi es desenvolupa una discussió més detallada dels resultats i de les futures línies de recerca.

1 Introduction

The present thesis has been carried out within the framework of the Social Innovation Chair (SIC) of the Universitat de Lleida (UdL). The main aim of the SIC has always been to generate social change in the city of Lleida but also in its surroundings through social actions that benefit the local people. At the grassroots level of the SIC appear the premises of the positive psychology movement. The Chair has prompted different projects through its lines of research, which have attempted to anticipate and detect social needs. In this endeavor, training activities, consulting, and investigations have been implemented with the ultimate goal of improving the quality of life of a wide spectrum of society. In order to disseminate its scientific knowledge, the SIC has participated in different national and international conferences and symposia and has published several research articles.

The origins of this thesis are immersed within the “Well-being and Healthy Organizations” research line and more specifically within the “Discovering your Character Strengths” project. This project has been implemented in high schools (among other institutions) in an effort to provide adolescents with resources to improve their well-being and happiness through the identification and promotion of personal resources like character strengths, emotional intelligence, and satisfaction with life. The project, in its essence, aimed to increase innovation in the school institution, while at the same time provide tools to the educational and psychological counseling services to help adolescents with their future professional careers. Through the thesis presented here, it will be possible to better understand how the abovementioned project has evolved during recent years and has also allowed us to collect data for this thesis.

Within the framework of the SIC, I was granted an official pre-doctoral scholarship by the UdL and an Erasmus scholarship to carry out a three-month international research stay (from September 2021 to December 2021) at Universitatea din Oradea (Oradea, Romania). This stay abroad has allowed me to be considered for the international PhD mention. The underpinning of the present thesis is a compendium of four research studies, three of which have been published and one is undergoing review in a peer-reviewed scientific journal. The thesis is structured around seven chapters, including this introductory paragraph.

2 Theoretical background

2.1 Adolescence and well-being

Adolescence is a crucial transitional stage in biological, physical, and psychological development (Burger & Samuel, 2017). It is also a period where multiple transitions involving fundamental circumstances materialize. These circumstances can include transitional education stages, the formation and maintenance of relationships, or the simple pursuit of self-awareness. The latter involves being conscious of who you are, how you think, and what you do, which is at the heart of adolescents' intrapersonal conflicts (Zaky, 2016). Hence, research contributions dealing with this specific age group are a cornerstone for advancement in the accompaniment of adolescents to a physically but also a mentally healthy adulthood. Accordingly, adolescents are not yet adults and they need age-appropriate support and care which include guidance and empathy. Efficient adolescent care entails implementing systematic measures to promote well-being and prevent mental illness among adolescents (Zaky, 2016). But how can scholars contribute to this aim by taking a positive standpoint on the matter?

In recent decades, a growing number of studies have investigated the well-being of adolescents. This exponential growth has been linked to the advance in the rights of children and adolescents in the 1990s (Navarro et al., 2017). A few years ago, the Sustainable Development Goals (SDG; United Nations General Assembly, 2015) also introduced it as a fundamental point in the 2030 Agenda, as stated in the third goal: "*ensure healthy lives and promote well-being for all at all ages*". This goal seeks to eliminate the global well-being disparity and has given rise to well-being initiatives and strategies targeting the adolescent population from different international organizations such as the following: Universal Health Coverage which launched a call for a comprehensive approach to address the health and well-being needs of adolescents (Lehtimaki & Schwalbe, 2019) or the World Health Organization (WHO) –United Nations International Children's Emergency Fund (UNICEF)– Lancet Commission which have also called for children (under 18 years old) to be at the center of the SDG (Clark et al., 2020). As stated, the study of well-being in adolescents has become the target of projects and investigations conducted by many organizations. It is not only psychologists that are interested in advancing in the study of adolescents' well-being. Professionals from other fields are also convinced about the lack of tools and comprehension of this necessary yet still understudied topic. Hence, a need for a healthy but also purposeful life has emerged and has been brought to the foreground of many research studies.

Two perspectives have been widely studied throughout the literature trying to define and measure well-being. All humans typically form an opinion as to how much they like

the life they live (i.e., hedonic tradition) but they also typically develop ideas on who they are and what they live for (i.e., eudaimonic tradition; Veenhoven, 2020). The hedonic tradition is associated with the concept of subjective well-being (SWB; Diener, 1984), which involves a combination of one cognitive process (i.e., life satisfaction) and two affective processes (i.e., positive and negative affect; Cummins & Cahill, 2000). Life satisfaction entails individual evaluations of how satisfied one is with one's own life while the affective processes entail the presence of positive affect and the absence of negative affect. These three elements comprise the tripartite structure of SWB. To note, from this moment onwards we will use either SWB or emotional well-being (EWB) interchangeably. By comparison, the eudaimonic tradition is associated with the concepts of psychological well-being (PWB; Ryff, 1989; Ryff & Keyes, 1995) and social well-being (SoWB; Keyes, 1998). PWB is premised on the idea that positive (and effective) functioning comes from the development and realization of human potential (i.e., self-fulfillment; Waterman, 1993). PWB is also the most widely used subjective assessment within the eudaimonic tradition and encompasses six dimensions: self-acceptance (having positive attitudes towards oneself and being conscious of one's own limitations), autonomy (being independent when taking decisions and evaluating personal experiences according to one's own criteria), positive relations (having trusting, satisfactory, and reciprocal relationships), purpose in life (comprising the ability to find meaning in challenges and efforts, and having and nurturing purpose and goals in life), environmental mastery (having a sense of competence in managing the environment, along with meeting personal needs and desires), and personal growth (experiencing constant growth, improvement, and openness to new experiences) (Ryff, 1989). To fully understand the optimal functioning and mental health of individuals, it was also suggested to include SoWB as part of the eudaimonic tradition (Keyes, 1998). This reveals how one is functioning in society and consists of five dimensions: social integration (feeling of belongness and support from a community and society), social acceptance (having a positive attitude towards individuals, trusting and accepting them with their differences and complexities), social contribution (perceiving oneself as useful to society and that the goals accomplished are valuable and valued by the society), social actualization (believing in the evolution of society and the progression of individuals), and social coherence (understanding society as something logical, predictable and meaningful, arousing interest in [belonging to] society) (Keyes, 2005; Keyes, 1998).

The distinction between the hedonic and eudaimonic traditions has generated debates among scholars as to the overlap between the two (Deci & Ryan, 2008); for instance, the extent to which they are correlated or their discriminant validity (Strelhow et al., 2020). In the study of adolescents, though mainly in other age groups, hedonic well-being has been put in the spotlight leaving the eudaimonic tradition at a secondary stage (Huta, 2013). Although it is not an easy dimension to define or operationalize in research, scholars suggest that the eudaimonic tradition can aid in understanding the concept of well-being (Deci & Ryan, 2008) and should thus be included in the evaluation of adolescents' well-being (Strelhow et al., 2020). Consequently, the present thesis has focused on the study of the three well-being domains (SWB, PWB, and SoWB).

The fledgling science of positive psychology, which involves the study of optimal human functioning considering both the hedonic and eudaimonic traditions, has been widely accepted by the scientific community. However, the conventional view of mental health as the mere absence of psychopathology and negative outcomes is widespread among many social and clinical scholars (Seligman & Csikszentmihalyi, 2000). Despite the deep-rooted medical approach of the prevention of illness being still widely shared by the scientific community, there is increased recognition of the conceptualization of complete mental health as defined by the presence of a positive indicator (i.e., well-being) and a negative indicator (i.e., psychopathology; Suldo & Shaffer, 2008). Together, they form the so-called dual-factor model of mental health (Keyes, 2005).

2.1.1 The dual-factor model of mental health

Children and adolescents (between 5 and 18 years old) constitute almost one-third of the global population and approximately 20% of them at some point during this stage of life experience a mental health *difficulty* (UNICEF, 2013). The use of different terms in the field, such as mental health *difficulty*, adopted by UNICEF (2013), or mental health *symptoms*, referring to psychological distress adopted by other scholars (e.g., Shi et al., 2020), is considered contradictory to the extent that they do not clearly represent what they seek to convey: health (Doll, 2008). This has led to a continuous misuse of the term and an increased challenge in seeking a clear and unified definition of the concept of mental health.

In 1958 Jahoda already stated: “the absence of mental health may constitute a necessary criterion for mental health” (p. 15). Two decades ago, Greenspoon and Saklofske (2001) added (in italics): “the absence of mental health may constitute a necessary, *but not sufficient*, criterion for mental health”. These authors also conducted the first study to integrate the two proposed indicators of mental health (i.e., positive indicator; well-being, and negative indicator; psychopathology). The study demonstrated that the consideration of two indicators to better understand mental health is beneficial, given that psychopathology can co-occur with high levels of SWB (Greenspoon & Saklofske, 2001), and thus suggested that well-being and psychopathology are not opposite poles of a single continuum (Suldo & Shaffer, 2008). As a consequence, the dual-factor model provides a conceptualization of mental health as defined by the presence of a positive indicator and the absence of clinical risk factors (Westerhof & Keyes, 2010). According to this conceptualization, mental health is more than the mere absence of psychopathology, and therefore well-being and mental diseases are considered as related but empirically distinct constructs (WHO, 2004). In view of the above, the absence of psychopathology in children and adolescents does not necessarily indicate a state of complete mental health (Keyes, 2009), and the introduction of both positive and negative indicators to the assessment of mental health involves a more comprehensive understanding of the concept itself (Antaramian et al., 2010).

But why is it important to introduce the dual-factor model of mental health in adolescents? During adolescence, emotional inclinations often stabilize, and negative in-

clinations can develop into stable and pathological states of, for instance, depression and anxiety (Derdikman-Eiron et al., 2013). Certainly, adolescents are at particularly high risk of mental diseases, most of which also develop during this stage (Wasil et al., 2021). The point is that during the transition from adolescence to adulthood, there is an even higher prevalence of suffering from a mental disease (Pearson & Wilkinson, 2013), specifically depression, which has its peak at the age of 15 to 17 years (Keyes et al., 2019). It is estimated that over 3% of females and 4.5% of males between 15 and 19 years old suffer from depression, while 5.5% of females and 3.5% of males suffer from anxiety disorders (WHO, 2017). Hence, adolescence is considered the age of onset of psychological distress (Paus et al., 2008; Shapero et al., 2013). In fact, the numbers of adolescents affected by depression, anxiety, and stress has increased in recent years, becoming a societal burden (WHO, 2017). Although psychological distress is an aspect to worry about during this life stage, it has also been demonstrated that adolescents reporting high levels of well-being would be closely related to decreased levels of depression (Doll, 2008; Tejada-Gallardo et al., 2021a[1]). Unlike in childhood, the social and psychological components of well-being in adolescence seem to gain importance, whereas that of the emotional component tends to decrease (Hallam et al., 2014). Of the three components of well-being, PWB appears to be the most emergent among older adolescents (González-Carrasco et al., 2019). Considering the above, the three components of well-being should be put in the spotlight when fighting psychological distress, considered the negative indicator of mental health in this thesis.

In light of the potential conceptualization of mental health that Greenspoon & Saklofske (2001) proposed, the utility of a dual-factor model of mental health is useful to study the optimal psychological functioning of adolescents. A holistic approach to well-being is then necessary in a sense that psychological diseases or illnesses can have an adverse effect on the development of children and adolescents, such as the ability to understand and manage emotions and thoughts, to build and maintain social relationships, or to deal with failure (WHO, 2013). Adolescents also face increasing and constant demands to satisfy the needs of normative adjustment, including academic and social adaptation and identity formation (La Guardia & Ryan, 2002). All these demands have been linked to decreased SWB, SoWB, and PWB (Chen & Page, 2016; González-Carrasco et al., 2019) and to exacerbated psychological distress (Hammen, 2005; Suldo et al., 2016). Following the conceptualization by Greenspoon & Saklofske (2001) of mental health, Suldo and Shuffer (2008) studied the dual-factor model of mental health in adolescents. These authors included the assessment of SWB as a reliable index of the positive dimension. However, recent studies on adolescents' well-being (e.g., Sarriera & Bedin, 2017; Strelhow et al., 2020) have been committed to a wider conceptualization of well-being, including both the hedonic and eudaimonic traditions. Following this trend, and as previously mentioned, the present thesis also involves the study of SoWB and PWB (besides EWB) in adolescents as part of the positive indicator of mental health. Hence, the omission of well-being in the operation-

1. This refers to Study 2 of the thesis.

alization of mental health is particularly worrying when the aim is to evaluate promotion and prevention programs (Clonan et al., 2004; Keyes, 2009; Suldo et al., 2016).

With this in mind, the ultimate goal of mental health promotion and prevention programs is to enhance well-being and, as a consequence, prevent a broad array of psychological disorders. This thesis has contributed to the dual-factor model of mental health through three articles. In the first article (Study 1), a systematic review and a meta-analysis examined the impact of psychological programs on fostering adolescents' mental health in the school context (i.e., multicomponent positive psychology interventions [MPPIs]). Measures of SWB, SoWB, and PWB on the one hand, and measures of psychological distress (i.e., depression, anxiety, and stress) on the other, were included in this study. In the second article (Study 2), mental health was studied in relation to time attitudes through a person-centered approach (i.e., latent profile analysis [LPA]) —a further explanation on the topic is presented below under the sub-section: *Time perspectives and time attitudes in adolescents*. In the third article (Study 4), an MPPI developed by the research group was tested on adolescents' mental health using the network approach of psychology. To better understand the dimensionality of mental health indicators, the network approach has been recently applied to the study of different psychological phenomena (Fried et al., 2017). The main contribution of this approach, as opposed to the common cause perspective aimed at identifying a latent variable that causes the formation and changes of psychological variables, is that it yields in the assessment of constructs based on the causal relationships displayed among the components that form the network (e.g., symptoms or items). It is conceived as an inclusive approach and transcends many limitations in the study of, for instance, mental health. Researchers often find issues when it comes to explaining the discriminant validity between constructs of well-being (Strelhow et al., 2020) and psychological distress, especially depression and anxiety (Julian, 2011). The network approach assumes that dimensions, in this case of well-being and psychological distress, are causally intertwined in complex ways. This might explain the psychometric challenges to differentiate between constructs within this field of research (Fabian, 2021). Hence, this inclusive approach would allow to observe the underlying structural network in the study of mental health by identifying the mutual connections (i.e., edges or links) between its indicators (i.e., nodes or vertices) (Epskamp et al., 2018; Tejada-Gallardo et al., 2021 [under review][2]).

To summarize, throughout this thesis mental health can be conceptualized in consideration of a positive indicator (well-being—EWB, SoWB, and PWB) and a negative indicator (psychological distress—depression, anxiety, and stress). To implement and assess mental health promotion and prevention programs, it is necessary to include well-being as a reliable index, failing which the full understanding of mental health remains incomplete. Either way, it is also important to consider which are the aspects that contribute to the well-being of adolescents. In the pages that follow, this question will be approached in detail.

2. This refers to Study 4 of the thesis.

2.1.2 Which aspects can contribute to adolescents' well-being?

Traditionally, the study of adolescents' well-being has been tackled from an adult-centered approach in which adolescents are only prepared for what awaits them in the future: adult life. However, previous work has already focused on changing this rooted belief and has placed adolescents at the center of the study with their day-to-day opinions and concerns (e.g., González-Carrasco et al., 2019), thus giving way to an adolescent-centered approach. Owing to this change of approach, the central aspects of adolescents' well-being have been explored in greater depth. Some of these aspects are explained in detail below and are divided into the following groups: factors associated with levels of well-being, age and gender, and context.

Levels of well-being

Some factors associated with adolescents' well-being can be explained according to their levels of well-being. Depending on these levels, it is possible to find differences in the factors that adolescents consider important for their own evaluation of well-being. Adolescents with high levels of SWB place more interest in factors from the eudaimonic tradition (e.g., self-acceptance or life objectives); conversely, adolescents with low levels of well-being give more importance to factors associated to the hedonic tradition (e.g., being happy; González-Carrasco et al., 2019). Following this trend, adolescents with low levels of SWB also report that not having any relative that can help them when they needed it has a negative impact on their well-being, while adolescents with high levels of SWB report that being able to rely on a family member when needed and receiving support from them impacts positively on their well-being (González-Carrasco et al., 2019). Assuming adolescents' self-evaluations of well-being, enhancing its levels through promotion programs seems a reasonable strategy to achieve optimal psychological functioning.

Age and gender

Researchers have conducted ongoing investigations into the aspects that lead to adolescents' well-being and have revealed that age and gender are also important factors to consider. Longitudinal studies (González-Carrasco, et al., 2017a; González-Carrasco, et al., 2017b) have reported decreases in well-being as adolescence advances. In particular, it has been possible to observe a decline in adolescents' SWB from 10 to 15 years of age (Casas & González-Carrasco, 2019; Holte et al., 2014). This feature can be closely associated to developmental factors common to this life period. However, the association of well-being to a clearly eudaimonic factor, such as having life objectives, was mainly found among older adolescents. Hence, an eudaimonic conception of well-being appears during the adolescent period (especially in late adolescence) in contrast to previous ages, when a hedonic conception prevails. In this line, Ryan and Deci (2000) suggested that the factors associated to the hedonic tradition do not inevitably contribute to adolescents' high levels of well-being, while eudaimonic factors do. Regarding gender,

girls tend to be more concerned with aspects related to the eudaimonic tradition (e.g., leaving others with a good memory of you or appreciating the small things). Nevertheless, the decline of well-being during adolescence is more pronounced in girls compared to boys (Crous et al., 2018). The majority of studies on children and adolescents focus on SWB. However, few studies have started to introduce PWB in research dealing with adolescents. The main reason is due the difficulty in evaluating PWB in children because it is still challenging to develop validated measures for this age group. As previously stated, PWB emerges in older adolescents (González-Carrasco et al., 2019) and this is leading researchers to start (and to continue) to introduce measures of PWB in adolescent samples to report well-supported results. Considering the decline of well-being during adolescence and that PWB is mainly studied in late adolescence, three articles of the thesis (Studies 2, 3, and 4) have focused on this specific age-group (15 years old).

Context

Finally, other factors that adolescents also consider fundamental for their well-being are those related to relationships (i.e., family and non-family members), social support, self-efficacy (González-Carrasco et al., 2019), school performance (Suldo & Huebner, 2006), integrity, and autonomy (Ryan & Deci, 2001). Another important factor is individual traits (Viñas et al., 2014) such as optimism, a construct that is related to adolescents' SWB (Scheier et al., 1994; Tejada-Gallardo et al., 2020a).

All these aspects can be integrated in the intrapersonal, family, school, and community contexts of adolescents. Well-being is considered an individual circumstance but is immersed in different contexts in which adolescents develop. Lee and Yoo (2015) supported these findings and demonstrated in a representative, cross-cultural study that these contexts are important predictors of adolescents' well-being. Among all of them, this thesis focuses on the school setting to examine the dynamics of well-being because, as explained in the following lines, it has an important influence on adolescents' well-being.

The World Happiness Report is an annual publication led by the United Nations Assembly which aims to measure worldwide happiness and use these data to help guide public policy. Results from the 2017 World Happiness Report (Clark et al., 2017) showed that life in school (both for children and adolescents) has a crucial effect on their EWB. Regarding older adolescents (from 15 to 18 years old), the effect of secondary school on their EWB was similar to the effect reported about the family and bigger than the effect reported about elementary education. Promoting well-being at this transitional stage has a positive effect on family, peer relationships (Lester et al., 2016), and school life (Clark et al., 2017), but also on the reduction of risk-taking behaviors (Moore et al., 2017). Hence, being satisfied while spending time in this particular setting is associated to positive psychological variables such as positive affect (Gilman & Huebner, 2003), hope, self-esteem (Huebner & Gilman, 2006), locus of control and to low levels of depression, anxiety, and stress (Huebner et al., 2001). Together, these findings support the key role of the school setting as a vehicle to improve the well-being of adolescents.

2.1.3 Time perspective and time attitudes in adolescents

The behavior of individuals does not depend entirely on their present circumstances. Their mood is deeply affected by their hopes and wishes and by the views of their own past (Velleman, 1991). This remark has been profoundly connected with a person's SWB, which is comprised not only of the present circumstances but also of the reminder of positive past events, the savor of present events, and the anticipation of future positive events (Bryant, 2003). The way in which people evaluate and feel towards time may also influence the global evaluation of their satisfaction with life.

As humans, we all have the ability to travel back and forward in time. This capacity to mentally anticipate and recall events helps us to learn from previous experiences and to plan future events (Cunningham et al., 2015). Time perspective is this inner capacity possessed by humans and is defined as a multi-dimensional construct that emerges from cognitive processes in which human experience is divided into past, present, and future time frames and influences specific behaviors through the way individuals think and feel about time (Zimbardo & Boyd, 1999). The Zimbardo time perspective inventory (Zimbardo & Boyd, 1999) was the first comprehensive and theory-based operationalization of time perspectives and it consisted of five dimensions: past negative, past positive, present hedonistic, present fatalistic, and future. Time perspective can be adaptive in a sense that it leads individuals to think about time and thus make decisions and engage in specific behaviors (Mello & Worrell, 2015). To put it more pointedly, individuals who foresee a fruitful future might be well advised to not avoid present duties and secure a desirable future (Cunningham et al., 2015). This leads us to understand how time perspectives can contribute to well-being depending on one's life circumstances.

The construct of time perspective is regarded as a developmental phenomenon that is particularly salient in adolescence (Piaget, 1955); however, Mello & Worrell (2015) adapted and reconceptualized the model proposed by Zimbardo & Boyd (1999) because it demonstrated limited utility in adolescent samples (Zimbardo time perspective inventory scores were not always reliable). Moreover, the structural validity of the model, which lacks a negative dimension towards the future, did not support the original structure of the scale (Mello & Worrell, 2007). Accordingly, Mello & Worrell (2015) presented a new conceptual model of time perspective for adolescents. This model proposes that time perspective is composed of the three time frames (i.e., past, present, and future) in five dimensions (i.e., time attitudes, time orientation, time relation, time frequency, and time meaning). The former refers to individuals' positive and negative feelings towards the past, present, and future and can be assessed using a self-administered questionnaire (Mello & Worrell 2015). Time attitudes is the most commonly studied element of time perspectives and although it is named differently, this element has been previously investigated under the Zimbardo time perspective inventory (Zimbardo & Boyd, 1999). Regarding the construct of time attitudes and with the intention of broadening their study in adolescents, time attitudes have been investigated in two articles of the present thesis

(Study 2 and Study 3); for this reason, the present subsection will attempt to cover the roots of the concept.

The study of feelings towards time has gained attention with particular regard to adolescence in efforts to describe how time attitudes promote adolescent-specific developmental, social, and emotional changes (e.g., Andretta et al., 2014; Worrell et al., 2019). Research on adolescents has employed Mello & Worrell's (2015) time attitudes measure to investigate several developmental outcomes through a person-centered approach. A person-centered approach is built on the assumption that a target population might include multiple unobserved sub-groups with distinct configurations of variables. The objective in this approach, therefore, is to identify these population sub-groups in which the analyzed variables are treated as characteristics of those individuals rather than merely outcomes (Laursen & Hoff, 2006). Research on time attitudes employs person-centered analysis, such as the LPA, to identify types of individuals who display similar positive and negative feelings towards the past, present, and future (i.e., latent profiles) and describe the organization of time attitudes within individuals (Lanza et al., 2010; Mello & Worrell, 2015). Time attitude profiles have been associated with academic achievement and self-esteem, suggesting that positive profiles (e.g., positive and optimistic) reflect higher academic expectations and self-esteem than negative profiles (e.g., negative and pessimistic; Andretta et al., 2014). Other studies on risk-taking behaviors demonstrated that certain profiles were associated with less alcohol use, and that the positive profiles were associated with the highest proportion of alcohol abstainers (McKay et al., 2019). Morgan et al., (2016) also demonstrated that individuals clustered in the positive profile had higher self-efficacy and were less sensation-seeking than those clustered in negative profiles. In short, studies on time attitude profiles have indicated that positive profiles are associated with more adaptive outcomes.

As previously stated, several profiles have been observed across time attitude studies involving adolescents (Andretta et al., 2014; Konowalczyk et al., 2019; McKay et al., 2019; Wells et al., 2018). An example of these profile labels are: positive –agreeable feelings towards all time frames; balanced –similar feelings towards each time frame; ambivalent –a lack of strong feelings towards all three time frames; and negative –disagreeable feelings towards all time frames. Although previous research has revealed similar profiles across studies (e.g., McKay et al., 2019; Morgan et al., 2016; Wells et al., 2018), the blend of evidence has made it difficult to establish a common pattern of clusters because variations across profiles are likely in adolescent samples. Regarding the optimal profiles, the positive is the ideal profile and the balanced profile has been proposed as indicative of adequate functioning (Boniwell & Zimbardo, 2004). Thus, being positive or maintaining a healthy balance towards the three time frames may be significant for the well-being of adolescents (Cunningham et al., 2015). However, one concern among researchers studying this topic refers to individuals who are very focused on the negative feelings towards the three time frames and would consequently avoid present and future life pleasures.

Recent research has found that individuals with high levels of PWB recall more positive than negative memories from the past (Garcia & Siddiqui, 2009). How indi-

viduals relate to the past may also be related to their own self-acceptance, personal growth, purpose in life, environmental mastery, autonomy, and the ability to create positive relations with others. In efforts to mitigate maladaptive time attitude profiles and help individuals transition towards optimal profiles, interventions targeting well-being constructs have been proposed (Miller & Nickerson, 2008). This can be explained because positive emotions concern one's feelings about time (past, present, and future; Diener & Seligman, 2002); for instance, individuals can feel positive emotions and be happy about their past but engage in negative emotions and be unhappy about their future. Accordingly, nudging adolescents with negative feelings towards their past events, present experiences, and future expectations to more positive feelings can be related to enhanced well-being (Tejada-Gallardo et al., 2021b[3]) and, as a consequence, to reduced psychological distress (Tejada-Gallardo et al., 2021a).

2.1.4 How can we promote adolescents' mental health?

Previous authors have already attempted to answer to this question, however, different approaches to the matter and results have emerged from the existing literature. Below is a brief summary of programs attempting to promote the mental health of adolescents.

A considerable amount of research has been published on programs to promote mental health. Examples of such programs are: social and emotional learning, well-being therapy, self-regulation interventions, positive psychology interventions (PPIs), and MPPIs, among others. These studies involve both face-to-face and online interventions. A literature review of school-based mental health promotion programs (mainly social and emotional learning programs; O'Connor et al., 2017) and a meta-analysis of follow-up effects on social and emotional learning programs (Taylor et al., 2017) found that a variety of interventions targeting mental health can be implemented with positive effects on social and emotional assets that contribute to the positive development of students. Sin and Lyubomirsky (2009) conducted the first systematic review and meta-analysis of PPIs to report the effects on well-being and depressive symptoms. In this investigation, only three out of 49 studies targeted both children and adolescent populations. These three studies did not report significant effects, leaving a gap in the research of programs aimed at promoting adolescents' mental health. However, the investigation was fully extended in a systematic review and meta-analysis about the effects of school-based MPPIs on adolescents' well-being and psychological distress (Tejada-Gallardo et al., 2020b[4]). Study 1 of the thesis reported small-to-moderate effect sizes on the well-being and psychological distress of adolescents after an MPPI program in the school context. For this reason, it is not only of greatest importance to investigate and advance in the

3. This refers to Study 3 of the thesis.
4. This refers to Study 1 of the thesis.

study of mental health but also to develop, implement, and evaluate programs aimed at increasing adolescents' well-being and reducing their psychological distress.

Within the framework of these standards, we undertook the present thesis on the basis of the positive psychology paradigm. Hence, the following section will approach positive psychology, and more specifically PPIs, as the bases to develop intervention programs in the school setting.

2.2 PPI programs

While traditional psychology has focused exclusively on negative outcomes and suffering, which has led to seeing the "half-empty glass" of an individual's life, the positive psychology movement has brought the "half-full" part of the proverb to the foreground. Positive psychology arose from the desire to investigate scientifically how to achieve *a good life*. This approach is rooted in the attainment of optimal human functioning and flourishing and truly believes in actions that can lead individuals and communities to thrive (Seligman & Csikszentmihalyi, 2000). This approach also complements the medical model of disease and tries not to focus on deficiencies and vulnerabilities, rather on the proliferation and use of psychosocial strengths and resources, such as gratitude, optimism, self-efficacy, life purpose, kindness, and positive relationships, among others. According to Park and Peterson (2003), "positive psychology provides a broad perspective for understanding how childhood programs might produce optimal development" (p. 2). Early promotion programs for children and adolescents have been established in different settings due to the growing importance that educational and clinical psychologists are giving to early intervention and across the stages of children's and adolescents' lives (Reynolds et al., 2010).

The PPI programs are grounded in positive psychology and the objective of these interventions is to reinforce positive behaviors and emotions, increase positive affect, and decrease negative affect through the use, for instance, of character strengths (Blasco-Belled et al., 2018; Ros-Morente et al., 2018) in order to enhance well-being. Nevertheless, they also provide indirect positive effects through decreasing emotionally negative states such as depression or anxiety (Pawelski, 2016). More generally, PPIs promote SWB and PWB, increase happiness, and decrease depressive symptoms in the general population (Bolier et al., 2013; Koydemir et al., 2020). Regarding the school context, in a prior literature review of school-based single component PPIs, adolescents' well-being and academic performance was fostered while distress was mitigated through the application of PPIs (Waters, 2011).

In contrast to PPIs, which are interventions that include one or more individual exercises targeting one component of well-being (e.g., gratitude, hope or character strengths; Froh et al., 2009; Marques et al., 2011; Proctor et al., 2011), MPPIs are based on a variety of individual exercises targeting two or more theoretically relevant well-being components conducted within an integral program (Seligman, 2011, 2018). According to the synergis-

tic change model (Rusk et al., 2018), which posits that targeting multiple domains of positive functioning decreases the risk of relapse and increases the probability of spill-over effects and synergy between activities, MPPIs are more likely to provide longer lasting effects than PPIs (Rusk et al., 2018). To understand the scope of MPPIs it is necessary to bear in mind the two traditions that define well-being: the hedonic and eudaimonic. Under this premise, well-being is a relatively sustained experience whose achievement requires personal effort (Waterman, 1993) and involves how one is functioning in response to life's demands and to society at large (Keyes, 1998; Ryff, 1989; Ryff & Keyes, 1995). Nevertheless, studies examining the effectiveness of these interventions in adolescent samples in the school context are limited (Roth et al., 2017), possibly due to the difficulties of introducing school-based well-being initiatives within the school curriculum.

Although a previous internet-based systematic review and meta-analysis showed that the implementation of PPIs in adolescents contributes to the promotion and enhancement of well-being and (in some studies) to the reduction of psychological distress (Välimäki et al., 2017), the effects that interventions targeting multiple domains of positive functioning would have on adolescents' well-being were unknown. Despite the increasing popularity of MPPIs in the general population (Hendriks et al., 2019; Koydemir et al., 2020) and the emergence of positive education as a mechanism to introduce positive interventions in the school context, no systematic review and meta-analysis previously addressed this question. Study 1 of the present thesis thus reviewed the available literature about the topic and only found nine studies that focused on the implementation of empirically validated MPPIs aimed at increasing the well-being of this age group (Tejada-Gallardo et al., 2020b). This systematic review and meta-analysis has also demonstrated that this limitation is even greater in our country (Spain) where no single program has been found in the scientific literature, and therefore we assume that no program has previously validated its effectiveness (nor been implemented).

2.2.1 MPPIs in the school context

School is a context where adolescents develop throughout this life stage. In fact, it plays a key role in facilitating or inhibiting adolescents' successful cognitive and social development (Cartland et al., 2003). Hence, education should not only be about academic learning but also about students' mental health (Nooddings, 2003). Teaching and building happiness in the educational context can serve as an effective tool to promote adolescents' optimal psychological functioning (Seligman et al., 2009).

The educational context is considered the most important setting to promote the well-being of adolescents because not only is it a flexible and cost-effective place for a diverse range of programs but also adolescents feel safer compared to in a healthcare setting (WHO, 2001). Apart from being involved in their academic and cognitive development, schools also have the function of nurturing students' emotional and social development (Holte et al., 2014). Hence, embracing the positive mental health of adolescents can not only improve the ability to learn and to become academically successful, but also

to become self-fulfilled young adults. Schools also serve as a support to adolescents in their transitional life circumstances in which they have to choose and decide about the future. As a result, it is important that school institutions working with adolescents should include health promotion and youth development as evidence-based programs. In short, they should take the promotion of children's and adolescents' optimal psychological adjustment more seriously (Weisz et al., 2005).

Growing evidence supports the belief that the programs seeking to promote EWB, SoWB, and PWB in schools can produce long-term benefits (Holte et al., 2014). Long-term promotion programs in the school setting can also change the school environment and are likely to be more successful than brief prevention programs (Weare & Nind, 2011). A change of this magnitude involves a profound transformation, starting within the school board. However, reforms at policy level will be required to overcome the disconnection between the growing evidence as to the efficacy of school-based positive interventions and the relevant obstacles (White, 2016). This leads to a change of paradigm in school institutions with a positive approach in terms of education, called positive education (Bernard & Walton, 2011; Seligman et al., 2009). Still, one of the challenges in trying to assess positive education as a whole is that the different interventions proposed previously have rarely been used or assessed together as part of a whole-school program. To our knowledge, this whole-school approach has only been implemented in a few school institutions with programs such as the Australian MindMatters (Wyn et al., 2000) or the initiative implemented at the Greelong Grammar School (O'Connor & Cameron, 2017). These approaches have led to health, academic, and social gains (McCabe, 2007), yet it is still simply not known whether the whole is synergistically stronger than the individual parts.

Positive education emerged alongside the positive psychology movement. Within educational institutions, positive education aims to teach both the skills of well-being and the skills of achievement, mainly through the application of school-based promotion-orientated interventions that target the mental health of children and adolescents (Seligman et al. 2009). To date, these interventions have been implemented in isolated classrooms and not as part of the school curriculum. However, to have a sustained effect, adolescents need to be exposed to mental health promotion programs more constantly and during several high-school years (Waters, 2011). Given the need for positive youth development in schools, it is imperative to foster the introduction of these programs under the approach of positive education practices (Noble & McGrath, 2008). This approach argues that there are five key foundations of well-being that are the enabling factors that should be built into PPIs and as a consequence in MPPIs: social and emotional competency, positive emotions, positive relationships, engagement, and sense of meaning and purpose.

Put together, school-based MPPIs are strategies that aim to address the promotion of well-being and the prevention of psychological distress in children and adolescents in the school setting (Waters, 2011). These strategies help practitioners and teachers identify adolescents with low well-being, which, in some cases, indicates a greater risk of psychopathological symptoms (Suldo & Shaffer, 2008). Hence, the implementation of MPPIs in the school setting have been proposed as the basis to promote adolescents' mental

health (Seligman et al., 2009). Nevertheless, schools should also be seen as proactive institutions in the use of these comprehensive and multifaceted approaches needed to build and protect students' mental health and promote healthy developmental pathways for the transition to adulthood (O'Connor et al., 2017; Schulenberg et al., 2004).

Approximately three million people in Spain are diagnosed with depression every year, and this condition typically has its onset at the age of 15 (Spanish Ministry of Health, Consumer Affairs, and Social Welfare, 2017). This age is of particular importance given that in the Spanish educational system, it is considered a key transitional stage when adolescents should decide whether they wish to continue studying or join the workforce. Transition and adaptation to young adult life is healthier when adolescents experience well-being and relatively minor symptoms of psychological distress. Hence, the promotion of mental health among adolescents can be also an effective strategy to ensure young adult transitions and future adult positive mental health (O'Connor et al., 2017). Even though the prevention of mental illnesses is central to psychologists' work, building and promoting well-being should be of equal importance, as adolescents may not have optimal functioning regardless of the absence of any mental disorder (Suldo et al., 2014). A recent study by O'Connor et al., (2017) examined the long-term implications of adolescent positive mental health for successful transitions to young adult. Mental health at 15-16 years was found to be associated with indicators of career progression and taking on citizenship responsibilities over a decade later. This suggests that in the school context successful and healthy transitions into young adult roles and responsibilities may be facilitated by targeted mental health promotion programs.

2.2.2 The Get to Know Me+ program

This project has evolved and grown in recent years. Its current form is a result of effort and dedication by the members of the SIC. The phases of the project to the version used in the present thesis are explained below. However, further into the text (conclusions of the thesis), a more recent version of the project, after applying some modifications to the Get to Know Me+ program, is presented.

The Get to Know Me+ program has its origins in a previous program by the SIC called "Discovering your Character Strengths". The primary aim of this program was (and still is) to identify students' character strengths, emotional intelligence, and life satisfaction so that adolescents can be aware of and improve their well-being. Participants were adolescents, mainly 15-16 years old, from educational institutions of the city of Lleida. The procedure of this project consisted of two steps; first, two members of the SIC attended a one-hour school class to provide students with access to an online platform so they could complete a set of self-reports. Secondly, students obtained an individualized report explaining their results, which were commented with a member psychologist of the SIC to clarify any doubts. This program has been implemented since 2015 until today. After some time, the formal and informal feedback from the participating members —students and teachers— revealed the utility and importance of this project. Therefore,

the SIC team conducted a thoughtful review of the basics of the program to incorporate some suggestions and modifications. The result led to developing a new and comprehensive well-being program: the Get to Know Me+ program.

The Get to Know Me+ program was designed with the intention of covering more aspects of well-being (not only character strengths) since a lengthier program resulted in more effects on the well-being of individuals (Hendriks et al., 2019) and adolescents (Tejada-Gallardo et al., 2020b). Hence, the Get to Know Me+ program was created to enhance the mental health of adolescents in the school setting. The name of the program was decided in an interview with the adolescents who participated in the pilot study and reported their evaluations concerning the program. The sentence "get to know me" was constantly repeated in the interview, as students indicated that the program helps them to get to know themselves better both in greater depth and in a more positive way. We therefore decided to give this name to the first pilot project.

The main goals of the program are: (1) to enhance the well-being of adolescents during the transition process to young adulthood (15-17 years old); (2) to help adolescents overcome the challenges that they face personally and socially, promoting optimal psychological functioning; and (3) to develop positive feelings towards time (past, present, and future). The Get to Know Me+ program applied for this thesis had a limited duration of six weeks due to restraints in school schedules. The study version of the program was designed to function as an integrated whole composed of the principles of well-being under three modules: (1) focus on the positive emotions of the present; (2) deal with the positive emotions of the past; and (3) move forward towards the positive emotions of the future. The positive or negative feelings that adolescents have towards time also influence their emotional state and well-being (Tejada-Gallardo et al., 2021a). Also, an individual's behavior is not determined solely by their present situation, as one's mood is affected by personal hopes, goals, and views of the past (Mello & Worrell, 2015). Hence, the components of the program focus not only on present life experiences but also on past recollections and future expectations regarding one's life (Cunningham et al., 2015). Accordingly, the Get to Know Me+ program incorporates several aspects that emphasize the promotion of adolescents' well-being through the three time frames. For instance, gratitude practices may boost positive attitudes towards the past (Seligman et al., 2005), signature strengths practices may develop positive present attitudes (Proctor et al., 2011), and reflecting on one's best future self may promote positive attitudes towards the future (Sheldon & Lyubomirsky, 2006). Each session consisted of four parts with an introductory flow activity, a central activity to put the principle of well-being into practice, a general group discussion, and the closing of the session. Table 1 shows a summary of the program sessions implemented in the high schools that participated in this thesis.

TABLE 1. SUMMARY OF INTERVENTION CONTENTS

Modules and sessions	Session goals	Procedure and activities
Introductory session		
1. Well-being	• Establish supportive group environment • Introduce students to the broad aspects of well-being (Lyubomirsky et al., 2005) and the aspects that determine it	**Flow activity**: Mind map activity: "Which memories do you relate with your favorite fruit"? **Central activity**: Mind map activity: "What does well-being mean to you"? **Group discussion**: "What does well-being mean? Why is it important?" **Closing**: Suggesting ways of increasing well-being through purposeful thoughts
Focus on the positive emotions of the present		
2. Character strengths	• Define character strengths and virtues (Park et al., 2004) • Explore students' character strengths through the VIA questionnaire and apply them to different situations	**Flow activity**: Identify the character strengths (using a card game) of their best friend/important person **Central activity 1**: Identify their own character strengths **Central activity 2**: Identify and share two character strengths of their group peers using a card game **Central activity 3**: Select and apply their top two character strengths in three different contexts (family, friends, school) **Group discussion**: Discuss their previous choices with the class group **Closing**: Discuss how character strengths are related to well-being and encourage students to use their greatest strengths
3. Dealing with emotions	• Introduce the components of emotional intelligence (attention, clarity, and regulation) • Challenge negative emotions and thoughts through cognitive restructuring and describing past negative experiences (Fava, 1999)	**Flow activity**: Identify and define each component of emotional intelligence **Central activity**: Emotional action process. Identify a conflict situation; recognize the emotions, thoughts, and behavior that the situation evoked; finally, suggest and plan more adaptive responses to similar future situations. **Group discussion**: Share the central activity with the class group **Closing**: Discuss the importance of acknowledging their freedom to change and adapt their responses to distressful situations and highlight the contribution of positive emotions to well-being

***T*urn back to the positive emotions of the past**		
4. Gratitude	• Introduce gratitude and its contribution to well-being through prosocial behavior (Froh et al., 2009) • Connect with and appreciate positive emotions • Learn to integrate actions and expressions of gratitude in their daily lives	**Flow activity**: *The Desert Island*: "What would you take with you to a desert island?" Importance of reminding themselves of the most important things in their life **Central activity**: Gratitude letter **Group discussion**: Voluntarily share the gratitude letter with the class group **Closing**: Remind as to why gratitude can be important for improving well-being. Challenge students to make a gratitude visit during the week
Move forward to the positive emotions of the future		
5. Optimistic thinking	• Introduce optimism and optimistic thinking • Learn methods to achieve and/or increase an optimistic explanatory style (Sheldon & Lyubomirsky, 2006)	**Flow activity:** Identify and share an important memory, person, and wish **Central activity**: My best possible self **Group discussion**: Voluntarily share the central activity and discuss the importance of optimistic thinking with the class group **Closing**: Remind students that optimism can help them focus on positive goals for their futures and prevent feelings of helplessness through the belief that there are ways to meet those goals
6. Goal setting	• Compile the activities and exercises learned through the program • Frame life in terms of goal establishment and plans to achieve those goals	**Flow activity**: Go through and revise the previous program activities and exercises via a snowball effect **Central activity**: Personal action plan: Establish the steps needed to become their best selves **Group discussion**: Share the action plan with the class group **Closing**: Remind students of how all the activities and exercises covered throughout the program helped increase their well-being. Encourage them to keep on practicing and completing all their work

3 Rationale, objectives, and hypotheses

3.1 Thesis rationale and objectives

In 2015, all the members of the United Nations signed the 2030 Agenda for SDG (United Nations, 2020). The third goal of the Agenda was to "*ensure healthy lives and promote well-being for all at all ages*". Central to this goal are the concepts of health and well-being, especially of women, children, and adolescents, which has been at the center of the overall success of the strategy instigated by different organizations (e.g., United Nations, WHO or UNICEF). Adolescence is a critical period of the life course when factors that contribute to well-being are either acquired or not (Ross et al., 2020). Hence, the present thesis focuses on the study and promotion of adolescent mental health (including well-being), trying to dovetail these aspects with the third SDG. It is worth mentioning that this thesis was initiated before the outbreak of the Covid-19 pandemic and therefore the implementation of the intervention program was previous to lockdown. However, the direct or indirect impact of the Covid-19 pandemic has also brought to the forefront the importance of systems (such as school institutions) being in place to support the mental health of children and adolescents (UNICEF, 2021).

Drawing upon the presented strands of research into the mental health of adolescents, this thesis attempts to add new knowledge to the existing literature. The compilation of the four thesis studies aims to fill some gaps about adolescents' mental health. All participants in the studies were high school students in their last compulsory year in the Spanish educational system. We specifically selected this population because they have to deal with important decisions about their future. Not only is adolescence considered a transitional stage, but it is also a complicated period because it includes all the crucial circumstances and decisions that they have to face during this developmental period. Taken together, the present thesis is organized in two sections; Section 1, an introductory and broad-based section to lay the groundwork of the thesis. This section includes Studies 1 and 2 with the objective of achieving a more thorough understanding of the school-based MPPI programs available in the literature and to expand the study of time attitudes and mental health of adolescents. Section 2 is a more specific section to put the experimental part into practice. This section includes Studies 3 and 4 with the objective of studying and promoting the mental health of adolescents through a school-based MPPI program. Regarding the specific objectives of the thesis, they are presented below.

3.2 Specific objectives and hypotheses

Specific objective 1. To systematically review all the literature about school-based MPPIs in an effort to examine the short- and long-term effects of these interventions on adolescents' mental health.

Research questions and hypotheses:

- **RQ1:** What is the efficacy of school-based MPPIs in promoting mental health indicators (i.e., increasing well-being and decreasing psychological distress)?
- **H1:** MPPIs would have a small but significant effect on mental health indicators.
- **RQ2:** What is the influence of the different variables (e.g., study design or duration of intervention) on the effects of school-based MPPIs?
- **H2:** Variables such as study design, type of intervention, the existence or not of a control group, or the presence or not of follow-up would influence the efficacy of MPPIs.

Specific objective 2. To investigate the unexplored relationship between time attitude profiles and mental health in adolescents.

Research questions and hypotheses:

- **RQ1:** Which time attitude profiles emerged from an adolescent sample?
- **H1:** The two most common time attitude profiles (i.e., positive and negative) would emerge as well as a combination of other time attitude profiles found in previous studies (both in number and characteristics).
- **RQ2:** Do time attitude profiles relate to indicators of mental health?
- **H2:** Positive profiles would be associated with higher scores for EWB, SoWB, and PWB and lower scores for depression, anxiety, and stress symptoms.

Specific objective 3. To explore the extent to which a school-based MPPIs may have an impact on the transition probabilities towards optimal time attitude profiles in adolescents, and the influence of these transitions on their well-being (EWB, SoWB, and PWB).

Research questions and hypotheses:

- **RQ1:** May an MPPI influence adolescents' transition probabilities to more positive profiles compared to the control group?
- **H1:** After an MPPI, adolescents in the intervention group would transition towards more positive profiles compared to the control group.
- **RQ2:** After an MPPI, do adolescents in the experimental group clustered in positive profiles report higher scores for EWB, SoWB, and PWB?
- **H2:** Adolescents in the intervention group clustered in positive profiles would report higher EWB, SoWB, and PWB compared to those allocated to the control group.

Specific objective 4. To explore changes in the network structure of mental health after the implementation of a school-based MPPI in adolescents.

Research questions and hypothesis:

- **RQ1:** What are the changes in the structure of mental health after an MPPI at post-test and follow-up assessments between groups?
- **H1:** Changes in the network structure of mental health would be more present after an MPPI in the intervention group compared to the control group. More changes in the network structure of mental health would also be observed at post-test than at follow-up measurement assessment.

4 Methodology

The methodology of the present thesis is quantitative in nature and different designs and statistical techniques were employed to analyze the data. A summary of all techniques is presented in the following sub-sections.

4.1 Participants

The data for the whole thesis was gathered from adolescent samples. In particular, the data of Study 1 was based on a literature review of research studies including adolescents in the school setting. However, the data for Studies 2, 3, and 4 was collected from adolescents attending a compulsory educational institution (i.e., high school) in Lleida (western Catalonia, Spain). Specific data on participants' demographic characteristics are summarized in Table 2. To note, given the longitudinal design of Study 3 and Study 4, participants' responses were only included in the statistical analyses if they attended at least four of the six program sessions.

Participants from the three empirical studies (Studies 2, 3, and 4) were 10th grade students (4th year of compulsory secondary education according to the Spanish education system—called ESO) during data collection. Adolescents were from three different high schools located in the city of Lleida: INS Maria Rúbies, INS Ronda, and Sagrada Familia. It is noteworthy to mention that INS Maria Rúbies and INS Ronda are public high school institutions while Sagrada Familia only offers teaches up to compulsory secondary education level (Grade 10).

TABLE 2. SUMMARY OF DESCRIPTIVE CHARACTERISTICS

	N	M_{age}	SD	Female percentage
Study 1	4898 adolescents	13.27	1.85	54%
Study 2	317 adolescents	15.07	0.64	45.1%
Study 3	220 adolescents; 85 experimental group, 135 control group	14.98	0.62	47.3%
Study 4	220 adolescents; 85 experimental group, 135 control group	14.98	0.62	47.3%

4.2 Procedure

The procedure for gathering the data depended on the specific goals of each study. In Study 1, we performed a systematic review of the literature. Three databases were used to accomplish this purpose; PsychINFO, PubMed, and Scopus. The last run was

conducted in July 2019. The selection of the studies followed the PICOS (Population, Intervention, Comparison, Outcome, and Study design) approach and several inclusion and exclusion criteria were considered to incorporate the studies in the final sample. The eligibility of studies was also decided following a standardized screening procedure. Finally, a quality assessment of the included studies was performed using the Cochrane collaboration tool for assessing risk of bias (known as the RoB2) in randomized controlled trials (RCTs; Sterne et al., 2019). Further details regarding the methodological procedure of the systematic review are set out in Study 1.

The data collection for Studies 2, 3, and 4 followed the same procedure, the only difference being that Study 2 was cross-sectional in nature and the data was then gathered at one specific point in time. In contrast, Studies 3 and 4 followed a longitudinal and experimental design in which the Get to Know Me+ program was implemented and the assessment was conducted at different time points. Classes from the two participating high schools were randomly allocated to the experimental and control groups (placebo or active control group), thus an RCT was the design employed for these studies. To note, the placebo group engaged in a one-off activity ("Discovering your Character Strengths" project —see introduction) with the psychologists involved in the intervention. Participants completed the measures in the form of a survey via an online platform (Google Forms). In each survey, all respondents were given extensive information about the procedure and only those who completed the entire protocol were accepted to join the study. In all cases, the respondents participated voluntarily and could withdraw from the study at any time without further explanation. All participants received a form of informed consent, and their parents or legal guardians had to sign it in order to allow the adolescents to participate in the program and, as a consequence, use their data for research purposes. No partial responses were collected. By this means, the results were automatically stored for data analysis.

The data for the three empirical studies was gathered from adolescents who participated in the two programs commented on in the introduction ("Discovering your Character Strengths" and "The Get to Know Me+ program") which took place during the 2019-2020 academic year. The first data collection took place in September 2019, the second wave in December 2019, and the third in February 2020. Due to Covid-19 restrictions during the remainder of the academic year, no further data could be gathered. In fact, it has also been difficult to gain access to educational institutions for further data collection during the 2020-2021 academic year. For this reason, availability of data was limited for Studies 2, 3, and 4. The experimental study was approved by the Research Ethics Committee of the University of Lleida assigned registration code: CEIC-2157 (see Appendix 2).

4.3 Measures

Table 3 displays a review of the measures included in each study together with the methodology employed. The scales used in the quantitative methodology and their reliability estimates are presented in more detail in the results section, where the studies are included.

TABLE 3. REVIEW OF THE METHODOLOGY AND MEASURES USED IN EACH OF THE FOUR STUDIES

	Methodology	Measures	Construct
Study 1	Systematic review and meta-analysis	• *The Brief Multidimensional Student's Life Satisfaction Scale* (BMSLSS; Seligson et al., 2003) • *Multidimensional Students' Life Satisfaction Scale* (MSLSS; Huebner & Gilman, 2002) • *Positive and Negative Affect Schedule for Children* (PANAS–C; Laurent et al., 1999) • *Students' Life Satisfaction Scale* (SLSS; Huebner, 1991) • *Satisfaction with Life Scale* (SWLS; Diener et al., 1985)	• SWB
		• *Flourishing Scale* (FS; Diener et al., 2010) • *Psychological Well-Being* (PWB; Ruini et al., 2003) • *Psychological Well-Being Scale for Adolescents* (Bizarro, 1999)	• PWB
		• *Brief Symptoms Inventory* (BSI; Derogatis & Spencer, 1993) • *Depression, Anxiety and Stress Scale* (DASS–21; Lovibond & Lovibond, 1995) • *Kellner's Symptom Questionnaire* (SQ; Kellner, 1987) • *Revised Children Manifest Anxiety Scale* (RCMAS; Reynolds & Richmond, 1978)	• Depression, Anxiety, and Stress
Study 2	Empirical (cross-sectional)	• *Mental Health Continuum–Short Form* (MHC–SF; Keyes et al., 2008; Spanish adaptation by Echeverría et al., 2017)	• EWB, SoWB, and PWB
		• *Depression, Anxiety, and Stress Scale* (DASS–21; Lovibond & Lovibond, 1995; Spanish adaptation by Daza et al., 2002)	• Depression, Anxiety, and Stress
		• *Adolescent and Adult Time Inventory-Time Attitudes Scale* (AATI–TA; Mello & Worrell, 2017; Spanish adaptation by Mello et al., 2010)	• Time attitudes

Study 3	Empirical (longitudinal)	• *Mental Health Continuum–Short Form* (MHC–SF; Keyes et al., 2008; Spanish adaptation by Echeverría et al., 2017)	• EWB, SoWB, and PWB
		• *Adolescent and Adult Time Inventory–Time Attitudes Scale* (AATI–TA; Mello & Worrell, 2017; Spanish adaptation by Mello et al., 2010)	• Time attitudes
Study 4	Empirical (longitudinal)	• *Mental Health Continuum–Short Form* (MHC–SF; Keyes et al., 2008; Spanish adaptation by Echeverría et al., 2017)	• EWB, SoWB, and PWB
		• *Depression, Anxiety, and Stress Scale* (DASS–21; Lovibond & Lovibond, 1995; Spanish adaptation by Daza et al., 2002)	• Depression, Anxiety, and Stress

4.4 Statistical Analyses

The data analyses were carried out using different statistical tools, such as Comprehensive Meta-Analysis (CMA V.3; Borenstein et al., 2013), SPSS 27.0 (IBM corp, 2020), Mplus version 7.2 (Muthén & Muthén, 2012), and *RStudio* version 1.3.1093 (RStudio Team, 2020). A summary of the analyses employed in the four studies is presented in Table 4. However, a more detailed explanation of each analysis can be found below and also in the four studies included in the results section.

TABLE 4. SUMMARY OF THE ANALYSES PERFORMED IN EACH STUDY

	Study 1 (CMA)	**Study 2 (Mplus, SPSS)**	**Study 3 (Mplus, SPSS)**	**Study 4 (RStudio, SPSS)**
PRISMA-P[5]	✓			
Confirmatory factor analysis		✓	✓	
Measurement invariance			✓	
Latent profile analysis		✓	✓	
Latent transition analysis			✓	
Network analysis				✓

To conduct the systematic review and meta-analysis in Study 1, the preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) were followed in the planning, organization, and reporting of the study. To meta-analyze the effect sizes (Hedges' *g*), the means, standard deviations, and sample sizes were extracted from the included studies. Standardized effect sizes were calculated from the average score at pre-intervention and the average score at post-intervention from both groups separately and divided by the pooled standard deviations. Heterogeneity across studies was expected and, as a consequence, a random-effects model was selected to examine the pooled effect sizes (Borenstein et al., 2010). To test the presence of heterogeneity across studies, the Q test and I^2 statistic were employed (Higgins & Thompson, 2002) and further analyses on the sources of heterogeneity were explored. Sub-group analyses were examined to test possible moderating effects of a series of variables (e.g., study design, number of sessions or duration). Finally, publi-

5. Explanation of the abbreviation is presented in the text below the table.

cation bias was also assessed through funnel plots, Egger's test, Duval and Tweedie's trim-and-fill procedure, and the fail-safe N (Sterne et al., 2008).

Confirmatory factor analysis (CFA) is another statistical technique employed in Studies 2 and 3 to assess the measurement structure of scales. This is a type of structural equation modeling that deals specifically with measurement models; that is, the relationship observed between measures or indicators (e.g., test items) and latent variables or factors (Brown & Moore, 2012). The measurement structure of the scales was then assessed following standard recommendations of model fit evaluation (Hu & Bentler, 1999): the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Also, the measurement invariance of these models, which assesses whether the constructs of the scales were measured equally at different time points within a same group (Millsap, 2011), was evaluated longitudinally in Study 3 through different tests: 1) configural invariance, 2) weak invariance (loadings), 3) strong invariance (loadings and thresholds), and 4) strict invariance (loadings, thresholds, and uniquenesses).

LPA is a statistical procedure that was used in Studies 2 and 3 to classify individuals based on alike response patterns to a set of continuous variables (i.e., indicators–six time attitude factors). Despite being similar to CFA, LPA explains population heterogeneity by identifying the underlying unobserved categorical variable that divides a population into subgroups (i.e., profiles) of individuals who are similar in their responses for a set of observed variables (Oberski, 2016). Several statistical indices were used to support the choice of the retained profiles: 1) the Akaike information criterion (AIC); 2) the consistent AIC (CAIC); 3) the Bayesian information criterion (BIC); 4) the sample-size adjusted BIC (aBIC); 5) the adjusted Lo-Mendell-Rubin's likelihood ratio test (aLMR); and 6) the bootstrap likelihood ratio test (BLRT). The AIC, CAIC, BIC, and aBIC were used to compare competing models, and lower values indicated an overall better profile solution. The aLMR and BLRT were used to compare the models of the k profile and the $k - 1$ profile; when these tests are statistically significant, the model with higher profiles should be retained (Nylund et al., 2007). Entropy is another indicator that we relied on in the classification of individuals into latent profiles, with values ranging from 0 (lower accuracy) to 1 (higher accuracy; Tein et al., 2013).

The latent transition analysis (LTA) procedure is the longitudinal extension of the LPA used in Study 3. Once the exact number of profiles was identified at both measurement time points and for each group, the two-time multigroup specific models were combined into a longitudinal LPA to verify the extent to which these solutions were similar across time points (Morin & Litalien 2017; Morin et al., 2016). Tests of similarity were then conducted in sequence: 1) configural similarity (i.e., identical number of profiles); 2) structural similarity (i.e., identical within-profile means on the profile indicators); 3) dispersion similarity (i.e., identical within-profile variation on the profile indicators); and 4) distributional similarity (i.e., identical profile sizes). The most similar model from the previous procedure was then retained and converted into an LTA to estimate the within-person stability in profile membership and probability of transition-

ing from a particular profile at Time 1 to another profile at Time 2 (Kam et al., 2016). Put differently, to estimate the probabilities of transitioning among time attitude profiles in each group (i.e., control and experimental) from Time 1 to Time 2 after an MPPI.

Finally, a network analysis (NA), was conducted in Study 4 because it allows to study mental health from a different psychological approach to the ones previously presented. To investigate group differences in the network of mental health after the implementation of an MPPI, a moderated network model analysis was applied (Haslbeck & Waldorp, 2020). The visualization of the networks was composed of nodes (i.e., variables) and edges (i.e., partial correlations), in which the width of edges indicates the strength of the connections between the variables. The moderated network model approach enabled the fitting of networks using variables of mixed types (mixed graphical models), in which one variable acts as a moderator of the pairwise interaction between two nodes. In Study 4, a moderated mixed graphical model was fitted for each time-point measurement (pre, post, and follow-up) that included a grouping variable with two categories (i.e., control or intervention group) and the continuous variables (i.e., mental health). The grouping variable was introduced as a categorial moderator, allowing a comparison of group differences by conditioning on the moderator (Haslbeck & Waldorp, 2020). The values of the moderator to represent the control and experimental groups for the three timepoints were also specified. The aim was to test whether the “group” variable moderated the relationship between the variables included in the study (well-being and psychological distress indicators) after the intervention.

5 Results

5.1 Thesis publications

The present dissertation consists of four studies that have been published or have been submitted to peer-reviewed scientific journals. The impact factor of these journals shows the quality of the research conducted.

- **Publication 1: Effects of school-based multicomponent positive psychology interventions on well-being and distress in adolescents: A systematic review and meta-analysis** published in the *Journal of Youth and Adolescence,* 49(10), 1943–1969, https://doi.org/10.1007/s10964-020-01289-9. This journal is indexed in the Journal Citation Reports (Social Sciences edition) with and impact factor of 4.381 (2020, Received 8 April 2020, Accepted 9 July 2020, Published 18 July 2020). It is classified in the first quartile of the area of developmental psychology (ranking: 14/78; percentile: 82.69).

- **Publication 2: Feeling positive towards time: How time attitude profiles are related to mental health in adolescents** published in the *Journal of Adolescence,* 89, 84–94, https://doi.org/10.1016/j.adolescence.2021.04.002. This journal is indexed in the Journal Citation Reports (Social Sciences edition) with and impact factor of 3.256 (2020, Received 24 July 2020, Accepted 4 April 2021, Published 23 April 2021). It is classified in the second quartile of the area of developmental psychology (ranking: 25/78; percentile: 68.59).

- **Publication 3: Impact of a school-based multicomponent positive psychology intervention on adolescents' time attitudes: A latent transition analysis** published in the *Journal of Youth and Adolescence*, https://doi.org/10.1007/s10964-021-01562-5. This journal is indexed in the Journal Citation Reports (Social Sciences edition) with and impact factor of 4.381 (2020, Received 4 November 2021, Published 31 December 2021). It is classified in the first quartile of the area of developmental psychology (ranking: 14/78; percentile: 82.69).

- **Publication 4: Changes in the structure of mental health after a multicomponent positive psychology intervention in adolescents: A longitudinal network analysis** submitted to the *Journal of Happiness Studies*. This journal is indexed in the Journal Citation Reports (Social Sciences edition) with and impact factor of 3.852 (2020, submitted August 31, 2021, under review). It is classified in the first quartile of the area of interdisciplinary social sciences (ranking: 11/110; percentile: 89.55).

SECTION 1

A GLIMPSE OF THE GRASSROOTS OF THE THESIS

5.1.1 EFFECTS OF SCHOOL-BASED MULTICOMPONENT POSITIVE PSYCHOLOGY INTERVENTIONS ON WELL-BEING AND DISTRESS IN ADOLESCENTS: A SYSTEMATIC REVIEW AND META-ANALYSIS

Tejada-Gallardo, C., Blasco-Belled, A., Torrelles-Nadal, C., & Alsinet, C. (2020)

Journal of Youth and Adolescence, 49(10), 1943–1969

DOI: 10.1007/s10964-020-01289-9

Journal of Youth and Adolescence
https://doi.org/10.1007/s10964-020-01289-9

EMPIRICAL RESEARCH

Effects of School-based Multicomponent Positive Psychology Interventions on Well-being and Distress in Adolescents: A Systematic Review and Meta-analysis

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Received: 8 April 2020 / Accepted: 9 July 2020

Abstract
Multicomponent positive psychology interventions are increasing in the general population but the study of its effectiveness in adolescents is still scarce, especially in the school context. Previous meta-analyses have reported that multicomponent positive psychology interventions increase well-being and reduce distress outcomes. However, the results on these outcomes limit their samples to adult populations. The aim of the current systematic review and meta-analysis is to evaluate and compare the immediate but also long-lasting effects of school-based multicomponent positive psychology interventions aimed at increasing well-being indicators of mental health (i.e., subjective and psychological well-being) and reducing the most common psychological distress indicators (i.e., depression, anxiety, and stress) in adolescents. A total of 9 randomized and non-randomized controlled trials from the searched literature met inclusion criteria for the meta-analysis. The results showed small effects for subjective well-being ($g = 0.24$), psychological well-being ($g = 0.25$), and depression symptoms ($g = 0.28$). Removing low-quality studies led to a slight decrease in the effect sizes for subjective well-being and a considerable increase for psychological well-being and depression symptoms. The relevant moderation analyses had an effect on subjective well-being and depression symptoms. The present systematic review and meta-analysis found evidence for the efficacy of school-based multicomponent positive psychology interventions in improving mental health in the short and long-term. Small effects for subjective well-being, psychological well-being, and depression symptoms were identified. Effects for psychological well-being and depression symptoms remained significant over time. In light of our results, education policy-makers and practitioners are encouraged to include positive practices within the schools' curriculum as effective and easily implemented tools that help to enhance adolescents' mental health. Further research is needed in order to strengthen the findings about school-based multicomponent positive psychology interventions in adolescents.

Keywords Positive psychology · Well-being · Intervention · Multicomponent · School · Meta-analysis

Introduction

Psychological research and practice have traditionally focused on the treatment of mental illness, ignoring aspects of well-being and positive functioning promotion (Chakhssi et al. 2018). Adolescence is a crucial transitional stage in biological and psychological development (Burger and Samuel 2017), wherein optimal mental health is conceived as the combination of high levels of well-being and few symptoms of mental illness (Keyes 2009; World Health Organization 2004). In contrast to the growing number of evidence-based interventions, which mainly focus on the treatment of mental disorders and the reduction of psychological distress, few studies have examined the contribution that interventions aiming at increasing well-being have in adolescents (Suldo et al. 2014). Given the need for prevention and intervention during the period of adolescence, school-based programs are an increasing and

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Published online: 18 July 2020

effective method to enhance positive functioning (Freire et al. 2018). In this effort, positive psychology interventions originated as scientifically-based interventions that focus on strengthening positive emotions, thoughts, and behaviors through activities that can be easily implemented in daily routines (Schotanus-Dijkstra et al. 2015), and have proven their usefulness in promoting well-being and reducing distress in the school setting (Waters 2011). Thus, the present study seeks to examine the effects of school-based multicomponent positive psychology interventions on well-being indicators of mental health (i.e., subjective and psychological well-being) and psychological distress indicators (i.e., depression, anxiety, and stress) in adolescents through a systematic review of the existing literature and a meta-analysis.

School-based Positive Psychology Interventions in Adolescents

Adolescents spend a significant part of their lifetime in the school and therefore this environment plays an important role in their social, emotional, and psychological development (Waters 2011). Psychological distress can appear during adolescence, being the onset of mental health problems such as anxiety and depression symptoms (Paus et al. 2008), which are the later predictors of stress' levels (Shapero et al. 2013). Taking into account these considerations, schools could serve as a vehicle for the promotion of positive youth development and effective learning (Clonan et al. 2004). Positive education pursues the promotion of positive emotions, positive relationships, and character strengths and, simultaneously, it attempts to foster skills for happiness and well-being in the school context (Bernard and Walton 2011). Positive education comprises educational institutions that teach both the skills of well-being and the skills of achievement, mainly throughout the application of school-based positive psychology interventions (Seligman et al. 2009). To date, these interventions have been implemented in isolated classrooms and not as part of the school curriculum. However, to reach a sustained effect, adolescents have to be exposed to positive psychology interventions more constantly and through different high-school years (Waters 2011). Given the need for a positive youth development in schools, it is imperative to foster the introduction of these interventions under the approach of positive education practices (Noble and McGrath 2008). This approach argues that there are five key foundations of well-being (i.e., social and emotional competency, positive emotions, positive relationships, engagement, and sense of meaning and purpose), which are the enabling factors that should be built into positive psychology interventions.

Prior Research on Positive Psychology Interventions and Multicomponent Positive Psychology Interventions

In contrast to positive psychology interventions, which are single-component interventions that include one or more individual exercises targeting one component of well-being (e.g., gratitude, hope or character strengths) (Froh et al. 2009; Marques et al. 2011; Proctor et al. 2011), multicomponent positive psychology interventions are based on a variety of individual exercises targeting two or more theoretically relevant well-being components that resemble the key elements of positive education and are conducted within an integral program (Seligman 2011, 2018). According to the Synergistic Change Model (Rusk et al. 2017), which poses that targeting multiple domains of positive functioning decreases the risk of relapse and increases the probability of spill-over effects and synergy between activities, multicomponent positive psychology interventions are more likely to provide long-term effects over positive psychology interventions (Rusk et al. 2017).

To understand the scope of multicomponent positive psychology interventions it is necessary to acknowledge the two main theoretical approaches that define well-being: the hedonic and eudaimonic perspectives. The hedonic perspective describes well-being in terms of pleasure maximization and pain avoidance (Ryan and Deci 2001), and subjective well-being has been commonly referred to as the psychological construct affiliated to this conceptualization (Diener 1984). By contrast, the eudaimonic perspective claims the realization of one's true inner potential and virtue as a pathway to experiencing a meaningful and fulfilling life (Vittersø 2016; Waterman 1993). Under this premise, well-being is a relatively sustained experience that requires personal effort to be achieved (Waterman 1993) and involves how one is functioning in response to life's demands (psychological well-being; Ryff 1989, 1995) and to larger society (social well-being; Keyes 1998). Multicomponent positive psychology interventions are composed of at least two components that target both perspectives of well-being: hedonia and eudaimonia. Nevertheless, studies examining the effectiveness of these interventions applied in the school context in adolescents are limited (Roth et al. 2017), possibly due to the difficulties of introducing school-based well-being initiatives in the school curriculum.

In a prior literature review of school-based single component positive psychology interventions, adolescents' well-being and academic performance was fostered while distress was mitigated through the application of positive interventions (Waters 2011). Despite the increasing popularity of multicomponent positive psychology interventions in the general population and the emergence of positive education as a

mechanism to introduce positive interventions in the school context, it comes as surprise that the application and examination of multicomponent positive psychology interventions' effectiveness has not been previously reviewed in adolescents, but only in adults (Hendriks et al. 2019; Koydemir et al. 2020). As a result, the present study focused on a review of the existing literature on the topic and the subsequent effects of school-based multicomponent positive psychology interventions in adolescents.

Current Study

In recent years, there has been an increased popularity of studies on positive psychology interventions. While some meta-analyses have demonstrated the efficacy of multicomponent positive psychology interventions in adult samples, no single meta-analysis has investigated the effects of these interventions in adolescents in the school context. To address this gap, the purpose of the present meta-analysis was to examine the immediate but also long-lasting effects of school-based multicomponent positive psychology interventions aimed at increasing well-being and reducing psychological distress symptoms of adolescents aged between 10 and 18 years old.

The first aim was to identify and quantify the efficacy of well-being indicators of mental health (subjective and psychological well-being) as primary outcomes, and psychological distress indicators (depression, anxiety, and stress) as secondary outcomes, since it is necessary to the continued success of the interventions. To note, not all studies included in the current meta-analysis measured aspects of psychological distress, therefore all selected studies included (a) well-being mental health outcomes, but not necessarily (b) psychological distress outcomes. As a secondary aim, moderation analyses were also applied to explore how intervention effects may vary across different groups (i.e., publication year, study design, type of intervention, control group, number of sessions, duration of intervention, quality of the studies, and follow-up measures). Such analyses were used to investigate sources of heterogeneity, which cannot be drawn from the pooled treatment effect estimate. Taken together, the present study attempted to evaluate the effects of school-based multicomponent positive psychology interventions on well-being and distress symptomatology and the features that improve their efficacy in order to establish recommendations for future interventions to implement in school settings.

Methods

The preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) for the conducting of systematic reviews and meta-analyses (Moher et al. 2015) were followed in the planning, implementation and reporting of the present meta-analysis. This study was registered in PROSPERO (#CRD42019139586), an international prospective register for systematic reviews.

Search Strategy

A systematic literature search was performed in the PsycINFO, PubMed, and Scopus databases. Another procedure to identify eligible studies was the reference list screening of previous reviews and meta-analyses for additional potentially eligible studies (Ciocanel et al. 2017; Dunning et al. 2018; Taylor et al. 2017; Waters 2011; Weiss et al. 2016). The last run was conducted in July 2019 and it was done by the first and second authors. The search terms used were: positive psychology, well-being, happy, happiness, gratitude, optimism, kindness, strengths, compassion, forgiveness, intervention, prevention, program, promotion, adolescent, teenager, and youth. The search strings were combined according to the databases (see Appendix Table 5).

Selection of Studies

The inclusion criteria for the selected studies were formulated in accordance with the PICOS approach and the studies were included, based on the following criteria: (1) the focus of the intervention was adolescents (10–18 years old) from the general population, (2) interventions should target at least two components of well-being as part of a program, (3) measures of the intervention should include outcomes of subjective or psychological well-being and could also include secondary outcomes of depression, anxiety, and stress symptoms, (4) school programs were the focus of the interventions, which included all activities delivered in the school setting during school hours, (5) studies were randomized controlled trials and non-randomized controlled trials that used a control condition, and (6) studies were published in peer-reviewed journals without time restrictions. The exclusion criteria were the following: (1) young people from the clinical population, (2) interventions that only targeted one component of well-being, such as gratitude intervention, hope therapy, strength-based approaches and mindfulness-based interventions, (3) studies not providing sufficient data for the analysis of the effect sizes at post-treatment and with comparison groups, (4) studies published in book chapters, theoretical or narrative review papers and dissertations, and (5) articles published in languages other than English or Spanish.

Data Extraction

Two data extractors (CTG and ABB) independently assessed the eligibility of the studies following a standardized

procedure. After removal of duplicates, the retrieved articles from the search were screened. First, the title and abstract were screened by two independent reviewers (CTG and ABB). Secondly, the full text was assessed for all eligible studies. In cases where there was a need to discuss further the disagreements over abstracts or the full text, a third researcher (CTN) also took part until a consensus was reached in all the processes. Data extraction templates were used to extract all the data from the included studies. The information extracted was comprised of the following aspects: the source of the study (author, publication, and date), participants' details (demographic characteristics and sample size of the experimental and control groups), study design (randomized and non-randomized controlled trials), type of intervention (exercises, number of sessions, duration of the intervention, and delivery) and outcomes at pre, post, and follow-up measures (primary and secondary outcome measures—subjective and psychological well-being and depression, anxiety, and stress symptoms respectively). When data on study methods or results were missing, the authors were contacted to request the necessary information to proceed with the analysis.

Quality Assessment

All the selected studies were assessed for their methodological quality using the newest Cochrane collaboration tool for assessing risk of bias (RoB 2) in randomized controlled trials (Sterne et al. 2019) by the first (CTG) and second author (ABB) independently. The Cochrane collaboration tool was assessed with respect to five domains: (1) bias arising from the randomization process, (2) bias due to deviation from intended interventions, (3) bias due to missing outcome data, (4) bias in measurement of the outcome, and (5) bias in selection of the reported result. The rating consisted of answering (yes, probably yes, probably no, no, and no information) signaling questions that elicited relevant information for the assessment of risk of bias. The responses to the questions guided the final judgment; the study was judged to be at "low risk of bias" for all domains, if all domains were considered to be at low risk, as having "some concerns" if at least one domain was considered to raise some concerns, or at "high risk of bias" if at least one domain was considered to be at high risk of bias (Sterne et al. 2019). When discrepancies between authors' ratings regarding quality scores occurred, the authors discussed these differences about the article until they agreed on a common score. The same method was used to assess the risk of bias for randomized and non-randomized controlled trials to standardize the tool for both designs as the majority of studies were randomized controlled trials (and only two were non-randomized controlled trials). An inter-rater reliability of 0.98 was found, which represents an almost perfect level of agreement between authors (McHugh 2012).

Statistical Analyses

Data were analyzed with the program Comprehensive Meta-Analysis (CMA V.3; Borenstein et al. 2013). For each study, means, standard deviations, and sample sizes were extracted to calculate the effect size. Hedges' *g* effect size was used to calculate the differences between groups (i.e., multicomponent positive psychology intervention condition and control condition). Standardized effect sizes were calculated from the average score at pre-intervention and the average score at post-intervention from both groups separately and divided by the pooled standard deviations. Hedge's *g* measure was used instead of Cohens' *d* to calculate the effect sizes because the former is a more accurate measure when sample sizes are small, and when sample sizes are bigger the results for both statistics are roughly equivalent (Cuijpers 2016). In the present study, small and big sample sizes were present, therefore in the calculation of the effect sizes of the different outcomes the instruments that explicitly measured the outcome were used. For subjective well-being and psychological well-being, a pooled effect size was calculated for all the instruments that measure each outcome. In this sense, one effect size was provided for each outcome in the study. The same procedure was applied to the outcomes of depression and anxiety symptoms. Concerning the stress outcome, it was not possible to calculate its effect size due to the lack of studies measuring it. Follow-up effect sizes were calculated, between-group, if there was a minimum of three studies per outcome.

Due to the diversity of the population (i.e., adolescents from different schools and countries), considerable heterogeneity across studies was expected. For this reason, a random-effects model was used (Borenstein et al. 2010), which assumes that effect sizes are sampled from a population of universal effect sizes. Separated meta-analyses were performed for (1) subjective well-being, (2) psychological well-being, (3) depression symptoms, and (4) anxiety symptoms with a confidence interval of 95% and using a two-tailed test. General effect sizes are considered small between 0–0.32, moderate between 0.33–0.55, and large between 0.56–1.2 (Lipsey and Wilson 1993). Forest plots for between-group effect sizes at post-intervention were created for each outcome variable. Heterogeneity of effect sizes was also examined using the Q test and I^2 statistics. The Q test indicates whether there is heterogeneity in the meta-analysis or not—significant values indicate heterogeneity, suggesting that one or more variables moderated the effect size. The I^2 statistics captures the percentage of the variance between the included studies that can be

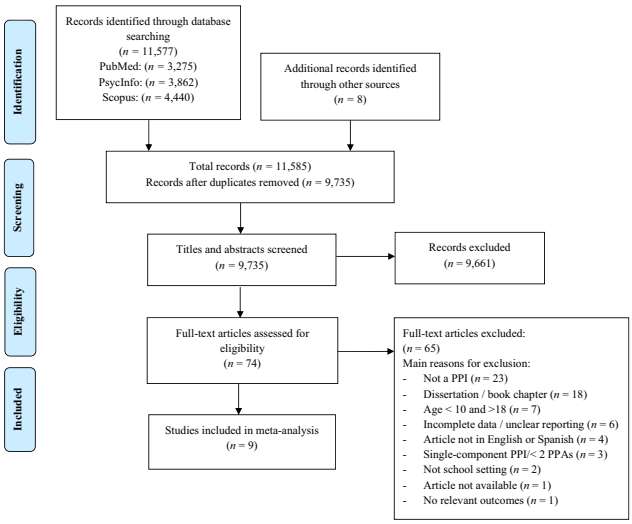

Fig. 1 Study selection flow diagram

attributed to heterogeneity—a value of 0% indicates homogeneity, while values of 25%, 50%, and 75 % indicate low, moderate, and high levels of heterogeneity, respectively (Higgins and Thompson 2002).

Different subgroup analyses were examined to test the possible moderating effects of the following variables: (1) year of publication: the last five years and older, (2) study design: randomized and non-randomized controlled trials, (3) intervention: multicomponent positive psychology intervention and multicomponent positive psychology intervention combined with another form of intervention, (4) control group: placebo or waitlist, (5) sessions: six sessions or less and more than six sessions, (6) duration: six weeks or less and more than six weeks, (7) quality of studies: high quality, some concerns and low quality, and (8) presence of follow-up: measurement at follow-up and no measurements at follow-up.

Publication bias was assessed through funnel plots, the Egger's test, Duval and Tweedie's trim-and-fill procedure, and the fail-safe N. First, funnel plots were created by plotting the overall mean effect size against study size. A symmetric distribution of studies around the effect size indicates the absence of publication bias, whereas an accumulation of studies on one side or another indicates publication bias (Sterne et al. 2008). Second, Egger's test was used to examine the symmetric distribution of studies around the effect size with a quantitative test. Funnel plot asymmetry was considered if $p < 0.05$ (Egger et al. 1997). Third, Duval and Tweedie's trim-and-fill procedure was applied. This procedure imputes the effect sizes of missing studies and produces an adjusted effect size accounting for these missing studies (Duval and Tweedie 2000). Finally, the fail-safe N indicates the number of unpublished non-significant studies that would be required to lower the overall effect size below significance (Egger et al. 1997). Findings were considered robust if the fail-safe N $\geq 5n + 10$, where n is the number of studies (Rosenberg 2005).

Results

Study Selection

A total of 11,585 studies were found in the electronic databases: 3275 from PubMed, 3862 from PsycInfo, 4440 from Scopus and 8 from different reference lists. After removal of duplicates, 9735 articles remained for title and abstract screening. In the next phase, 9661 articles were discarded because they did not meet the inclusion criteria and 74 articles remained to be full-text reviewed. Of these, a total of 9 articles were included in the meta-analysis. The PRISMA analysis represents the process of study selection (Fig. 1).

Description of Studies

The studies included a total of 4898 participants, 2537 in the intervention condition and 2357 in the control condition. The age of participants ranged from 10 to 18 ($M = 13.27$, $SD = 1.85$; 54% female) years old. The 9 studies included

Table 1 Main characteristics of the included studies ($N = 9$)

First author (year)	Location	Sample size(age), % female	Design	Intervention type	Delivery	Duration in weeks (n sessions/hours)	Control group	Follow-up	Outcome measures
Boniwell (2015)	England, UK	164 (12–13 years), 50%	non-RCT	MPPI	Group	9 weeks (18 sessions)	Placebo	–	SWB: SLSS, MSLSS, PANAS-C
Burckhardt (2016)	Australia	267 (15–18 years),50%	RCT	MPPI + ACT	Group	12 weeks (16 sessions)	Placebo	–	PWB: FS Dep/Anx/Str: DASS-21
Freire (2018)	Portugal	99 (13–17 years), 56%	non-RCT	MPPI + PYD	Group	8 weeks (8 sessions)	Placebo	–	SWB: SWLS PWB: PWBS-A
Roth (2017)	USA	42 (11–13 years),50%	RCT	MPPI	Group	10 weeks (10 sessions)	Waitlist	5 and 7 weeks	SWB: BMSLSS, SLSS, PANAS-C
Ruini (2009)	Italy	227 (14–16 years), 61%	RCT	MPPI (WBT)	Group	6 weeks (6 sessions)	Placebo	6 months	PWB: PWB Anx: RCMAS, SQ; Dep: SQ
Shoshani (2014)	Israel	1038 (11–14 years), 50,5%	RCT	MPPI	Group	30 weeks (15 sessions)	Waitlist	6 and 12 months	SWB: SWLS Anx/Dep: BSI
Shoshani (2016)	Israel	2517 (12–15 years) 50%	RCT	MPPI	Group	30 weeks (15 sessions)	Waitlist	8 and 12 months	SWB: SWLS, PANAS
Suldo (2014)	USA	40 (10–12 years old), 62%	RCT	MPPI	Group	10 weeks (10 sessions)	Waitlist	6 months	SWB:BMSLSS, SLSS, PANAS-C
Tomba (2010)	Italy	162 (mean = 11.41 years) 57%	RCT	MPPI (WBT)	Group	6 weeks (6 sessions)	AM	6 months	PWB: PWB Anx: RCMAS, SQ; Dep: SQ

ACT acceptance and commitment therapy, *AM* anxiety-management school protocol, *Anx* anxiety, *Dep* depression, *MMPI* multicomponent positive psychology intervention, *non-RCT* non-randomized controlled-trial, *PYD* positive youth development, *PWB* psychological well-being, *RCT* randomized controlled-trial, *Str* stress, *SWB* subjective well-being, *WBT* well-being therapy. Abbreviations of questionnaires are listed in Appendix Table 6.

Table 2 Quality assessment of the studies included in the meta-analysis

Study	Domain 1	Domain 2	Domain 3	Domain 4	Domain 5	Overall score
Boniwell (2015)	HR	SC	LR	SC	LR	HR
Burckhardt (2016)	LR	LR	LR	SC	LR	SC
Freire (2016)	HR	LR	LR	SC	SC	HR
Roth (2017)	LR	LR	LR	SC	LR	SC
Ruini (2009)	LR	SC	LR	LR	HR	HR
Shoshani (2014)	LR	LR	LR	LR	LR	LR
Shoshani (2016)	LR	LR	LR	LR	LR	LR
Suldo (2014)	SC	LR	LR	SC	SC	SC
Tomba (2010)	LR	LR	LR	SC	LR	SC

Domain 1 risk of bias arising from the randomization process, *Domain 2* risk of bias due to deviations from the intended interventions (effect of assignment to intervention), *Domain 3* risk of bias due to missing outcome data, *Domain 4* risk of bias in measurement of the outcome, *Domain 5* risk of bias in selection of the reported results, *LR* low risk, *SC* some concerns, *HR* high risk

in the meta-analysis were targeting multicomponent positive psychology interventions and 2 of them were combined with another technique (acceptance and commitment therapy and positive youth development). Well-being therapy was a technique used in 2 studies and it was identify as a multicomponent positive psychology intervention because it was based on Ryff's model of psychological well-being (Schotanus-Dijkstra et al. 2015). Seven studies were randomized controlled trials and 2 were non-randomized controlled trials. The delivery mode was group intervention for all the studies. Five control conditions were active control groups (placebo, $n = 4$; anxiety-management school protocol, $n = 1$) and 4 were non-active control groups (waitlist). The number of sessions varied between 6 and 18 ($M = 11.56$, $SD = 4.53$). The duration of the program ranged from 4 to 30 weeks ($M = 13.44$; $SD = 9.58$). Six studies reported follow-up effects and the average follow-up time was 6.25 months ($SD = 2.75$) at post-intervention. The main characteristics of the studies are presented in Table 1.

Study Measures

The study's primary outcomes were both subjective well-being and psychological well-being. The outcomes classified as subjective well-being were the following: satisfaction with life, positive affect, and student's life satisfaction. The outcomes classified as psychological well-being were the following: flourishing and psychological well-being domains (i.e., self-efficacy, autonomy, environmental well-being, personal growth, positive relationships, purpose in life, and self-acceptance). All studies included at least one measure of each outcome. Concerning secondary outcomes of the meta-analysis, the measures included were depression, anxiety, and stress symptomatology. However, only one study reported stress outcomes and thus analyses were not performed for this outcome. In total, six studies measured subjective well-being, five studies measured psychological well-being, four studies measured depression, and four studies measured anxiety symptoms. Five studies included two measures of subjective well-being (Boniwell et al. 2015; Roth et al. 2017; Shoshani and Steinmetz 2014; Shoshani et al. 2016; Suldo et al. (2014), which were pooled by the authors of the meta-analysis. One study included more than two measures of psychological well-being that were pooled (Tomba et al. 2010), and two studies included two measures of anxiety symptoms that were also pooled (Ruini et al. 2009; Tomba et al. 2010). In these cases, the effect sizes were calculated using the average effect size of various outcomes of each study (Malle 2006; Turner et al. 2006). See Appendix Table 6 for detailed information on the used instruments per outcome.

Quality Assessment

When a minimum of one domain did not meet the criteria, the study was labeled as being at high risk of bias. When at least one domain was judged to raise some concerns, the study was labeled as having some concerns and when all domains were judged to be at low risk of bias, the study was labeled as being at low risk. Three studies were rated as being at high risk of bias (i.e., low quality), four studies were rated as having some concerns and two studies did meet all the criteria for being rated as low risk of bias (i.e., high quality). The randomization process domain was the most poorly rated due to the non-randomized controlled trials included in the study that were also assessed with the Cochrane collaboration tool for assessing risk of bias (RoB 2). The quality assessment is displayed in Table 2.

Post-intervention Effects of Multicomponent Positive Psychology Interventions

Post-intervention effects were calculated for the main outcomes (subjective well-being and psychological well-being)

Table 3 Between–group effects

Outcome measures	Studies	Hedges' g	95% CI	Z	Heterogeneity		Fail-safe N
					Q-value	I^2	
Studies post-intervention							
SWB	6	0.24	(0.11–0.37)	3.65^{***}	9.82^{*}	49.09	53
PWB	5	0.25	(−0.01–0.51)	1.86^{*}	22.58^{***}	82.29	41
Depression	4	0.28	(0.13–0.43)	3.69^{***}	5.64	46.84	27
Anxiety	4	0.14	(0.04–0.24)	2.96^{**}	2.17	0.00	3
Studies post-intervention excluding low quality studies							
SWB	4	0.21	(0.05–0.37)	2.59^{*}	8.09^{*}	62.91	
PWB	4	0.31	(−0.03–0.67)	1.74	15.93^{***}	87.45	
Depression	3	0.34	(0.24–0.44)	6.56^{***}	1.01	0.00	
Anxiety	3	0.15	(0.05–0.25)	2.99^{**}	1.75	0.00	
Follow-up studies							
SWB	4	0.13	(0.03–0.23)	2.54^{*}	4.10	30.34	
PWB	3	0.44	(−0.45–1.31)	1.80^{*}	87.65^{***}	97.71	
Depression	3	0.31	(0.20–0.41)	5.80^{***}	1.78	0.00	
Anxiety	3	0.15	(0.05–0.26)	2.99^{**}	1.74	0.00	
Follow-up studies excluding low quality studies							
PWB	2	0.66	(−0.39–1.72)	1.22	40.16^{***}	97.51	
Depression	2	0.29	(0.11–0.47)	3.24^{**}	1.51	34.05	
Anxiety	2	0.21	(0.10–0.33)	3.75^{***}	0.54	0.00	

PWB psychological well-being, *SWB* subjective well-being

$^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$

and for the secondary outcomes (depression and anxiety symptoms). The analysis of effect sizes was done for all the studies and also for all the outcomes excluding low quality studies (i.e., studies rated as being at high risk of bias). Follow-up effects were also calculated for the studies that included a follow-up analysis and for outcomes excluding low quality studies. Results for studies excluding outliers were not calculate since neither of the studies included in the meta-analysis was considered an outlier. The main results are presented in Table 3.

Post-intervention effects on subjective well-being

For subjective well-being ($n = 6$) a significant small effect size was observed ($g = 0.24$, 95% CI 0.11–0.38, $p = 0.000$) at post-intervention. The effect sizes of the studies ranged from 0.08 to 0.69. Heterogeneity analysis revealed a moderate level of heterogeneity ($I^2 = 49.09$, $Q = 9.82$, $p < 0.05$). When low quality studies were excluded, the effect size remained small ($g = 0.21$, 95% CI 0.05–0.37, $p < 0.01$) and the heterogeneity increased to a higher level ($I^2 = 62.91$, $Q = 8.09$, $p < 0.04$). The forest plot in Fig. 2 shows the post-intervention effect on subjective well-being.

Post-intervention effects on psychological well-being

For psychological well-being ($n = 5$) a significant small effect size was observed ($g = 0.25$, 95% CI 0.01–0.51, $p < 0.05$). The effect sizes of the studies ranged from 0.02 to 0.60. Heterogeneity analysis revealed a high level of heterogeneity between studies ($I^2 = 82.29$, $Q = 22.58$, $p = 0.000$). When low quality studies were excluded, the effect size remained small but was non-significant ($g = 0.31$, 95% CI 0.03–0.67, $p < 0.12$) and heterogeneity remained high ($I^2 = 87.45$, $Q = 15.93$, $p = 0.000$). The forest plot in Fig. 3 shows the post-intervention effect on psychological well-being.

Post-intervention effects on depression symptoms

For depression symptoms ($n = 4$) a significant small effect size was observed ($g = 0.28$, 95% CI 0.13–0.43, $p = 0.000$). The effect sizes of the studies ranged from 0.03 to 0.44. Heterogeneity analysis revealed that the level of heterogeneity was non-significant. When low quality studies were excluded, the effect size increased to moderate ($g = 0.34$, 95% CI 0.24–0.44, $p = 0.000$) and the heterogeneity

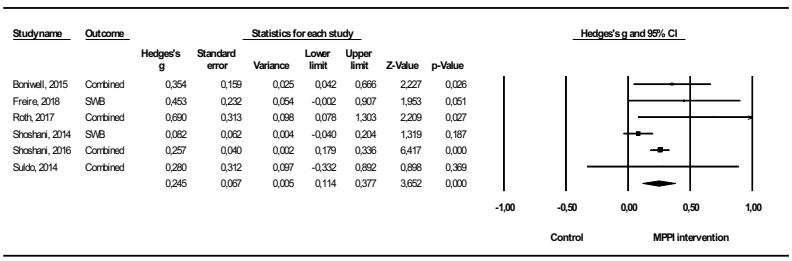

Fig. 2 Forest plot of post-intervention effect sizes for subjective well-being

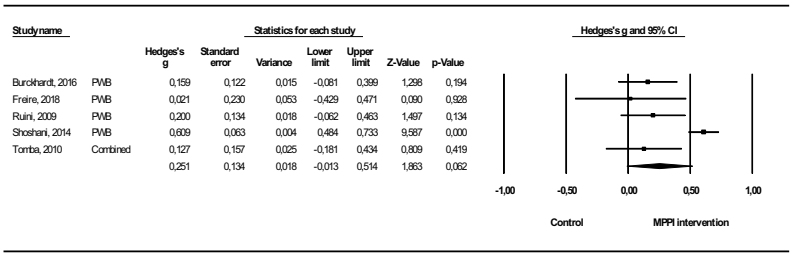

Fig. 3 Forest plot of post-intervention effect sizes for psychological well-being

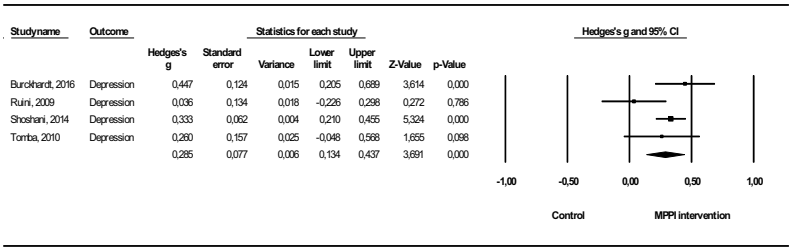

Fig. 4 Forest plot of post-intervention effect sizes for depression symptoms

remained non-significant. The forest plot in Fig. 4 shows the post-intervention effect on depression symptoms.

Post-intervention effects on anxiety symptoms

For anxiety symptoms ($n = 4$) the effect size at post-intervention was non-significant. When low quality studies were excluded, the effect size remained non-significant. Heterogeneity analysis revealed that no heterogeneity was found and hence did not require exploration in a subgroup analysis. The forest plot in Fig. 5 shows the post-intervention effect on anxiety symptoms.

Subgroup Analysis

A total of eight moderators were defined in the meta-analysis: year of publication (last five years vs. older), design of the study (randomized vs. non-randomized controlled trials), type of intervention (multicomponent positive psychology intervention vs. multicomponent positive psychology intervention combined with another positive intervention), control group (placebo vs. waitlist), sessions (six or less vs. more than six), duration (six weeks or less vs. more than six weeks), quality of the studies (high, some concerns, and low), and follow-up

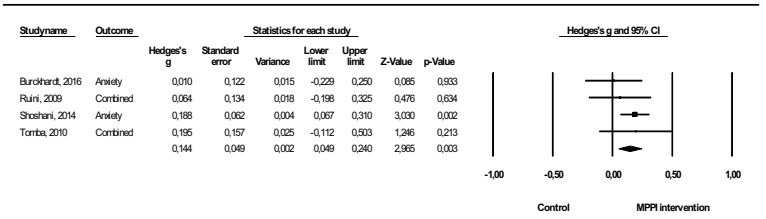

Fig. 5 Forest plot of post-intervention effect sizes for anxiety symptoms

measures (presence of follow-up vs. no follow-up). These categorical moderators were used in a subgroup analysis to examine the likely contributions in the overall effect sizes at post-intervention.

Regarding subjective well-being, significant moderating analyses indicated that non-randomized controlled trials showed a significant larger effect size ($n = 2$; $g = 0.38$, 95% CI 0.12–0.64, $p < 0.003$) compared to randomized controlled trials ($n = 4$; $g = 0.21$, 95% CI 0.05–0.37, $p < 0.009$). Depending on the type of intervention, moderating effects were also observed: the only study that employed a multicomponent positive psychology intervention combined with another type of positive intervention showed a significant larger effect size ($n = 1$; $g = 0.45$, 95% CI 0.00–0.90, $p < 0.05$) compared to studies with a multicomponent positive psychology intervention exclusively ($n = 5$; $g = 0.23$, 95% CI 0.09–0.37, $p < 0.001$). The type of control group also had a significant moderating effect: studies where the control group was a placebo showed larger effects ($n = 3$; $g = 0.38$, 95% CI 0.12–0.64, $p < 0.003$) compared to control group studies with waitlist ($n = 2$; $g = 0.15$, 95% CI 0.05–0.37, $p < 0.009$). The quality of the study was also a significant moderator for subjective well-being: studies with some concerns regarding their quality had a larger effect size ($n = 2$; $g = 0.48$, 95% CI 0.05–0.93, $p < 0.02$) compared to low quality studies ($n = 2$; $g = 0.38$, 95% CI 0.12–0.64, $p < 0.003$). Finally, the fact of including a follow-up in the study was also considered a moderator: studies with no follow-up showed a significant larger effect size ($n = 2$; $g = 0.38$, 95% CI 0.12–0.64, $p < 0.003$) compared to the studies that included follow-up ($n = 4$; $g = 0.21$, 95% CI 0.05–0.37, $p < 0.009$).

For depression symptoms significant moderating analyses were found. The study that was published in the last five years had a significant larger effect size ($n = 1$; $g = 0.44$, 95% CI 0.20–0.69, $p = 0.000$) compared to the older published studies ($n = 3$; $g = 0.23$, 95% CI 0.05–0.41, $p < 0.01$). Depending on the type of intervention, moderating effects were also observed: the study that employed a multicomponent positive psychology intervention combined with another type of positive intervention showed a significant larger effect size ($n = 1$; $g = 0.44$, 95% CI 0.20–0.69, $p = 0.000$) compared to studies with a multicomponent positive psychology intervention exclusively ($n = 3$; $g = 0.23$, 95% CI 0.05–0.41, $p < 0.001$). The quality of the study was also a significant moderator for subjective well-being. Studies with some concerns regarding quality had larger effects ($n = 2$; $g = 0.37$, 95% CI 0.18–0.56, $p = 0.000$) compared to high quality studies ($n = 1$; $g = 0.33$, 95% CI 0.21–0.45, $p = 0.000$). Finally, the fact of including a follow-up in the study was also considered a moderator: the study with no follow-up analysis showed a significant larger effect size ($n = 1$; $g = 0.44$, 95% CI 0.20–0.69, $p = 0.000$) compared to the studies that included follow-up ($n = 3$; $g = 0.23$, 95% CI 0.05–0.41, $p < 0.01$). For psychological well-being and anxiety symptoms, any significant results were found. Table 4 shows the results of the subgroup analysis.

Follow-up Effects

Studies reporting follow-up data of periods ranging from six to twelve months were analyzed. In the present meta-analysis, when multiple follow-ups were present in the same study, only the longest interval was used. Analysis of follow-ups did not show any effect size on subjective well-being and anxiety symptoms. The follow-up effect size for psychological well-being was moderate ($g = 0.44$, 95% −0.45–1.31, $p < 0.04$) and for depression symptoms was small ($g = 0.31$, 95% 0.20–0.41, $p = 0.000$). When low quality studies were excluded, the results for psychological well-being did not show any significant effect. By contrast, the effect size remained small for depression symptoms ($g = 0.29$, 95% 0.11–0.47, $p < 0.001$) and turned out to be significantly small for anxiety symptoms ($g = 0.21$, 95% 0.10–0.33, $p = 0.000$).

Table 4 Subgroup analysis

Outcome	Criteria	Value	N	Hedges' *g*	95% CI	I^2	Z
SWB	Year	Last 5 years	4	0.27	(0.20–0.34)***	0.00	7.21
		Older	2	0.08	(−0.03–0.20)	0.00	1.46
	Design	RCT	4	0.21	(0.05–0.37)**	62.73	2.06
		non-RCT	2	0.38	(0.12–0.64)**	0.00	2.94
	Intervention	MPPI	5	0.23	(0.09–0.37)**	54.63	3.24
		MPPI combined	1	0.45	(−0.00–0.90)*	0.00	1.95
	Control	Placebo	2	0.38	(0.12–0.64)**	0.00	2.94
		Waitlist	4	0.21	(0.05–0.37)**	62.73	2.60
	Sessions	≤6 sessions	–	–	–	–	–
		>6 sessions	6	0.24	(0.11–0.37)***	49.09	3.65
	Duration	≤6 weeks	–	–	–	–	–
		>6 weeks	6	0.24	(0.11–0.37)***	49.09	3.65
	Quality	High	2	0.17	(0.00–0.34)*	0.00	2.19
		Concerns	2	0.48	(0.05–0.93)*	82.20	2.19
		Low	2	0.38	(0.12–0.64)**	0.00	2.94
	Follow-up	Yes	4	0.21	(0.05–0.37)**	62.73	2.60
		No	2	0.38	(0.12–0.64)**	0.00	2.94
PWB	Year	Last 5 years	2	0.12	(−0.08–0.34)	0.00	1.18
		Older	3	0.33	(−0.00–0.67)*	85.29	1.91
	Design	RCT	4	0.29	(0.00–0.57)*	84.62	2.00
		non-RCT	1	0.02	(−0.42–0.47)	0.00	0.09
	Intervention	MPPI	3	0.33	(−0.00–0.67)*	85.21	1.91
		MPPI combined	2	0.12	(0.08–0.34)	0.00	1.87
	Control	Placebo	3	0.15	(−0.00–0.32)	0.00	1.86
		Waitlist	2	0.38	(−0.08–0.85)	87.66	1.62
	Sessions	≤6 sessions	2	0.16	(−0.03–0.36)	0.00	1.66
		>6 sessions	3	0.29	(−0.08–1.50)	86.66	1.50
	Duration	≤6 weeks	2	0.16	(−0.03–0.36)	0.00	1.66
		>6 weeks	3	0.29	(−0.08–0.68)	86.66	1.50
	Quality	High	2	0.60	(0.48–0.73)***	0.00	9.58
		Concerns	2	0.14	(−0.04–0.33)	0.00	1.52
		Low	1	0.15	(−0.07–0.38)	0.00	1.34
	Follow-up	Yes	3	0.33	(−0.00–0.67)*	85.21	1.91
		No	2	0.12	(−0.08–0.34)	0.00	1.18
Depression	Year	Last 5 years	1	0.44	(0.20–0.69)***	0.00	3.61
		Older	3	0.23	(0.05–0.41)*	50.42	2.53
	Design	RCT	4	0.28	(0.13–0.43)***	46.68	3.69
		non-RCT	–	–	–	–	–
	Intervention	MPPI	3	0.23	(0.05–0.41)*	50.42	2.53
		MPPI combined	1	0.44	(0.20–0.69)***	0.00	3.61
	Control	Placebo	2	0.24	(−0.15–0.64)	80.34	1.19
		Waitlist	2	0.32	(0.20–0.43)***	0.00	5.55
	Sessions	≤6 sessions	2	0.13	(−0.08–0.35)	15.21	1.19
		>6 sessions	2	0.35	(0.24–0.46)***	0.00	6.38
	Duration	≤6 weeks	2	0.13	(−0.08–0.35)	15.21	1.19
		>6 weeks	2	0.35	(0.24–0.46)***	0.00	6.38
	Quality	High	1	0.33	(0.21–0.45)***	0.00	5.32

Table 4 (continued)

Outcome	Criteria	Value	N	Hedges' *g*	95% CI	I^2	Z
		Concerns	2	0.37	(0.18–0.56)***	0.00	3.86
		Low	1	0.03	(−0.22–0.29)	0.00	0.27
	Follow-up	Yes	3	0.23	(0.05–0.41)*	50.42	2.53
		No	1	0.44	(0.20–0.69)***	0.00	3.61
Anxiety	Year	Last 5 years	1	0.02	(−0.22–0.25)	0.00	0.08
		Older	3	0.17	(0.06–0.27)**	0.00	3.19
	Design	RCT	4	0.14	(0.04–0.24)**	0.00	2.96
		non-RCT	–	–	–	–	–
	Intervention	MPPI	3	0.17	(0.06–0.27)**	0.00	3.19
		MPPI combined	1	0.01	(−0.22–0.25)	0.00	0.08
	Control	Placebo	2	0.03	(−0.14–0.21)	0.00	0.38
		Waitlist	2	0.18	(0.07–0.30)**	0.00	3.27
	Sessions	≤6 sessions	2	0.11	(−0.08–0.31)	0.00	1.17
		>6 sessions	2	0.13	(−0.03–0.29)	40.61	1.56
	Duration	≤6 weeks	2	0.11	(−0.08–0.31)	0.00	1.17
		>6 weeks	2	0.13	(−0.03–0.29)	40.61	1.56
	Quality	High	3	0.15	(0.05–0.25)**	0.00	2.99
		Concerns	1	0.06	(−0.19–0.32)	0.00	0.47
		Low	–	–	–	–	–
	Follow-up	Yes	3	0.17	(0.06–0.27)**	0.00	3.19
		No	1	0.01	(−0.22–0.25)	0.00	0.08

MPPI multicomponent positive psychology intervention, *PWB* psychological well-being, *RCT* randomized controlled trial, *non-RCT* non-randomized controlled trial, *SWB* subjective well-being

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

Publication Bias

The funnel plot is an approach used to assess publication bias. Symmetry in the funnel plot indicates that the publications are representative, whereas asymmetry indicates that publication bias is likely to be present in the meta-analysis. In the current study, the funnel plot for each analyzed outcome (subjective well-being, psychological well-being, depression, and anxiety) was somewhat asymmetrical. However, the funnel plot is a subjective method and therefore cannot be relied on exclusively in the case of this result. Thus, the fail-safe N test was also conducted, which revealed that 53 studies for subjective well-being, 41 studies for psychological well-being, 27 studies for depression symptoms, and 3 studies for anxiety symptoms were needed to nullify the significant effect at $p > 0.05$. The Egger's regression intercept test was also used and the results were only significant for psychological well-being (-4.76, $t = 4.74$, $df = 3$, $p < 0.01$), reporting non-significant results for subjective well-being (0.84, $t = 0.94$, $df = 4$, $p < 0.40$), depression symptoms (-1.18, $t = 0.56$, $df = 2$, $p < 0.62$), and anxiety symptoms (-1.18, $t = 1.07$, $df = 2$, $p < 0.39$). Finally, Duval and Tweedie's trim-and-fill method was also tested and possible missing studies were imputed to observe potential changes on the effect sizes. For psychological well-being ($g = 0.29$, 95% CI = 0.05–0.52) and anxiety symptoms ($g = 0.16$, 95% CI = 0.07–0.26) the effect sizes increased, for subjective well-being decreased ($g = 0.18$, 95% CI = 0.05–0.31) and for depression symptoms remained the same ($g = 0.28$, 95% CI = 0.13–0.43). Importantly, the studies included in the meta-analysis, and specifically on each outcome, are not many in order to consider the results potentially significant. Thus, it is likely that missing publications might have affected the results of the present meta-analysis.

Discussion

Despite the increasing popularity of multicomponent positive psychology interventions in the general population and the emergence of positive education as a mechanism to introduce positive interventions in the schools, the effectiveness of multicomponent positive psychology interventions has not been previously examined in adolescents. To address this gap, the present study investigated the effects of school-based multicomponent positive psychology interventions on well-being (subjective and psychological) and

psychological distress symptoms (depression, anxiety, and stress) in adolescents through a meta-analysis. Results indicated that school-based multicomponent positive psychology interventions enhanced subjective and psychological well-being and reduced depression symptoms but not anxiety. Multicomponent positive psychology interventions can increase adolescent's mental health in the short and long term, hence, education policy-makers and practitioners are encouraged to implement these interventions within the schools' curriculum, especially in combination with other evidence-based positive interventions, in efforts to provide adolescent with effective tools that ensure their mental health in school.

Efficacy of Multicomponent Positive Psychology Interventions on Mental Health in Adolescents

The current meta-analysis showed that school-based multicomponent positive psychology interventions in adolescents yielded to increases in subjective well-being ($g = 0.24$) and psychological well-being ($g = 0.25$) and reductions in symptoms of depression ($g = 0.28$), in accordance with research on adults (Hendriks et al. 2019; Koydemir et al. 2020). Although the effects were small, this suggests that multicomponent positive psychology interventions are an effective strategy to boost well-being in the school context. A possible explanation for the small effects would be that adolescents' well-being tend to decrease from early to late adolescence (González-Carrasco et al. 2017). A remarkable finding about the efficacy of multicomponent positive psychology interventions is related to the long-term effects found for psychological well-being and depression symptoms: on the one hand, the effects on these outcomes increased from the short to the long term, which contrasts with previous meta-analyses about positive interventions in adults (Bolier et al. 2013; Chakhssi et al. 2018). On the other hand, the effects on subjective well-being were larger in the short-term (just after the intervention) but decreased in the long run, similar to research on adults (Bolier et al. 2013; Hendriks et al. 2019).

According to the hedonic and eudaimonic traditions of well-being, multicomponent positive psychology interventions may have an immediate impact during and right after the intervention is conducted, raising the levels of emotional well-being. Using positive practices that target the key elements of positive education (social and emotional competency, positive emotions, positive relationships, engagement, and sense of meaning and purpose) can entail a pleasant experience for adolescents. While this sense of subjective well-being dissipates over time, a deeper and more sustained sense of meaning and fulfillment is reinforced at follow-up. The fact that adolescents tend to seek many small and momentary pleasures but also have life objectives to accomplish (González-Carrasco et al. 2019) may contribute to explain why multicomponent positive psychology interventions provide both short-term and long-term gains.

The promotion of mental health (and also education) is captured by the 2030 Agenda for Sustainable Development Goals (UN General Assembly. 2015), an international agreement to ensure 17 global challenges for sustainable development. Depression is considered as a common indicator of mental illness (Keyes 2002) characterized by anhedonia (low subjective well-being) and aspects of individual and social malfunctioning (low psychological well-being) (American Psychiatric Association. 2013), and it has become a paramount concern in mental health and societal progress given the high rates of people affected in recent years (World Health Organization 2017). More specifically, depression symptoms affect negatively the daily functioning of adolescents (Derdikman-Eiron et al. 2011) and they have been associated with poorer social relationships and academic outcomes, substance abuse, and increased risk of suicide (Beesdo et al. 2009; Birmaher et al. 1996). In light of this, researchers and practitioners are called to provide accessible tools to mitigate this issue that might thus be of societal advantage, and the present study found empirical evidence to support the notion that multicomponent positive psychology interventions are an effective long-term strategy to reduce depressive symptomatology among adolescents.

Which Characteristics Can Make Multicomponent Positive Psychology Interventions More Beneficial?

Subgroup analysis revealed that the characteristics of the intervention could lead to effective contributions of the multicomponent positive psychology interventions on subjective well-being and depression symptoms. The main features of these interventions included year of publication, study design, type of intervention, control group, quality of studies, and measurement of follow-up. For depression symptoms, the fact that studies published over the last five years were more effective suggests that interventions might evolve and adapt over time to be more effective. The study design was considered as another significant moderator. The non-randomization of participants for the intervention or control group was observed as a more effective process than the randomization of participants for subjective well-being outcomes. This can be explained by the fact that in non-randomized controlled trials it is easier to control study characteristics (e.g., allocation sequence generation or allocation sequence concealment [Sterne et al. 2019]), which may lead to more (pre)fabricated or beneficial results than randomized controlled trials. Also, in many cases, peer journals preferred the publication of studies with favorable (i.e., significant) results rather than unfavorable (i.e.,

non-significant) results—this is known as the "file drawer problem" (Dalton et al. 2012).

The type of intervention was a significant moderator for subjective well-being and depression symptoms. When multicomponent positive psychology interventions were combined with another type of positive intervention, the results turned out to be more effective. This combination increases the probability of merging complementary approaches (Burckhardt et al. 2016) and therefore providing and covering a wider range of intervention goals. The control group used in the studies turned out to be a significant moderator for subjective well-being and depression symptoms. In studies where the control group was a placebo, the effect was larger than studies where the control group was in the waitlist. The fact that in psychosocial interventions the control group engaged in other activities, despite being unrelated to the intervention, is considered more valid than relying on the classical design of the waitlist control group (Popp and Schneider 2015). In addition, the quality of studies also had a significant moderating effect on subjective well-being and depression symptoms. In line with a previous meta-analysis (Bolier et al. 2013), for subjective well-being studies with some concerns regarding quality showed larger effects compared to studies with low and high quality. For depression symptoms, it was found the same pattern; however, previous meta-analysis with adults (Chakhssi et al. 2018; Hendriks et al. 2019) showed contradictory results, which might have been caused as a result of the different tools used to assess risk of bias in the different meta-analytic reviews. Finally, significant differences in the effects of the follow-up moderator for subjective well-being and depression symptoms were found. Studies in which follow-up was not examined had larger effects than studies including follow-up measures. As stated previously, this may be related to the assumption that studies with non-significant results are less likely to be published (Sterne et al. 2019). When follow-up was tested, the effectiveness of interventions might be lowered since the peak of effectiveness normally happens right after the intervention. The intervention effects from previous meta-analyses in adults (Bolier et al. 2013; Hendriks et al. 2019) on subjective well-being are likely to be reduced over time, thus the results unsurprisingly suggest that positive interventions targeting subjective well-being may only increase momentary well-being in adolescents.

Limitations

Although the current systematic review and meta-analysis addressed some gaps in the literature, the findings must be understood within the confines of its limitations. First, caution is warranted when interpreting the results of the study due to the small number of studies included in the analysis of each outcome and subgroups. For this reason, future studies of school-based multicomponent positive psychology interventions in adolescents are needed to draw firmer conclusions on the efficacy of these interventions. Second, regarding the quality of the studies included in the meta-analysis, it creates a sample with only two studies being rated as low risk of bias. This aspect highlights the importance of considering the assessment of the quality of studies in meta-analytic reviews to be aware of possible limitations of the findings. Third, one of the outcomes of the study (stress) could not be analyzed since there was a lack of studies reporting the stress' effects. Fourth, the inclusion criteria (e.g., adolescent population, intervention in the school setting, articles from peer-reviewed journals, or articles in English or Spanish) were very restrictive and results should be interpreted in light of the chosen features. Lastly, the study only included studies published in peer-reviewed journals and the possibility to omit unpublished results or studies with null findings is present.

The benefits of school-based multicomponent positive psychology interventions in adolescents are evident; however, the studies presented few limitations to discuss. Schools programs are implemented with time restrictions because they are not commonly integrated in the school curriculum but rather handled and implemented by external professionals. Future programs should be implemented by school teachers or school psychologists previously trained, which might enable to introduce the program in schools and through different years. Furthermore, the combination of a multicomponent positive psychology intervention with another evidence-based positive intervention resulted more effective than the single application of a multicomponent positive psychology intervention. Among the reviewed studies, only 2 used the combination of both interventions. Additionally, the number of participants in some studies was weakly powered (i.e., less than 50 participants) and therefore lacked predictive value, which might be translated into exaggerated effects (Button et al. 2013). It is important to highlight that an optimal sample size is required to yield representative results. Finally, all studies included some risk of bias, suggesting that a rigorous methodology and reporting should be followed to increase the quality of studies. The main issue is the lack of information provided by the studies – for instance, many studies lacked information regarding the allocation sequence of participants, session attendance, and the blinding of the assessor to intervention status. This issue should be addressed in the context of journal publication and advocates for more high-quality studies that provide all information needed to allow a doable assessment of research quality.

Implications

Overall, school-based multicomponent positive psychology interventions aiming at increasing well-being and reducing depression symptoms in adolescents were effective. Ensuring mental health and education are paramount to the Sustainable Development Goals, since mental illness can indeed be a risk factor of education attainment. Providing adolescents with low-cost, easily-delivered tools that promote their mental health and optimal development are key to ensure health and education goals. This meta-analysis showed that multicomponent positive psychology interventions can offer plausible resources to meet these goals: in the short-run, these interventions can help to maximize pleasant experiences in the school context that may also benefit adolescents' academic performance. In the long-run, they can strengthen the psychological functioning of adolescents and provide them with a sense of meaning and fulfillment. The present findings encourage to introduce multicomponent positive psychology interventions in the school curriculum for building up psychological resources and mitigating the most common societal burden identified worldwide – depression symptomatology.

Based on moderator analysis, we would recommend professionals to implement multicomponent positive psychology interventions in conjunction with other evidence-based positive interventions that enhance well-being, and researchers to preferentially include a placebo control group. Education policy-makers and practitioners are potentially called to exert a relevant role in the application and guidance of positive practices that, in the end, might facilitate the learning process and academic performance of adolescents. As the continued willingness from professionals working with adolescents for the incorporation of the positive education premises in the schools to develop both positive youth functioning and effective learning, education policies should consider the introduction of positive practices like multicomponent positive psychology interventions in the school's curriculum to enhance the well-being of adolescents and reduce their psychological distress. In line with the above-mentioned considerations, teaching both the skills of well-being and the skills of achievement will be associated with greater academic achievement and engagement of adolescents in the school context (Datu 2018). Still, it is necessary to establish rigorous methodological approaches to lead to higher-quality studies in the field of positive psychology interventions, such as using randomized controlled trials and follow-up measurements to increase the quality of studies and reduce publication bias. The present study presents evidence on the efficacy of multicomponent positive psychology interventions, proposes following rigorous methodological approaches, and exposes new gaps in the conceptualization of these interventions in the school context.

Conclusion

The effectiveness of multicomponent positive psychology interventions in adolescents' school-based settings was, to date, not systematically evaluated. This meta-analysis addressed this gap by synthesizing the efficacy of these interventions on subjective and psychological well-being, and symptoms of depression, anxiety, and stress. Results demonstrated that multicomponent positive psychology interventions can be effective in improving subjective and psychological well-being and reducing depression symptoms in adolescents. No effects were found for symptoms of anxiety, while effects on stress could not be analyzed due to lack of studies. The effects on psychological well-being and depression symptoms remained significant in the long-term, posing that multicomponent positive psychology interventions offer an opportunity to ensure mental health during adolescents' development in schools. Academic policies and education practitioners should consider the inclusion of these interventions within the school curriculum to promote adolescents' mental health and optimal development.

Acknowledgements We would like to thank Jorge Moya and Jaume March for their contributions to earlier versions of this manuscript.

Authors' Contributions C.T.G. conceived of the study, participated in the initial literature search, the evaluation of quality of studies, conducted the preliminary statistical analysis and wrote the first draft of the manuscript; A.B.B. advised the design, participating in the identification of relevant studies, the evaluation of quality of studies, interpretation of the study findings and helped to draft the manuscript; C.T.N. participated in the literature search, data extraction and statistical analysis; C.A. contributed to the conceptualization of the study, interpretation of the findings and oversaw study execution. All authors read and approved the final manuscript.

Data Sharing and Declaration The datasets generated and/or analyzed during the current study are not publicly available but are available from the corresponding author on reasonable request.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval The current manuscript used published studies as the sole data source and did not involve any other data collection or direct interactions with human participants. As such, seeking approval from a human subjects' review committee is irrelevant.

Informed Consent This research did not involve any data collection or direct interaction with participants and therefore informed consent was not obtained.

Appendix: Table 5

Table 5 Strings of the search

PUBMED: *((“positive psych*”[Title/Abstract] OR “well-being”[Title/Abstract] OR wellbeing[Title/Abstract] OR happy[Title/Abstract] OR happiness[Title/Abstract] OR gratitude[Title/Abstract] OR optimism[Title/Abstract] OR kindness[Title/Abstract] OR strengths[Title/Abstract] OR compassion[Title/Abstract] OR forgiveness[Title/Abstract])) AND (intervention*[Title/Abstract] OR prevention*[Title/Abstract] OR program*[Title/Abstract] OR promotion[Title/Abstract])) AND (adolescent*[Title/Abstract] OR youth[Title/Abstract] OR teen*[Title/Abstract]) (filter: English, Spanish)*

PSYCINFO: *AB (“positive psych*“ OR “well-being” OR wellbeing OR happy OR happiness OR gratitude OR optimism OR kindness OR strengths OR compassion OR forgiveness) AND AB (intervention* OR prevention* OR program* OR promotion) AND AB (adolescent* OR teenager* OR youth OR teen*) and TI (“positive psych*“ OR “well-being” OR wellbeing OR happy OR happiness OR gratitude OR optimism OR kindness OR strengths OR compassion OR forgiveness) AND TI (intervention* OR prevention* OR program* OR promotion) AND TI (adolescent* OR teenager* OR youth OR teen*) (filter: academic journals, English, Spanish)*

SCOPUS: *(TITLE-ABS-KEY (“positive psych*“ OR “well-being” OR wellbeing OR happy OR happiness OR gratitude OR optimism OR kindness OR strengths OR compassion OR forgiveness) AND TITLE-ABS KEY (intervention* OR prevention* OR program* OR promotion) AND TITLE-ABS- KEY (adolescent* OR youth OR teen*)) AND DOCTYPE (ar) AND (LIMIT-TO (SUBJAREA, “PSYC”) OR LIMIT-TO (SUBJAREA, “SOCI”)) AND (LIMIT-TO (LANGUAGE, “English”) OR LIMIT-TO (LANGUAGE, “Spanish”))*

Appendix: Table 6

Table 6 Abbreviations of questionnaires

***Subjective well-being*:** BMSLSS: The Brief Multidimensional Student’s Life Satisfaction Scale; MSLSS: Multidimensional Students’ Life Satisfaction Scale; PANAS-C: Positive and Negative Affect Schedule for Children; SLSS: Students’ Life Satisfaction Scale; SWLS: Satisfaction with Life Scale

***Psychological well-being*:** FS: Flourishing Scale; PWB: Psychological Well-Being; PWBS-A: Psychological Well-Being Scale for Adolescents

***Depression*:** BSI: Brief Symptoms Inventory; DASS-21: Depression, Anxiety and Stress Scale; SQ: Kellner’s Symptom Questionnaire

***Anxiety*:** BSI: Brief Symptoms Inventory; DASS-21: Depression, Anxiety and Stress Scale; RCMAS: Revised Children Manifest Anxiety Scale; SQ: Kellner’s Symptom Questionnaire

***Stress*:** DASS-21: Depression, Anxiety and Stress Scale

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Reports an error in: “Effects of school-based multicomponent positive psychology interventions on well-being and distress in adolescents: A systematic review and meta-analysis” by Tejada-Gallardo, C., Blasco-Belled, A., Torrelles-Nadal C., & Alsinet, C. (Journal of Youth and Adolescence, Online Publication, July 18, 2020). In the original article in Table 3, studies at post-intervention PWB, the confidence interval should be (0.01–0.51) not (-0.01–0.51) since the effect size was significant. In Table 3 also, in follow-up studies PWB, the confidence interval should be (0.45–1.31) not (-0.45–1.31) since the effect size was also significant. In post-intervention effects on subjective well-being sub-section, second line, the confidence interval should be (0.11–0.37) as in Table 3 not (0.11–0.38). In post-intervention effects on psychological well-being sub-section, eighth line, the confidence interval should be (-0.03–0.67) as in Table 3 not (0.03–0.67). Finally, in follow-up effects sub-section, eighth line, the confidence interval should be (0.45–1.31) not (-0.45–1.31). These errors can lead to misconceptions about the results.

5.1.2 FEELING POSITIVE TOWARDS TIME: HOW TIME ATTITUDE PROFILES ARE RELATED TO MENTAL HEALTH IN ADOLESCENTS

Tejada-Gallardo, C., Blasco-Belled, A., & Alsinet, C. (2021)

Journal of Adolescence, 89, 84–94.

DOI: 10.1016/j.adolescence.2021.04.002

Journal of Adolescence 89 (2021) 84–94

Contents lists available at ScienceDirect

Journal of Adolescence

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

Feeling positive towards time: How time attitude profiles are related to mental health in adolescents

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ARTICLE INFO

Keywords:
Time attitudes
Mental health
Well-being
Psychological distress
Adolescents

ABSTRACT

Introduction: Time attitudes refer to the way individuals feel about their past, present, and future and have been associated with adolescent-specific developmental, social, and emotional changes. The dual-factor model of mental health proposes that optimal functioning entails high levels of emotional, social, and psychological well-being, as well as low levels of psychopathology. Since previous research has suggested that time attitudes can assist in understanding the development of adolescents, the primary objective of this study was to examine the relationship between time attitudes and mental health according to the dual-factor model. *Methods*: A total of 317 Spanish high school students aged between 14 and 16 years (45.1% females) participated in the study. Time attitudes were assessed with the Adolescent and Adult Time Inventory-Time Attitudes Scale, and profiles were identified through person-centered analysis. Data were also gathered on well-being and psychological distress measures, which were analyzed as distal outcomes. *Results:* Four time attitude profiles were identified – negatives, positives, past negatives, and present/future negatives. Adolescents belonging to the positive profile reported higher scores on well-being and lower scores on psychological distress. The psychological well-being and depression constructs had higher (positive and negative, respectively) scores across all profiles. These results suggested an association between time attitude profiles and mental health according to the dual-factor model. *Conclusions:* We suggest that positive psychology interventions may nudge adolescents towards a more positive appraisal of the past, present, and future and promote their mental health and positive development. Further practical implications are discussed.

Time perspective is understood as an individual's thoughts and feelings about the past, the present, and the future (Zimbardo & Boyd, 1999). The study of adolescence has brought forth a conceptual model of time perspective with additional dimensions that is relevant to that period of life (Mello & Worrell, 2015). A rapidly growing number of studies have examined the relationship between time attitudes and adolescent-specific developmental outcomes (e.g., Andretta et al., 2014), but less attention has been paid to mental health. The latter is defined as the combination of high levels of emotional, social, and psychological well-being and low levels of psychopathology – as conceptualized by the dual-factor model of mental health (Keyes, 2009; World Health Organization [WHO], 2004). Within this framework, well-being can be understood as the subjective perception of one's life conditions (Ng & Fisher, 2013). Generally, adolescents experience decreased well-being (Chen & Page, 2016; González-Carrasco et al., 2019) and increased psychological distress, which entails a discomforting emotional experience in response to life stressors and can ultimately result in psychological disorders or impaired daily functioning (Hammen, 2005). On this basis, we sought to examine the relationship between time

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https://doi.org/10.1016/j.adolescence.2021.04.002
Received 24 July 2020; Received in revised form 25 March 2021; Accepted 4 April 2021
Available online 23 April 2021

attitudes and mental health in adolescents. To that end, time attitudes can be assessed using a person-centered approach to identify different profiles according to how adolescents feel about their past, present, and future.

1. Adolescents' time perspectives

Time attitudes have recently been incorporated into research as an independent phenomenon, having initially been subsumed within a broader construct, namely, time perspective (Mello & Worrell, 2015). Time perspective is a multi-dimensional construct that emerges from cognitive processes in which human experience is divided into past, present, and future time frames and influences specific behaviors through the way that individuals think and feel about time (Zimbardo & Boyd, 1999). The construct of time perspective is regarded as a developmental phenomenon that is particularly salient in adolescence (Piaget, 1955) – a period characterized by identity formation that allows adolescents to form a perspective on time different from the one they had in childhood (Mello & Worrell, 2015). The Zimbardo time perspective inventory (ZTPI; Zimbardo & Boyd, 1999) is the first comprehensive and theory-based operationalization of time perspectives and comprises five dimensions (i.e., past negative, past positive, present hedonistic, present fatalistic, and future). Within these dimensions, the most adaptive attitude towards temporal frames is commonly referred to as the balanced time perspective (BTP; Zimbardo & Boyd, 1999). The BTP has been proposed as a more adaptive and positive alternative to coping with the demands of life since it represents a combination of high scores on past positive, present hedonistic, and future and low scores on past negative and present fatalistic (Boniwell & Zimbardo, 2004). Nevertheless, the model proposed by Zimbardo and Boyd (1999) has demonstrated limited utility in adolescent samples, indicating that ZTPI scores are not always reliable. Moreover, the structural validity of the model, which lacks a negative dimension towards the future, did not support the original structure of the scale (Mello & Worrell, 2007). Accordingly, Mello and Worrell (2015) presented a new conceptual model of time perspective for adolescents. This model proposes that time perspective is composed of the three time frames (i.e., past, present, and future) in five dimensions (i.e., time attitudes, time orientation, time relation, time frequency, and time meaning). Time attitudes refer to individuals' positive and negative feelings towards the past, present, and future and can be assessed using a self-administered questionnaire (Mello & Worrell, 2015).

2. Time attitude profiles

The study of feelings towards time has gained attention with particular regard to adolescence in an effort to describe how time attitudes promote adolescent-specific developmental, social, and emotional changes (e.g., Andretta et al., 2014; Worrell et al., 2019). Research on adolescents has employed Mello and Worrell's (2015) time attitudes measure to investigate several developmental outcomes through a person-centered approach. Time attitude profiles have been associated with academic achievement and self-esteem, suggesting that positive profiles (i.e., positive and optimistic) reflect higher academic expectations and self-esteem than negative profiles (i.e., negative and pessimistic; Andretta et al., 2014). Other studies on risk-taking behaviors demonstrated that certain profiles were associated with less alcohol use. In fact, the positive profiles are associated with the highest proportion of alcohol abstainers (McKay et al., 2019). Morgan et al. (2019) also demonstrated that individuals clustered in the positive profile had higher self-efficacy and were less sensation-seeking than those clustered in negative profiles. In short, studies on time attitude profiles have indicated that positive profiles are associated with more adaptive outcomes.

Several profiles have been observed across time attitude studies involving adolescents (Andretta et al., 2014; Konowalczyk et al., 2019; McKay et al., 2019, Wells et al., 2018). These profiles include the following: positive – agreeable feelings towards all time frames; balanced – similar feelings towards each time frame; ambivalent – a lack of strong feelings towards all three time frames; and negative – disagreeable feelings towards all time frames. Although previous research has yielded equal profiles across studies (e.g., McKay et al., 2019; Morgan et al., 2016; Wells et al., 2018), establishing a common pattern of clusters is difficult because variations across profiles are likely in adolescent samples. A few studies found more specific profiles, such as negative future profiles, which are characterized by high scores for the negative (past and present) time frames and near zero for the positive (past and present) time frames. With regard to the future time frame, both positive and negative attitudes scored above zero (McKay et al., 2019; Morgan et al., 2019; Wells et al., 2018). Previous studies also identified past negative profiles, characterized by high scores on past negative and low scores on past positive, while all other time frames were near zero (Konowalczyk et al., 2019; Worrell et al., 2019). Finally, present/future negative profiles were characterized by high scores for both present and future negative and low scores for present and future positive, while all other time frames were near zero (Worrell et al., 2019).

Research on time attitudes employs person-centered analysis, such as latent profile analysis (LPA), to identify types of individuals who display similar positive and negative feelings towards the past, present, and future (i.e., latent profiles) and therefore describe the

organization of time attitudes within individuals (Lanza et al., 2010; Mello & Worrell, 2015). A person-centered approach focuses on identifying differences between profiles in which the analyzed variables are treated as characteristics of those individuals rather than merely outcomes (Laursen & Hoff, 2006). In our study, participants were categorized into profiles sharing similar time attitudes. Additionally, it is possible to predict membership of profiles according to selected variables of interest (Wang & Hanges, 2011). These variables are known as distal outcomes and represent the consequences of latent profile membership rather than the indicators of latent profiles. Analyzing a distal outcome of latent profiles indicates how the confluence of time attitudes at an initial point predicts the outcome of interest over time (i.e., mental health; Lanza et al., 2013).

3. The dual-factor model of mental health and time attitudes

The dual-factor model provides a conceptualization of mental health that is defined by the presence of positive factors (i.e., emotional, social, and psychological well-being) and the absence of clinical risk factors (e.g., depression and anxiety disorders; Westerhof & Keyes, 2010). According to this conceptualization, mental health is more than the mere absence of psychopathology, and therefore mental health and psychopathology are studied as related but empirically distinct constructs (WHO, 2004). Since the absence of psychopathology in youth does not necessarily indicate a state of complete mental health (Keyes, 2009), considering the promotion of (emotional, social, and psychological) well-being in assessments of adolescents' mental health has become imperative within the movement towards positive youth development and effective learning (Clonan et al., 2004; Keyes, 2009; Suldo et al., 2016).

During the transition from adolescence to adulthood, there is a high prevalence of mental illness (Pearson et al., 2013), specifically depression, which has its highest rates among adolescents (Birmaher et al., 1996). Depression has detrimental consequences for the daily functioning of young people (Derdikman-Eiron et al., 2013). It is estimated that over 3% of females and 4.5% of males between the ages of 15 and 19 years old suffer from depression, while 5.5% of females and 3.5% of males suffer from anxiety disorders (WHO, 2017). As the number of adolescents affected by depression, anxiety, and stress has increased in recent years, these conditions are becoming a societal burden (Stewart et al., 2013; WHO, 2017). Unlike in childhood, in adolescence, the social and psychological components of well-being seem to dominate, whereas the emotional component tends to decrease (Hallam et al., 2014). Of the three components of well-being, psychological well-being seems to be the most common among late adolescents (González-Carrasco et al., 2019). On the other hand, psychological distress, which includes depression, anxiety, and stress symptoms and is considered as marking the onset of mental illness, can appear during adolescence (Paus et al., 2008; Shapero et al., 2013).

Adolescents face increasing demands to satisfy the needs of normative adjustment, including academic and social adjustment and identity formation (La Guardia & Ryan, 2002). All these demands have been linked to decreased emotional, social, and psychological well-being (Chen & Page, 2016; González-Carrasco et al., 2019) and to exacerbated psychological distress (Hammen, 2005; Suldo et al., 2016). Time attitude profiles have previously been associated with well-being in early and late adolescence, demonstrating that having a positive profile is related to optimal outcomes in terms of well-being (i.e., general well-being and somatic and psychological symptoms; Konowalczyk et al., 2018; Worrell et al., 2019). Although the relationship between time attitudes and depression, anxiety, and stress has been investigated, no existing evidence accounts for the contribution of time attitudes to the specific indicators of emotional, social, and psychological well-being in adolescents. Being able to relate a positive time attitude profile to greater well-being and lower psychological distress would be beneficial for practitioners working with adolescents, in that promoting a positive appraisal of the past, present, and future may foster the optimal psychological adjustment necessary in this developmental stage.

3.1. The current study

The goal of this study is to investigate the relationship between time attitude profiles and mental health in a sample of adolescents. Previous research on time attitudes has found variability of adolescents' profiles that precludes generalizations. In addition, the relationship between time attitude profiles and mental health (i.e., well-being and psychological distress) has not previously been explored using the dual-factor model (Keyes, 2002, 2009). In this study, we first identified the time attitude profiles of Spanish adolescents – that is, we identified groups of individuals with similar feelings and attitudes (positive and negative) towards the past, present, and future. Second, we examined the associations between the identified time attitude profiles and the dual-factor model of mental health – in other words, how the profiles predicted indicators of mental health and mental illness. Based on prior research on time attitudes, our first hypothesis was that clusters of positive profiles would be associated with higher levels of emotional, social, and psychological well-being and lower levels of depression, anxiety, and stress. Based on research on adolescents' well-being, our second

hypothesis was that the constructs of psychological well-being and depression would score more highly than other variables.

4. Methods

4.1. Participants and procedure

A total of 317 Spanish adolescents ($M = 15.07$; $SD = 0.64$; 45.1% females) participated in the study. Specific demographics are presented in Table S1. The participants were final-year students from four high schools in west Catalonia (Spain). The adolescents were involved in a school program aimed at assessing and promoting mental health in high schools. The participants and their parents received consent information from the high schools, with the option to leave the study whenever they desired. An informed consent form signed by the parents or a legal guardian was required for an adolescent to participate in the study.

4.2. Measures

Time attitudes were measured with the Adolescent and Adult Time Inventory-Time Attitudes Scale (AATI-TA; Mello & Worrell, 2007; Spanish adaptation of Mello et al., 2010). The AATI-TA consists of six subscales that assess past positive, past negative, present positive, present negative, future positive, and future negative. The scale is comprised of 24 items with a 5-point Likert scale (1 = *totally disagree*, 5 = *totally agree*). The Cronbach's α reliability estimates of the AATI-TA for the present study were 0.86 for the past positive, 0.92 for the past negative, 0.89 for the present positive, 0.75 for the present negative, 0.88 for the future positive, and 0.80 for the future negative. The following sample items are representative of each subscale: "I have very happy memories of my childhood" for past positive, "I wish that I did not have the past that I had" for past negative, "I am happy with my current life" for present positive, "I am not satisfied with my present" for present negative, "Thinking about my future excites me" for future positive, and "Thinking about my future makes me sad" for future negative.

Well-being was measured with the Mental Health Continuum – Short Form (MHC-SF; Keyes et al., 2008; Spanish adaptation of Echeverría et al., 2017). The MHC-SF consists of three subscales that assess emotional, social, and psychological well-being. The scale is comprised of 14 items, and respondents rate the frequency of each feeling in the past month on a 6-point Likert scale (1 = *never*, 6 = *every day*). The Cronbach's α reliability estimates of the MHC-SF for the present study were 0.80 for emotional well-being, 0.73 for social well-being, and 0.81 for psychological well-being. The following sample items are representative of each subscale: "In the past month … how often did you feel happy?" for emotional well-being, "… how often did you feel that you had something important to contribute to society?" for social well-being, and "… how often did you feel that you liked most parts of your personality?" for psychological well-being.

Psychological distress was measured by the Depression Anxiety Stress Scale (DASS-21; Lovibond & Lovibond, 1995; Spanish adaptation of Daza et al., 2002). The DASS-21 assesses the levels of symptomatology associated with depression, anxiety, and stress during the past week. This scale is comprised of 21 items, and responses are based on a 4-point Likert scale (0 = *did not apply to me at all*, 3 = *applied to me very much, or most of the time*). The Cronbach's α reliability estimates of the DASS-21 for the present study were 0.83 for depression, 0.74 for anxiety, and 0.75 for stress. The following sample items are representative of each subscale: "Over the past week … I couldn't seem to experience any positive feeling at all" for depression, "… I was worried about situations in which I might panic and make a fool of myself" for anxiety, and "… I found it hard to wind down" for stress.

4.3. Statistical analysis

All of the data and syntaxes necessary to replicate the results are available to download in an open repository at: https://osf.io/ux263/?view_only=1b3a2c1da9c345db866149cc9aebfb0b (the link was blinded for peer review purposes). Confirmatory factor analysis (CFA) and LPA were conducted using maximum likelihood estimation with robust standard errors in Mplus Version 7.2 (Muthén & Muthé). We first assessed the measurement structure of each scale following standard recommendations of model fit evaluation. The lower bound for acceptable model fit for the comparative fit index (CFI) and the Tucker–Lewis index (TLI) was set to 0.90, while the upper bound for acceptable model fit for the standardized root mean square residual (SRMR) was set to 0.08 and to 0.05 for the root mean square error of approximation (RMSEA; Marsh et al., 2004). To compare competitive models, we used the Bayesian information criterion (BIC), in which lower values indicate better model fit (Byrne, 1995; Kline, 2011). Based on prior research, we assessed the two-, three-, and six-factor models of the AATI-TA (Mello & Worrell, 2007); the three-factor model of the MHC (Keyes et al., 2008); and the three-factor model of the DASS-21 (Lovibond & Lovibond, 1995).

Second, subgroups of high school students were identified using LPA to test the first hypothesis. LPA uses a type of finite mixture model and a variant of latent class analysis for continuous variables to identify clusters (i.e., latent profiles) and classify individuals based on responses for a series of continuous variables (i.e., indicators: past positive, past negative, present positive, present negative, future positive, and future negative). Despite being similar to CFA, LPA explains population heterogeneity by identifying the underlying unobserved categorical variable that divides a population into subgroups of individuals who are similar in their responses for a set of observed variables (Oberski, 2016). It is considered "a person-centered analytic tool that focuses on similarities and differences among people instead of relations among variables" (Berlin et al., 2014, p. 174).

Latent profiles of the AATI-TA were analyzed, and between two and seven profiles were tested. To determine the optimal number of latent profiles, each model was assessed using the following indicators: the Akaike information criterion (AIC), the BIC, the adjusted BIC (aBIC), the Lo–Mendell–Rubin likelihood ratio test (LMR), the adjusted LMR (aLMR), and the bootstrap likelihood ratio test (BLRT). Lower values on the AIC, BIC, and aBIC indicate an overall better profile solution. However, these indicators often keep improving with the addition of more profiles. The LMR and BLRT were used to compare the models of the k profile and the $k - 1$ profile. A significant p-value suggests that the k profile model is better than the $k - 1$ profile model. Put differently, comparing the estimated model (e.g., five classes) with a model with one less class (e.g., four classes) and obtaining a non-significant p-value ($p > .050$) indicates that the model with one less class should be accepted. Of the likelihood-based tests, the BLRT was found to be the best indicator of the appropriate number of profiles (Nylund et al., 2007). Finally, entropy highlights the precision of the classification of individuals into latent profiles, with values ranging from 0 (i.e., lower accuracy) to 1 (i.e., higher accuracy; Tein et al., 2013). To facilitate the labelling of profiles, time attitude factor means were standardized into T-scores ($M = 50$, $SD = 10$) and the criteria of ± 0.5 SDs around the mean for each factor was followed, so that positive values were above 0.5 SD and negative values were below 0.5 SD (e.g., Andretta et al., 2014; Worrell et al., 2019). This conversion yielded comparable scores that are easily interpretable.

Third, the relationship between profiles and distal outcomes (emotional well-being, social well-being, psychological well-being, depression, anxiety, and stress) was examined to test the second hypothesis. This was achieved by using the auxiliary variable function (DU3STEP) from the automatic three-step method in Mplus. This function allows the relationships between profiles and other continuous variables to be explored, correcting the class classification error and assuming that the variances of the distal outcomes vary across latent profiles (Asparouhov & Muthén, 2014).

5. Results

5.1. Preliminary analyses and measurement fit indices

Descriptive statistics and correlations of the variables are presented in Tables S1 and S2. All AATI-TA subscales had significant correlations with well-being and psychological distress variables. Emotional, social, and psychological well-being were correlated positively with the three positive times (present, past, and future) and negatively correlated with the three negative times (present, past, and future). Conversely, depression, anxiety, and stress demonstrated positive correlations with all negative times and negative correlations with all positive times.

The results from the assessment of the measurement models are presented in Table 1. Comparing the three AATI-TA measurement models (two, three, and six factors), only the six-factor model was well fitted to the data. The MHC-SF and the DASS-21 were both well fitted to the data.

Table 1
Model fit indices of the measurement models.

Scales	Model	CFI	TLI	SRMR	RMSEA [CI]	$\chi^2_{(df)}$	p	BIC
ATI-TA	Two-factor	0.480	0.428	.190	.155 [.149-.161]	$2163.08_{(251)}$	.000	21386.49
	Three-factor	0.832	0.814	.090	.089 [.082-.095]	$867.29_{(249)}$	.000	19790.82
	Six-factor	0.946	0.938	.050	.052 [.044-.059]	$434.04_{(237)}$	.000	19319.21
MHC-SF	Three-factor	0.940	0.926	.050	.060 [.047-.073]	$156.27_{(74)}$	.000	12848.74
DASS-21	Three-factor	0.911	0.898	.052	.052 [.044-.061]	$342.67_{(183)}$	.000	16471.54

Table 2
Fit indices of models containing two to seven latent profiles.

K	AIC	BIC	aBIC	Entropy	LMR *p*	aLMR *p*	BLRT *p*
2	3363.59	3435.00	3374.74	.920	.002	.002	≤0.001
3	3132.48	3230.21	3147.74	.870	.266	.272	≤0.001
4	**2900.80**	**3024.85**	**2920.18**	**.908**	**.003**	**.004**	**≤ 0.001**
5	2803.36	2953.71	2826.84	.913	.207	.216	≤0.001
6	2737.74	2914.41	2765.33	.914	.468	.474	≤0.001
7	2676.32	2879.30	2728.02	.883	.071	.074	≤0.001

5.2. Latent profile analysis

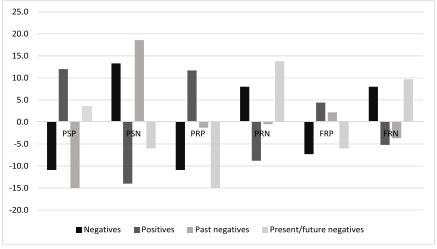
Table 2 presents the fit indices for the assessed competitive latent profile models. According to the BLRT, the four-profile solution should be selected since the BLRT was significant for all models. By contrast, the seven-profile model presented the lowest AIC and BIC. However – and relying on the posterior classification probabilities – the four-profile model had greater classification probabilities (0.90 and above) than the seven-profile model (0.85 and above), suggesting good discriminability and reliability (a probability value greater than 0.70 suggests a satisfactory fit; Nagin, 2015). Accordingly, the four-profile model appeared to be the optimal solution for the current sample, with a high entropy value of 0.90, which indicates that 90% of participants were correctly classified into the appropriate latent profile (Clark & Muthén, 2009). Moreover, the smallest profile contained more than 5% of the sample, which is the percentage needed to sustain the validity of a class membership (Hipp & Bauer, 2006; see Table S3).

Table 3 presents the mean AATI-TA subscale scores across the four latent profiles, while Fig. 1 presents them as a visual illustration. After we standardized the means into *T*-scores, Profile 1 made up 11% of the test sample ($n = 35$) and was labeled (past, present, and future) "negatives" due to the high mean scores on every negative subscale, with all standardized scores ranging between 0.5 and 1.5 SD, whereas positive mean scores ranged between −0.5 and −1.0 SD. Profile 2 made up 45% of the test sample ($n = 142$) and was labeled (past, present, and future) "positives" due to the high mean scores on the past and present positive subscales with more than 1 SD above the mean and the future positive subscale with 0.4 SD above the mean. By contrast, mean scores of negative subscales were 0.5 SD below average. Profile 3 made up 17% of the test sample ($n = 53$) and was labeled "past negatives" due to the high mean scores on the past negative subscales with more than 1.5 SD above the mean and the past positive mean scores with more than 1.5 SD below the mean. The mean scores for the present and future subscales (positive and negative) were all close to the mean ($<\pm 0.5$ SD). Profile 4 made up 27% of the test sample ($n = 87$) and was labeled "present/future negatives" due to the high mean scores on present and future negative subscales, with more than 1.5 SD above the mean. Mean scores for present and future positives subscales were between 0.5

Table 3
Mean scores on AATI-TA subscales across latent profiles.

Variables	Profile 1 Negatives (n = 35; 11%)	Profile 2 Positives (n = 142; 45%)	Profile 3 Past negatives (n = 53; 17%)	Profile 4 Present/future negatives (n = 87; 27%)
Past positive	−0.90 (0.13)	0.57 (0.03)	−1.06 (0.08)	0.02 (0.09)
Past negative	1.40 (0.20)	−0.71 (0.03)	1.58 (0.10)	−0.29 (0.11)
Present positive	−0.90 (0.11)	0.56 (0.05)	0.02 (0.08)	−0.58 (0.11)
Present negative	0.90 (0.09)	−0.46 (0.04)	0.08 (0.06)	0.35 (0.08)
Future positive	−0.55 (0.07)	0.20 (0.04)	0.30 (0.05)	−0.29 (0.05)
Future negative	0.89 (0.11)	−0.28 (0.03)	−0.17 (0.04)	0.22 (0.06)

Note. Profile 1 (negatives) and 2 (positives) are past, present, and future, respectively.



Note. PSP: Past positive; PSN: Past negative; PRP: Present positive; PRN: Present negative; FTP: Future positive; FTN: Future negative

Fig. 1. Latent time attitude profiles. *Note.* PSP: Past positive; PSN: Past negative; PRP: Present positive; PRN: Present negative; FTP: Future positive; FTN: Future negative.

and 1.5 SD below the mean. The mean scores for the past positive and negative subscales were close to 0.5 SD above and below the mean, respectively. All profiles retained the labels used in a previous study because the results yielded similar profiles with similar scores (Worrell et al., 2019).

5.3. Relationships between time attitude profiles and mental health

The equality of means of the distal outcomes was tested across the four latent profiles. Table 4 presents the mean scores across latent profiles on well-being (i.e., emotional, social, and psychological) and psychological distress (i.e., depression, anxiety, and stress). Based on Chi-square results and the Cohen's *d* effect size, Table 5 presents the differences between profiles regarding distal outcomes.

Table 4
Mean scores across latent profiles on time attitude-related variables: well-being and psychological distress.

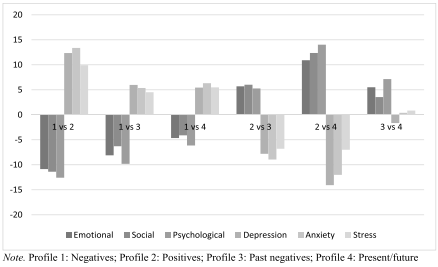
Outcome	Negatives	Positives	Past negatives	Present/Future negatives	Significant differences between profiles
	M (SE)	M (SE)	M (SE)	M (SE)	
Emotional well-being	−0.92 (0.15)	0.42 (0.04)	0.09 (0.06)	−0.25 (0.06)	1 < 4 < 3 < 2
Social well-being	−0.68 (0.12)	0.41 (0.04)	−0.04 (0.08)	−0.25 (0.06)	1 < 4 = 3 < 2
Psychological well-being	−1.20 (0.18)	0.52 (0.04)	0.15 (0.07)	−0.30 (0.06)	1 < 4 < 3 < 2
Depression	0.73 (0.12)	−0.40 (0.03)	0.11 (0.07)	0.18 (0.04)	2 < 3 = 4 < 1
Anxiety	0.26 (0.05)	−0.16 (0.01)	0.07 (0.03)	0.06 (0.02)	2 < 4 = 3 < 1
Stress	0.32 (0.06)	−0.19 (0.02)	0.09 (0.04)	0.07 (0.02)	2 < 4 = 3 < 1

Note. " = " the groups are not significantly different.

Table 5
Chi square statistics and Cohen's d for pairwise differences between profiles.

	Profile 1 vs. 2		Profile 1 vs. 3		Profile 1 vs. 4		Profile 2 vs. 3		Profile 2 vs. 4		Profile 3 vs. 4		
	χ^2	*d*	χ^2	*d*	χ^2	*d*	χ^2	*d*	χ^2	*d*	χ^2	*d*	Overall χ^2
Emotional	66.96[a]	−10.86	37.47[a]	−8.11	12.62[a]	−4.66	19.31[a]	5.69	90.57[a]	10.92	14.94[a]	5.52	183.90[a]
Social	65.32[a]	−11.40	18.21[a]	−6.28	8.21[a]	−4.11	23.25[a]	6.01	76.59[a]	12.36	4.50	3.54	128.74[a]
Psychological	85.04[a]	−12.58	47.78[a]	−9.81	21.28[a]	−6.15	16.84[a]	5.26	113.96.[a]	14.03	21.38[a]	7.14	176.65[a]
Depression	84.90[a]	12.35	17.55[a]	5.98	18.13[a]	5.44	39.25[a]	−7.80	119.11[a]	−14.07	0.46	−1.65	204.39[a]
Anxiety	69.00[a]	13.38	10.10[a]	5.37	15.21[a]	6.32	38.51[a]	−8.94	68.51[a]	−12.01	0.14	0.39	128.02[a]
Stress	55.90[a]	9.91	7.98[a]	4.51	12.32[a]	5.48	31.28[a]	−6.79	39.39[a]	−7.0	0.63	0.85	84.90[a]

Note: *Wald* χ^2 test, *df* = 3; *d*: Cohen's d; Emotional, Social, and Psychological refers to each dimension of well-being assessed by MHC; Profile 1: Negatives; Profile 2: Positives; Profile 3: Past negatives; Profile 4: Present/future negatives.
[a] The level of significance for relations was adjusted at p < .008 using the Bonferroni correction.



Note. Profile 1: Negatives; Profile 2: Positives; Profile 3: Past negatives; Profile 4: Present/future negatives

Fig. 2. Differences in effect sizes (Cohen's d) between profiles in their relationship to distal outcomes. *Note.* Profile 1: Negatives; Profile 2: Positives; Profile 3: Past negatives; Profile 4: Present/future negatives.

5.4. Well-being

The positive group had significantly higher mean scores on emotional, social, and psychological well-being than all other profiles. By contrast, the negative group demonstrated significantly lower mean scores on all three types of well-being than the other profiles. The past negative group demonstrated positive mean scores on emotional and psychological well-being but negative mean scores on social well-being. The mean scores for the present/future negative group were negative for all three types of well-being. Psychological well-being had the highest mean scores (in either a positive or a negative direction) for all four profiles. Taken together, the results demonstrated that the positive group, followed by the past negative group, reported the highest levels of well-being, whereas the negative group reported the lowest.

5.5. Psychological distress

The positive group had significantly lower mean scores on depression, anxiety, and stress than all other profiles. By contrast, the negative group showed significantly higher scores on all three psychological distress indicators than the rest of the profiles. There were no significant differences between the past negatives and present/future negatives, but both groups achieved higher scores on depression, anxiety, and stress than the positive group and lower scores than the negative group. Depression was the psychological indicator with the highest mean scores (in either a positive or a negative direction).

Based on Chi-square and Cohen's *d* results (see Fig. 2), the primary differences in well-being and psychological distress were observed between the positive and present/future negative groups, and between the negative and positive groups. The comparisons between the negative and present/future negative profiles revealed fewer differences. In general, depression and psychological well-being demonstrated the greatest differences between those groups.

6. Discussion

Adolescents can have different feelings and attitudes towards the past, present, and future. During adolescence, individuals face several challenges and demands that can reduce their well-being (González-Carrasco et al., 2019) and increase the likelihood of psychological distress (Suldo et al., 2016). The study of time attitudes offers new possibilities to explore whether regarding time frames as positive or negative is likely to influence adolescents' mental health. By investigating time attitude profiles, we analyzed the associations between the various profiles and mental health. The results confirmed our hypotheses since the positive time attitude profile was related to higher levels of emotional, social, and psychological well-being and lower levels of depression, anxiety, and stress. Moreover, psychological well-being and depression were the constructs with higher and lower scores, respectively, than the other distal outcomes.

This study identified four time attitude profiles of adolescents (i.e., past, present, and future negatives; past, present, and future positives; past negatives; and present/future negatives). These profiles are similar to those identified in a previous study, which also found a higher number of individuals clustered in positive profiles than in negative profiles (Worrell et al., 2019). However, in the present study, other negative profiles were generated that, together, comprised more individuals than the positive profile. These results demonstrated that the positive and negative profiles were somewhat comparable in terms of prevalence, although previous research has demonstrated that individuals may change profiles over time (Konowalczyk et al., 2018).

In the current study, there was a strong relationship between the six AATI-TA subscales and dual-factor model of mental health. With regard to the distinction between mental health and psychological distress (Keyes, 2009), time attitude subscales demonstrated different relationships with each construct. Present and future AATI-TA subscales were moderately and strongly correlated, respectively, with emotional, social, and psychological well-being, and the highest correlation was found between the present positive and emotional well-being. By contrast, all AATI-TA subscales were weakly or moderately correlated with psychological distress, with the highest correlation being between present negative and depression. These results are consistent with previous studies in adults (Cole et al., 2017) and late adolescents (Worrell et al., 2019), suggesting that a positive attitude towards the present is related to optimal functioning.

In our results, the positive profile was characterized by positive attitudes towards all three time frames. Positive feelings towards the past, present, and future have been associated with different outcomes in previous literature. For example, feeling positive about the past has been linked to a warm, sentimental attitude about past recollections and used to predict the reminiscence of experiences and memories characterized by positive moods (Stolarski et al., 2018). Likewise, feeling positive about the present has been associated with well-being and positive social relationships (Boniwell et al., 2010; Stolarski et al., 2014). Finally, a study found that feeling positive about the future was more common in goal-oriented, motivational, and self-aware individuals with high intention-behavior consistency (Shipp et al., 2009). Adolescents clustered in this profile reported higher levels of emotional, social, and psychological well-being and lower levels of depression, anxiety, and stress. In addition, previous studies have found that positive time attitude profiles are associated with optimal outcomes (i.e., general well-being and psychological symptoms; Konowalczyk et al., 2018; Worrell et al., 2019).

The results of the current study also revealed three negative profiles that differed in their degree of negative feelings towards the past, present, or future. As expected, the past, present, and future negative profile was associated with the poorest outcomes in terms of well-being and psychological distress. Nevertheless, the primary difference between the other two negative profiles was that participants in the present/future negative group reported decreased emotional and psychological well-being compared to those in the past negative group. Previous literature supports these findings since Rönnlund et al. (2017) found the future negative profile to be a

stronger predictor of negative moods and decreased well-being. On the other hand, the present negative profile was linked to increased depression symptoms, an unclear vision of the future, and a tendency to disregard future consequences of behaviors (McElwee & Haugh, 2010; Zimbardo & Boyd, 1999). Generally, our findings are in line with Worrell et al. (2019), suggesting that the past, present, and future negative and the present/future negative profiles are correlated with the most detrimental outcomes.

In line with the dual-factor model of mental health, we observed lower levels of psychological distress when higher scores on emotional, social, and psychological well-being were reported. Psychological well-being and depression demonstrated the highest (for both positive and negative) scores across all profiles. Psychological well-being may be the most relevant aspect of mental health during adolescence (González-Carrasco et al., 2019); having meaningful goals during transitional stages helps adolescents face various demands and, in most cases, eases the pursuit of a fulfilling life (Vittersø, 2016). By contrast, depression is the most prevalent form of psychological distress among adolescents and has been widely demonstrated to have a negative relationship with optimal development (Birmaher et al., 1996). Depression has been associated with poorer social relationships and academic outcomes, substance abuse, increased risk of suicide, and malfunctioning in adolescents (Beesdo et al., 2009; Birmaher et al., 1996; Derdikman-Eiron et al., 2011). Altogether, positive feelings about time may ensure positive mental health and optimal psychological functioning. This highlights the need to promote more positive feelings towards the past, present, and future.

6.1. Implications

This study has revealed that time attitudes are meaningful constructs in the study of mental health. Feeling positive towards the past, present, and future may enhance well-being and protect against psychological distress, suggesting that this type of profile is one of the most adaptive in adolescents. By contrast, feeling negative towards the past, present, and future may be counterproductive. These findings have important implications for developing interventions to target the promotion of mental health during adolescence. Previous studies on future time orientation interventions have demonstrated that time perspective can be modified (Oyserman et al., 2002). Therefore, the development of time perspective interventions based on positive psychology may influence individuals' tendencies to adopt a specific time perspective (Miller & Nickerson, 2008). Educational experiences shape one's time perspective and time attitudes, as adolescents spend much of their time in school. For this reason, time perspective-based interventions in the school context may prove effective in improving adolescents' mental health (Boniwell et al., 2015).

These interventions might be of assistance to students whose mental health is at risk and in promoting adolescents' general mental health. Strategies underpinning positive psychology interventions that focus on the enhancement of well-being and that, as a consequence, reduce psychological distress, are considered efficient science-based practices in the school context (Tejada-Gallardo et al., 2020). These interventions target components that can work on time frames and are based on fostering positive functioning and well-being. For example, gratitude practices targeting the past may boost positive attitudes towards the past (Seligman et al., 2005), savoring the present may develop positive present attitudes (Smith et al., 2014), and reflecting on our best future may promote positive attitudes towards the future (Sheldon & Lyubomirsky, 2006).

6.2. Limitations and future research

The results of this study should be understood in the context of a number of limitations. First, all data were collected through self-reporting, which can bias responses. Second, the design of the study was cross-sectional, and it is not possible to attribute causality in the results. Future longitudinal studies are needed to better understand the relationship between time attitudes and the dual-factor model of mental health in adolescents. It may be interesting to establish whether these profiles are consistent across countries, and cross-cultural research is therefore needed. This study has revealed a pattern of results similar to those of previous studies, demonstrating that well-being and psychological distress are related to time attitudes. For this reason, future research should go one step further and examine how time attitudes might change over time through interventions aimed at increasing well-being and reducing psychological distress.

Acknowledgement

This work was supported by a doctoral scholarship from the University of Lleida.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.adolescence.2021.04.002.

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Supplementary material

TABLE S1. DEMOGRAPHIC CHARACTERISTICS OF THE PARTICIPANTS INCLUDED IN THE STUDY

Demographics	N	%
Sex		
Female	143	45,1
Male	172	54,3
Other	2	0,6
Socioeconomic status		
Low	38	12
Average	202	63,7
High	77	24,3
Family composition		
Both parents together	260	82
Only one of the parents	51	16,1
Other family member	6	1,9

TABLE S2. DESCRIPTIVE STATISTICS AND CORRELATIONS OF ATI-TA SUBSCALES WITH WELL-BEING AND PSYCHOLOGICAL DISTRESS

	M (*SD*)	1	2	3	4	5	6	7	8	9	10	11
1. PSP	14.57(*4.23*)	-										
2. PSN	8.25(*4.86*)	-.83*										
3. PRP	15.42(*3.45*)	.41*	-.27*									
4. PRN	9.14(*3.54*)	-.29*	.40*	-.72*								
5. FTP	15.19(*3.68*)	.22*	-.20*	.48*	-.34*							
6. FTN	7.04(*3.26*)	-.22*	.30*	-.43*	.58*	-.60*						
7. EMO	11.13(*2.66*)	.36*	-.24*	.84*	-.58*	.50*	-.47*					
8. SOC	13.80(*4.66*)	.44*	-.32*	.57*	-.40*	.54*	-.35*	.78*				
9. PSY	21.38(*5.15*)	.34*	-.26*	.76*	-.53*	.52*	-.57*	.88*	.74*			
10. DEP	5.62(*4.50*)	-.36*	.43*	-.66*	.69*	-.23*	.49*	-.66*	-.47*	-.60*		
11. ANX	5.80(*4.19*)	-.38*	.46*	-.43*	.45*	-.22*	.47*	-.47*	-.32*	-.43*	.79*	
12. STR	8.16(*4.39*)	-.26*	.42*	-.34*	.43*	-.22*	.47*	-.32*	-.23*	-.30*	.69*	.92*

Note: PSP: Past positive; PSN: Past negative; PRP: Present positive; PRN: Present negative; FTP: Future positive; FTN: Future negative; EMO: Emotional well-being; SOC: Social well-being; PSY: Psychological well-being; DEP: Depression; ANX: Anxiety; STR: Stress.

*The level of significance for correlations was adjusted at $p < .004$ using the Bonferroni correction.

TABLE S3. AVERAGE LATENT CLASS PROBABILITIES FOR MOST LIKELY CLASS MEMBERSHIP (ROW) BY LATENT CLASS (COLUMN)

Profiles	af	rf	Profiles	1	2	3	4
1	35	0.11	1	0.96	0.00	0.02	0.01
2	142	0.45	2	0.00	0.95	0.00	0.04
3	53	0.17	3	0.00	0.00	0.98	0.01
4	87	0.27	4	0.03	0.06	0.00	0.90

Note: af = absolute frequency; rf = relative frequency.

SECTION 2

A GLIMPSE OF THE EXPERIMENTAL PART OF THE THESIS

5.1.3 IMPACT OF A SCHOOL-BASED MULTICOMPONENT POSITIVE PSYCHOLOGY INTERVENTION ON ADOLESCENTS' TIME ATTITUDES: A LATENT TRANSITION ANALYSIS

Tejada-Gallardo, C., Blasco-Belled, A., & Alsinet, C. (2021)

Journal of Youth and Adolescence.

DOI: 10.1007/s10964-021-01562-5

Journal of Youth and Adolescence
https://doi.org/10.1007/s10964-021-01562-5

EMPIRICAL RESEARCH

Impact of a School-Based Multicomponent Positive Psychology Intervention on Adolescents' Time Attitudes: A Latent Transition Analysis

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Received: 4 November 2021 / Accepted: 17 December 2021

Abstract
Time attitudes, which refer to positive and negative feelings towards the past, present, and future, are a salient phenomenon in the developmental stage of adolescence and have been related to better well-being. Positive feelings towards time can be promoted in the school setting through empirically validated positive psychology interventions. However, the extent to which these interventions impact the time attitudes of adolescents remains unknown. The current study investigated the influence of a multicomponent positive psychology intervention on adolescents' transitions between time attitude profiles and how these transitions are related to their emotional, social, and psychological well-being. Participants consisted of 220 ($M = 14.98$; 47.3% female) adolescents from two Spanish high schools who participated in the six-week Get to Know Me+ program. Adolescents' time attitudes and well-being were measured via the Adolescents and Adult Time Inventory–Time Attitudes and the Mental Health Continuum–Short Form, respectively, at pre- and postintervention. Participants were clustered in different profiles through a latent profile analysis, and the transitions were analyzed using a latent transition analysis. Five profiles were identified (*negative*, *present/future negative*, *past negative*, *optimistic*, and *positive*), and results indicated that adolescents who participated in the intervention were more likely to transition to positive profiles (*optimistic* and *positive*) and generally reported higher well-being, especially those in the *negative*, *present/future negative*, and *optimistic* profiles. Preliminary evidence showed that school-based multicomponent positive psychology interventions can have a positive impact on adolescents' feelings towards time and well-being.

Keywords Adolescents · Time attitudes · Profiles · Positive psychology · Multicomponent positive interventions · School

Introduction

Over the last two decades and with the emergence of positive psychology, the study of mental health has gained attention, as reflected by an exponential growth in research and an increased focus on this topic in practice. The traditional focus on negative aspects and the treatment of mental illness has evolved towards a more comprehensive understanding of mental health. The latter is conceived as the presence of well-being and the absence of psychopathology (Keyes, 2009). Adolescence can entail the onset of many mental adult disorders (Kessler et al., 2005), suggesting that the promotion of well-being at early stages may prevent future adult psychiatric disorders. In the educational context, positive education emphasizes the promotion of positive emotions, relations, and character strengths to foster the happiness and well-being of children and adolescents for educational purposes (Bernard & Walton, 2011; Seligman et al., 2009). According to this, programs that focus on the abovementioned aspects should be well-received by educational institutions. Nevertheless, there are still many obstacles in introducing these programs as part of school curricula (Weissberg et al., 2013). Adolescence is also a stage in one's biological and psychological

Supplementary information The online version contains supplementary material available at https://doi.org/10.1007/s10964-021-01562-5.

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Published online: 31 December 2021

developmental (Burger & Samuel, 2017) wherein time attitudes, which refer to positive and negative feelings towards time (past, present, and future), are a salient phenomenon. Previous research advocated for an association between time attitudes and emotional, social, and psychological well-being (Tejada-Gallardo et al., 2021). Studies investigating the effects of positive psychology education programs have shown positive results on well-being (e.g., Shoshani et al., 2016). In fact, time attitudes are likely to be responsive to positive psychology interventions because positive feelings towards time are predicted by beneficial variables at school, such as positive teacher-student relationships and satisfaction at school (Froiland et al., 2019). With the aim to broad the research field of adolescents' time attitudes and well-being, this study attempted to evaluate the impact that a school-based multicomponent positive psychology intervention had on adolescents' positive and negative feelings towards time and whether this intervention could influence their emotional, social, and psychological well-being.

Time Attitude Profiles and Well-Being in Adolescents

Mello and Worrell (2015) presented a conceptual model of time perspective for adolescents. This model proposes time perspective as a cognitive and motivational construct that originates in the thoughts of individuals and leads to decision-making processes and engagement in specific behaviors. Time perspective is also conceptualized as a multidimensional construct that encompasses five dimensions (i.e., time attitudes, time orientation, time relation, time frequency, and time meaning) in the three time frames (i.e., past, present, and future). The time attitude dimension is the most commonly studied component of time perspective; it refers to individuals' positive and negative feelings towards the past, present, and future (Mello & Worrell, 2015). Previous research on adolescents has employed time attitudes to investigate several developmental outcomes through a person-centered approach (e.g., Konowalczyk et al., 2019), which involves identifying and grouping individuals who share particular attributes. Latent profile analysis is a latent variable approach that focuses on identifying latent subpopulations (i.e., profiles) from a population based on a set of continuous variables (i.e., indicators; Wang & Hanges, 2011). In the present study, the latent profile analysis is used to identify individuals who display similar positive and negative feelings towards the past, present, and future, and the results of this analysis can therefore be used to describe the distribution of time attitudes across individuals (Lanza et al., 2010).

Adolescence is an important period in the emergence of mental illnesses, especially with regard to the onset of anxiety and depression symptoms (Paus et al., 2008). It is not only the presence of mental disorders at this developmental stage that is alarming, as the instability of their well-being, which tends to decrease from early to late adolescence (González-Carrasco et al., 2017). Adolescents' positive profiles have been related to beneficial outcomes, such as higher well-being and lower psychological distress (Tejada-Gallardo et al., 2021), suggesting that positive feelings towards the three time frames lead to optimal psychological functioning. Several profiles have emerged throughout the literature on time attitude profiles, for instance, negatives, present/future negatives, past negatives, moderately-negatives, ambivalents, optimists, balanced, and positives (Andretta et al., 2014; Tejada-Gallardo et al., 2021; Worrell et al., 2019). However, it seems that adolescents' time attitude profiles neither follow a common pattern of clusters (Tejada-Gallardo et al., 2021) nor are stable over time, especially when these profiles are related to developmental outcomes characteristic of this particular stage (McKay et al., 2018). For instance, some scholars observed a high frequency of transitioning (91.2%) among profiles between ages 13 and 15 (Konowalczyk et al., 2018). Other authors also reported a high percentage of adolescents who transitioned from one profile to another over time, with the change from a positive to a negative profile being the most common (Wells et al., 2018). In short, the development of time attitudes, which emerge in adolescence, is meaningfully related to mental health outcomes. Hence, the maintenance of or transition to positive profiles is somehow beneficial for this specific period of life (McKay et al., 2018). Given that this is the case, interventions aimed at improving adolescent's well-being by focusing on their positive feelings towards the past, present, and future may have an impact in terms of influencing transitions of individuals to more positive profiles.

Positive Psychology Interventions in the School Setting

Approximately 3 million people in Spain are diagnosed with depression every year, and this condition typically has its onset at the age of 15 (Spanish Ministry of Health, Consumer Affairs, and Social Welfare, 2017). This age is of particular importance given that in the Spanish educational system, it is considered a key transitional stage where adolescents should decide whether they wish to continue studying or join the professional world. The promotion of well-being in adolescents can be an effective strategy to ensure young adult transitions and future adult positive mental health (O'Connor et al., 2017). Even though the prevention of mental illnesses is central to psychologists' work, building and promoting well-being should be of equal importance, as adolescents may not have optimal

functioning regardless of the absence of any mental disorder (Suldo et al., 2014). Promoting well-being may thus help young people to meet the significant demands they face as they move into young adulthood (Schulenberg et al., 2004). Considering this issue in the context of the school setting, there is growing interest in the potential to promote healthy pathways into adulthood through school-based interventions targeting well-being, an approach that is often referred to as positive education (O'Connor et al., 2017). Positive education emerged alongside the positive psychology movement, which involves the application of empirically validated interventions and programs that have a positive impact on well-being. Positive interventions have also been introduced in the school setting with the aim of allowing children and adolescents to thrive both psychologically and academically (Green et al., 2011). In short, positive education can be understood as the application of positive psychology interventions in educational settings, and it is considered an approach that promotes well-being and academic learning (Seligman et al., 2009).

The school institution is considered a vital place of growth that affects life at home, the community, and future workplace (Seligman et al., 2009). Schools are excellent settings for delivering positive psychology initiatives because adolescents spend a great part of their waking time at school but also because these programs can be freely accessed by all adolescents, not only those that have the wealth and time to access them via private practices. However, reform at the policy level will be required to overcome the disconnection between the growing evidence as to the efficacy of school-based positive interventions and the relevant obstacles (White, 2016). One type of these interventions, multicomponent positive psychology interventions, are based on a variety of individual exercises targeting two or more theoretically relevant well-being components that resemble the key elements of positive education and are conducted within an integral program. When compared to single-component positive psychology interventions, multicomponent positive psychology interventions have been found to have more pronounced and long-term effects (Rusk et al., 2018; Seligman, 2011, 2018).

A School-Based Multicomponent Positive Psychology Intervention: The Get to Know Me+ Program

Get to Know Me+ is a multicomponent positive psychology school program consisting of three modules targeting different components of well-being across the three time periods: (1) focusing on the positive emotions of the present, (2) turning back to the positive emotions of the past, and (3) moving forward to the positive emotions of the future. An individual's behavior is not determined solely by their present situation, as one's mood is affected by personal hopes, goals, and views of the past (Mello & Worrell, 2015). Subjective well-being represents people's evaluations of their lives, including cognitive evaluations (i.e., life satisfaction) and affective evaluations (i.e., positive and negative emotions; Tomlinson et al., 2017). These components focus not only on present life experiences but also on past recollections and future expectations regarding one's life (Cunningham et al., 2014). Hence, the positive or negative feelings that adolescents have towards time also influence their emotional state and well-being (Tejada-Gallardo et al., 2021). The Get to Know Me+ program incorporates several aspects that emphasize the promotion of adolescents' well-being through the three time frames. For instance, gratitude practices may boost positive feelings towards the past (Seligman et al., 2005), signature strengths practices may develop positive feelings towards the present (Proctor et al., 2011), and reflecting on one's best future self may promote positive feelings towards the future (Sheldon & Lyubomirsky, 2006). Each session consisted of three parts with an introductory flow activity, a central activity to put in practice the principle of well-being, and the closing of the session. A more detailed description and plan of the program can be found in the Appendix.

The Current Study

Longitudinal studies have revealed that time attitude profile membership is susceptible to change over time, especially in adolescents, and cross-sectional studies have suggested that a positive time attitude profile is optimal in terms of well-being. Given the evidence and the lack of research on the impact of multicomponent positive psychology interventions on adolescents' time attitude profiles, the goal of the present study was to investigate to which extent a multicomponent positive psychology intervention (Get to Know Me+) can influence the probability of adolescents' transitions towards more adaptive time attitude profiles and the impact of these transitions on well-being. Although multicomponent positive psychology interventions are an effective strategy by which to increase well-being in the school setting, whether they can prompt transitions towards more positive profiles and the possible benefits of the transitions in terms of the emotional, social, and psychological well-being of adolescents remains unknown. Hence, this study presents an exploratory investigation of the topic. It has been hypothesized that the multicomponent positive psychology intervention will help adolescents to transition to more positive profiles (compared to the control group) and that the individuals with positive profiles in the intervention group will report higher emotional, social, and psychological well-being.

Methods

Participants and Procedure

Participants were 220 students[1] in the 9th grade ($M_{age} = 14.98$ years, $SD = 0.62$; 47.3% female) from two different high schools from west Catalonia (Lleida, Spain) that voluntarily participated in the program, which was conducted from October 2019 to December 2019. An invitation to participate in the study was given to different high-schools from the city of Lleida. Given that the intervention would imply re-scheduling some classes, only two high schools voluntarily accepted the invitation and were recruited to participate in the study. Further demographic characteristics of participants are presented in Table 1. Students needed to present an informed consent from their parents in order to participate in the research study. This informed consent stated that they could withdraw the study at any time. Of the total sample, 135 adolescents were randomly allocated to the control group (placebo) and 85 to the intervention group. All participants in the control group, with the exception of one, completed the baseline assessment and the posttest assessment; thus, a total of 134 participants were ultimately retained for the statistical analyses. Regarding the intervention group, the adolescents' responses were only considered if they had attended at least four of the six sessions. Six participants dropped out; thus, 79 participants were ultimately retained for the statistical analyses (total retention rate of 96.81%). The attrition rate of the present study is considered to be very low as dropout rates of other school interventions tend to be higher (e.g., 30%; Chacko et al., 2016). The assessments and intervention were delivered by two psychologists and doctoral students who were specifically trained for this purpose. The adolescents completed a pretest assessment (one week prior to the beginning of the program) and posttest (one week after the end of the program). The control group participated in a one-day individual session about their character strengths which was also delivered by the psychologists and doctoral students. The present study was approved by the University Ethics Committee under the code CEIC-2157.

Table 1 Sample demographics reported at baseline assessment

	Intervention ($N = 85$)		Control ($N = 135$)	
Demographic	*N*	%	*N*	%
Gender				
Female	44	51,8	60	44,4
Male	41	48,2	73	54,1
Other	0	0	2	1,5
Ethnicity				
Hispanic, Latino or other	6	7,0	8	5,9
Spanish origin	69	81,2	118	87,4
Not Hispanic	10	11,8	9	6,7
Socioeconomic status				
Low	16	18,8	36	26,7
Average	56	65,9	86	63,7
High	13	15,3	13	9,6
Family composition				
Both parents together	59	69,4	111	82,2
Only one of the parents	20	23,5	24	17,8
Other family member	6	7,1	0	0

Measures

Time attitudes

Time attitudes were measured with the Adolescent and Adult Time Inventory–Time Attitudes Scale (AATI–TA; Mello & Worrell, 2007; Spanish adaptation of Mello et al., 2010). The AATI–TA consists of six subscales that assess past positive, past negative, present positive, present negative, future positive, and future negative attitudes. The scale includes 24 items, which participants respond to using a 5-point Likert scale (1 = *totally disagree*, 5 = *totally agree*). The Cronbach's α reliability estimates for the present study were 0.88 (past positive), 0.92 (past negative), 0.89 (present positive), 0.73 (present negative), 0.87 (future positive), and 0.75 (future negative) at Time 1 and 0.89 (past positive), 0.90 (past negative), 0.91 (present positive), 0.73 (present negative), 0.89 (future positive), and 0.84 (future negative) at Time 2. The following sample items are representative of each subscale: "I have very happy memories of my childhood" for past positive, "I wish that I did not have the past that I had" for past negative, "I am happy with my current life" for present positive, "I am not satisfied with my present" for present negative, "Thinking about my future excites me" for future positive, and "Thinking about my future makes me sad" for future negative.

Well-being

Well-being was assessed using the Mental Health Continuum–Short Form (MHC–SF; Keyes et al., 2008; Spanish adaptation of Echeverría et al., 2017). The MHC–SF assesses an individual's emotional, social, and psychological well-being during the last month. This scale includes 14 items, which participants respond to using a

[1] Post hoc power analysis was calculated using G*Power (v. 3.1.9.7; Faul et al., 2009) to detect small (i.e., 0.20) effect size with the level of alpha = 0.05 and $n = 220$ (the sample size at pretest). The results indicated a power of 0.92. Likewise, the power was 0.91 for the sample size at posttest ($n = 213$), using the same effect size and alpha parameters.

6-point Likert scale (1 = never, 6 = every day). The following sample items are representative of each subscale: In the past month, "how often did you feel happy?" for emotional well-being; "how often did you feel that you had something important to contribute to society?" for social well-being; and "how often did you feel that you liked most parts of your personality?" for psychological well-being. The Cronbach's α reliability estimates for the MHC–SF were 0.77 (emotional well-being), 0.71 (social well-being), and 0.79 (psychological well-being) at Time 1 and 0.87 (emotional well-being), 0.81 (social well-being), and 0.82 (psychological well-being) at Time 2.

Data Analytic Plan

Preliminary analysis

A series of preliminary analyses were performed (detailed information is provided in Supplementary Material 1). All analyses were conducted with the maximum robust likelihood estimator (MLR) in Mplus 7.2 (Muthén & Muthén, 2012). Preliminary measurement models were first estimated at both time points to identify the optimal model for further analyses and their longitudinal measurement invariance across time points (Millsap, 2011). Items of time attitudes (i.e., profiles) and well-being (i.e., outcomes) scales were estimated with a confirmatory factor analytic (CFA) model that included six first-order factors for time attitudes (past positive, past negative, present positive, present negative, future positive, and future negative) and three first-order factors for well-being (emotional, social, and psychological well-being). Detailed information concerning the models, measurement invariance, and correlations is presented in Supplementary Material 1.

Factor scores were extracted rather than using scale scores to estimate the profiles and their relations with the outcomes. The use of factor scores in the following analysis made it possible to partly control for measurement error (Skrondal & Laake, 2001). To ensure comparability across the two time points, factor scores from the most invariant longitudinal measurement model were extracted (Millsap, 2011).

Latent profile analysis and latent transition analysis

At both measurement time points and for each group (i.e., control and experimental), one to seven latent profiles solutions were estimated based on the six-time attitude factors as profile indicators. Means and variances for these indicators were free to vary across profiles (Diallo et al., 2016; Peugh & Fan, 2013). The section titled Supplementary Material 1 presents detailed information concerning the model comparison procedures used to select the optimal number of profiles.

Once the optimal number of profiles was identified at both measurement time points and for each group, the two-time multigroup specific models were combined into a longitudinal latent profile analysis to verify the extent to which these solutions were similar across time points. This strategy, which is a combination of the longitudinal profile similarity test suggested by Morin and Litalien (2017) and the test of profile similarity across multiple groups developed by Morin et al. (2016), was used to determine whether the same number of profiles could be identified across time points and groups (i.e., within-sample stability; Kam et al., 2016). First, it was examined whether the same number of profiles was identified across time points and groups (*configural* similarity). This model was free of constraints and served as a baseline model for comparison with subsequent models in which restraints were sequentially incorporated. Second, *structural* similarity was tested by including equal constraints across time points and groups on the means of the profile indicators. This step was used to verify whether the shapes of profiles were similar or stable over time and between groups. Third, *dispersion* similarity of the profiles was examined by including equality constraints on the variances of the profiles across time points and groups. This step was used to test whether the within-profile similarity remained stable over time and between groups. Fourth, *distributional* similarity of the profiles was tested by constraining equality class probabilities across time points and groups. This last test was used to determine whether the prevalence of profiles was stable over time and between groups. The hypothesis of profile similarity will be supported when the values for at least two indices of the consistent Akaïke information criterion (CAIC), the Bayesian information criterion (BIC), and the sample-size adjusted BIC (aBIC) are lower for the model containing more equality constraints (Morin et al., 2016).

The most similar model from the previous procedure was then retained and converted into a longitudinal latent transition analysis to estimate the within-person stability in profile membership across time points and groups (i.e., whether adolescents remained in the same profile over time and which profile transitions were observed for each group; Kam et al., 2016). To facilitate the labeling of profiles, time attitude factor means were standardized into T-scores ($M = 50$, $SD = 10$), and the criterion of ±0.5 *SD*s around the mean for each factor was followed, meaning that positive values were above 0.5 *SD* and negative values were below 0.5 *SD* (e.g., Worrell et al., 2019). This conversion yields comparable scores that are easily interpretable. Finally, outcomes were incorporated into the final latent transition analysis.

Outcomes of profile membership

The outcomes (emotional, social, and psychological well-being) were added to the final retained model. First, it was allowed the outcomes to freely differ across profiles

and time points for each group. Second, explanatory similarity of the profiles was tested by constraining the within-profile means of the outcomes to be equal across time points. The model constraint function of Mplus was used to statistically test the mean differences between each pair of profiles based on the multivariate delta method (Kam et al., 2016; Raykov & Marcoulides, 2004). All the data and syntaxes necessary to replicate the results of the presented analyses are available to download in the open OSF repository.

Results

Profile Selection and Latent Transition Analysis

As a first step, the procedure used to determine the optimal number of profiles is detailed in the section titled Supplementary Material 1 and the results for the latent profile analysis models are presented in Supplementary Material 2 (Tables S3 and S4). The results suggested that the AATI–TA five-profile solution was the best option. The two-wave longitudinal latent profile analysis model of *configural* similarity was first estimated with a five-profile solution to verify the extent to which the same profiles were similar across measurement time points. The fit indices for all longitudinal models are presented in Table 2. Compared to the initial model of *configural* similarity, the next two models resulted in lower values for all fit indices, thereby supporting the *structural* and *dispersion* similarity of the five-profile solution over time. Finally, the model of *distributional* similarity resulted in higher values for all fit indices when compared to the previous model, which indicated the within-profile similarity of profiles over time. These results allowed to proceed with the following step, which consists of identifying and describing the profiles from the *dispersion* similarity model.

The model of *dispersion* similarity was then retained and converted into a complete latent transition analysis model. This final model, which resulted in high levels of classification accuracy (0.95), is illustrated in Fig. 1, and the exact within-profile means of the latent indicators are reported in the section titled Supplementary Material 2 (Table S5). After standardizing the means into T-scores, Profile 1 constituted 11.26% of the test sample ($n = 24$) and was labeled as (past, present, and future) *negative* due to the high mean scores on every negative subscale, with all standardized scores ranging between 0.5 and 1.5 *SD* and positive mean scores ranging between −0.5 and −1 *SD*. Profile 2 constituted 17.37% of the test sample ($n = 37$) and was labeled *present/future negative* due to the high mean scores on present and future negative subscales, which were between 1.0 *SD* and 1.5 *SD* above the mean. The mean scores for the present and future positives subscales were between −0.5 and −1.5 *SD*. Profile 3 constituted 9.85% of the test sample ($n = 21$) and was labeled *past negative* due to a high mean score on the past negative subscale, which was more than 1.5 *SD* above the mean, and its past positive mean score, which was more than 1.5 *SD* below the mean. The mean scores for the present and future subscales (positive and negative) were all close to the mean (<±0.5 *SD*). Profile 4 constituted 15.49% of the test sample ($n = 33$) and was labeled *optimistic* due to its negative past mean score of around 0.5 *SD*, present (positive and negative) mean scores close to the mean (<±0.5 *SD*), and a future positive mean score of around 0.5 *SD*. Profile 5 constituted 46% of the sample ($n = 98$) and was labeled *positive* due to high mean scores on the past and present positive subscales, which were more than 1 *SD* above the mean, and the future positive subscale, which was 0.4 *SD* above the mean. By contrast, the mean scores of the negative subscales were between 0.5 *SD* and 1.5 *SD* below the mean. All profiles retained the labels used in previous studies because the results yielded similar profiles with similar scores (Konowalzyk et al., 2019; Worrell et al., 2019).

Table 2 Results from the longitudinal latent profile analyses and latent transition analyses estimated on the full sample

	LL	*#fp*	Scaling	AIC	CAIC	BIC	aBIC	Entropy
Longitudinal Latent Profile Analyses								
Configural similarity	−2071.475	153	1.389	4448.949	5116.227	4963.227	4478.415	0.946
Structural similarity	−2141.496	63	1.635	4409.496	4694.257	4631.257	4421.629	0.924
Dispersion similarity	−2155.023	45	1.704	4400.046	4596.304	4551.304	4408.712	0.922
Distributional similarity	−2158.030	41	1.816	4398.060	4696.873	4555.306	4410.719	0.922
Latent Transition Analysis (Dispersion)	−2044.741	69	1.364	4227.483	4528.412	4459.412	4240.771	0.945
Explanatory Similarity								
Free relations with outcomes	−2886.781	54	0.580	6451.561	7645.039	7591.039	6516.847	0.982
Equal relations with outcomes	−3157.527	33	1.116	6423.054	6637.564	6604.564	6433.454	0.952

Note. LL model LogLikelihood, #fp number of free parameters, Scaling scaling factor, AIC Akaïke information criteria, CAIC consistant AIC, BIC Bayesian information criteria, aBIC sample-size adjusted BIC

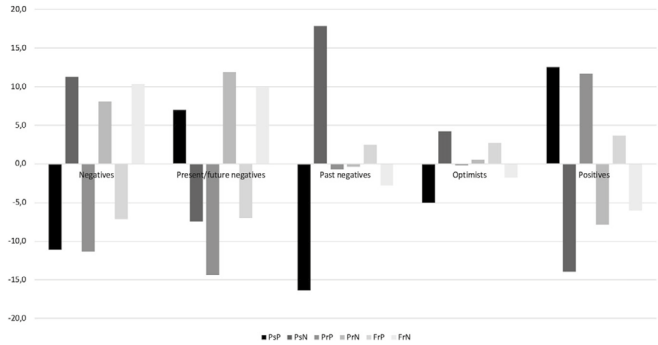

Fig. 1 Final 5-profile solution identified in the study at both time-points and groups. *Note*. PsP past positive, PsN past negative, PrP present positive, PrN present negative, FrP future positive, FrN future negative

Table 3 Transition probabilities for the latent transition analysis for control and intervention groups

Transition probabilities to time 2 profiles					
Control	Negatives	Present/future negatives	Past negatives	Optimists	Positives
Profile 1	0.711	0.237	0.000	0.000	0.052
Profile 2	0.096	0.785	0.000	0.008	0.111
Profile 3	0.092	0.000	0.652	0.256	0.000
Profile 4	0.157	0.140	0.125	0.397	0.181
Profile 5	0.041	0.062	0.000	0.027	0.871
Intervention	Negatives	Present/future negatives	Past negatives	Optimists	Positives
Profile 1	0.847	0.124	0.000	0.000	0.029
Profile 2	0.103	0.676	0.000	0.032	0.189
Profile 3	0.094	0.000	0.363	0.543	0.000
Profile 4	0.131	0.051	0.057	0.690	0.072
Profile 5	0.075	0.051	0.000	0.104	0.770

The next step consisted in the analysis of the transitions between time attitudes profiles. The *dispersion* similarity model was converted into a latent transition analysis and showed a moderate level of within-profile stability in profile membership for both groups, which suggests that a considerable number of participants remained in the same profile at Time 2. More specifically, between 10–60% of adolescents in the control group and 15–65% of those in the experimental group changed profiles over time (Table 3). Regarding the control group, the *negatives* (71.1%), *present/future negative*s (78.5%), and *positives* (87.1%) were the profiles that showed more stability over time, whereas, in the intervention group, the *negatives* (84.7%) and the *positives* (77%) were the most stable. The corresponding stability rates were lower in the intervention group for the *present/future negatives* (67.6%), *past negatives* (control: 65.2%; intervention: 36.3%), and *optimists* (control: 39.7%; intervention: 69%). The *past negative* profile (control: 12.5%; intervention: 5.7%) received fewer transitions from other profiles, followed by the *present/future negatives* (22.6%) in the intervention group, and the *optimists* (28.4%) in the control group. By contrast, the profiles to which individuals transitioned the most were the *negative* (38.6%) in the control group and the *optimistic* (67.9%) in the intervention group. In short, the results suggested that the intervention group showed more optimal transitions—79.3% from negative to positive profiles—compared to the control group, in which 30.8% of the participants shifted from negative to positive profiles.

Table 4 presents the percentages of those individuals who remained within and transitioned between profiles. The movers are defined as individuals who progress or regress across profiles. In general terms, the intervention group featured 31% more progressors and 24% fewer regressors when compared to the control group. The results also showed that the pure profiles (*positives* and

Table 4 Transitions of adolescents between profiles from pretest to posttest by movers and stayers in the control and intervention groups (%)

	Negatives	Present/future negatives	Past negatives	Optimists	Positives
Control					
Regressor	–	9,6	25,6	42,2	13
Stayer	71,1	78,5	62,5	39,7	87,1
Progressor	28,9	11,9	9,2	18,1	–
Intervention					
Regressor	–	10,3	9,4	23,9	23
Stayer	84,7	67,6	36,3	69	77
Progressor	15,4	22,1	54,3	7,2	–

negatives) exhibited more within-profile stability over time in the intervention group.

Outcomes of Profile Membership (Explanatory Similarity)

As a final step, an analysis of the relationship between time attitudes profiles and external outcomes, in this case emotional, social, and psychological well-being, can help clarify the differentiation of the profiles. The results showed that the explanatory similarity of the profiles was supported, as the model in which the relations between profiles and outcomes were constrained to equality across measurement times resulted in lower values on all fit indices compared to the model in which these relations were freely estimated (see Table 2). These results suggested that the relations between profiles and outcomes were similar across measurement times. Table 5 reports the means of the outcomes within each profile for each group. The results indicated that the means of each outcome for the most negative profiles (i.e., *negatives* and *present/future negatives*) were lower in the control group compared to the intervention group. Regarding the most central group (i.e., *past negatives*), the means were similar across groups. The *optimists* showed higher means (all outcomes) in the intervention group than in the control group, while the *positives* showed the opposite pattern. However, the means for this *positive* profile were similar across groups.

Concerning the intervention group, the *negative* profile reported the lowest levels for all well-being outcomes, with psychological well-being as the outcome with the lowest mean. In contrast, the *positive* profile reported the highest means for emotional and psychological well-being, and the *optimistic* profile reported the highest means for social well-being. The *past negative* was the profile with intermediate results in all outcomes; it showed negative means (close to 0) for emotional and social well-being, yet the mean for psychological well-being was positive. Finally, the *present/future negatives*

Table 5 Time invariant associations between profile membership and the outcomes by control and intervention group

	Negatives Mean [CI]	Present/future negatives Mean [CI]	Past negatives Mean [CI]	Optimists Mean [CI]	Positives Mean [CI]	Significant differences ($p \leq 0.05$)
Control						
Emotional Well-being	−1.253 [−1.482; −1.025]	−0.602 [−0.790; −0.414]	−0.017 [−0.293; 0.327]	−0.007 [−0.109; 0.095]	0.405 [0.337; 0.474]	5 > 4 = 3 > 2 > 1
Social Well-being	−1.196 [−1.394; −0.997]	−0.631 [−0.831; −0.431]	−0.046 [−0.517; 0.426]	0.126 [−0.019; 0.271]	0.532 [0.422; 0.643]	5 > 4 = 3 > 2 > 1
Psychological Well-being	−1.383 [−1.664; −1.102]	−0.711 [−0.897; −0.524]	0.053 [−0.266; 0.372]	0.040 [−0.091; 0.171]	0.503 [0.413; 0.592]	5 > 3 = 4 > 2 > 1
Intervention						
Emotional Well-being	−0.564 [−0.822; −0.305]	−0.444 [−0.611; −0.276]	−0.035 [−0.301; 0.231]	0.280 [0.184; 0.377]	0.308 [0.204; 0.411]	5 > 4 > 3 > 2 > 1
Social Well-being	−0.529 [−0.983; −0.074]	−0.488 [−0.739; −0.238]	−0.067 [−0.347; 0.213]	0.427 [0.239; 0.615]	0.349 [0.207; 0.492]	4 > 5 > 3 > 2 > 1
Psychological Well-being	−0.698 [−1.006; −0.390]	−0.635 [−0.850; −0.420]	0.064 [−0.319; 0.448]	0.385 [0.271; 0.500]	0.421 [0.315; 0.528]	5 > 4 > 3 > 2 > 1

Note: CI: 95% confidence interval

resembled the negatives, but the means were marginally higher in the *negative* profile. The analysis of the outcomes of profile membership showed that time attitudes profiles were differently associated with indicators of well-being, and therefore reinforces the distinguishing features of each profile identified in the current study. Overall, and supporting the hypotheses presented, the results indicated that a multicomponent positive psychology intervention can elicit adolescents to transition to (more) positive profiles. Also, adolescents allocated in the *negative*, *present/future negative*, and *optimistic* profiles are subsequently associated with a better psychological adjustment compared to the control group.

Discussion

In the pursuit of understanding well-being during adolescence, it is important to consider adolescents' (positive or negative) feelings towards the past, present, and future. Time attitudes are to be considered a relevant aspect to examine when facilitating a healthy transition to adulthood. In the present study, it was investigated the extent to which a randomized-controlled multicomponent positive psychology intervention contributed to the transitions among profiles and the effects of these transitions on adolescent's emotional, social, and psychological well-being. A total of five profiles were identified: *negative*, *present/future negative*, *past negative*, *optimistic*, and *positive*. Results indicated that adolescents who participated in the intervention reported more transitions to positive profiles compared to the control participants. The findings generally indicates that there were more progressors in the intervention group and more regressors in the control group. Regarding the (emotional, social, and psychological) well-being outcomes after the multicomponent positive psychology intervention program, the intervention group showed better psychological adjustment compared to the control group, with the exception of those individuals belonging to the *positive* profile. The transitions among profiles and the relations to well-being in the "pure" *negative* and *positive* profiles should be interpreted with caution.

Impact of a Multicomponent Positive Psychology Intervention on Time Attitudes: How Do Adolescents Transition Among Profiles?

Adolescents' time attitudes commonly change over time, and while transitions to negative profiles are more frequent during adolescence, the results showed that the multicomponent positive psychology intervention Get to Know Me+ may help adolescents to transition to more positive profiles. The number and type of profiles identified in the present study (*negative*, *present/future negative*, *past negative*, *optimistic*, and *positive*) was consistent with previous work on adolescents' time attitudes (Konowalczyk et al., 2019; Tejada-Gallardo et al., 2021). The *negative* and *positive* profiles can be considered as the "pure" profiles because they are respectively characterized by generally negative and positive feelings towards the past, present, and future. The *present/future negative* profile is characterized by having the most negative views of the present, negative views of the future similar to those individuals belonging to the negative profile, and positive views of the past. The *past negative* and the *optimistic* profiles are both characterized by negative views of the past and positive views of the future; however, *past negatives* presented the worst negative view of the past among profiles.

According to the transitions from negative to positive profiles, those who participated in the intervention were more likely to transition to positive profiles than those in the control group, confirming the first hypothesis. More specifically, 21.8% of the intervention participants moved to the *positive* profile, compared to 16.3% of control participants. Similarly, more than half of the intervention participants, compared to 26.4% of the control group, transitioned to the *optimistic* profile. These findings highlight the positive impact of the multicomponent positive psychology intervention in terms of helping adolescents to have adaptive emotional and evaluative feelings about the past, present, and future. Helping adolescents to experience such feelings can be of great importance in transitional stages, in which having positive feelings towards the three time frames can influence adolescents' behaviors.

Prior work in the field found that a *positive* profile was related not only to enhanced well-being (Tejada-Gallardo et al., 2021) but also to less alcohol use (McKay et al., 2019), better physical self-concept (Konowalczyk et al., 2019), and less involvement in risk-taking behaviors (Mello et al., 2018). Therefore, the introduction of school-based multicomponent positive psychology interventions that influence adolescents' transitions towards more positive profiles is likely to promote better emotional, social, and psychological adjustment to early adulthood. In general, adolescents tend to focus more on negative feelings towards present experiences (what is happening), their past recollections (what has happened), and their future expectations (what is yet to come; McKay et al., 2019). These aspects are closely related to the intrinsic motivation and the behavioral engagement adolescents have towards goals (Froiland et al., 2020). Hence, nudging adolescents to shift from more negative to positive profiles may help them accomplish their goals, especially in the school context (Miller & Nickerson, 2008).

With regard to transitions from positive to negative profiles, the multicomponent positive psychology intervention produced similar results in both groups. More concretely, the same percentage of adolescents shifted to the

"pure" *negative* profile, while the *present/future negative* and *past negative* profiles in the intervention group received half the number of transitions when compared to those identified in the control group. This result can be explained with reference to the common variability in adolescents' transitioning to more negative profiles over time (Konowalczyk et al., 2018). The profiles with the highest transitions in the intervention and control group were, respectively, the *past negative* (63.7% of between-profiles transitions) and the *optimistic* (60.3% of between-profiles transitions). These findings suggest that the intervention group had more transitions from negative to positive profiles compared to the control group and highlight the impact that the intervention had on profiles that are not "pure". In fact, the *negatives* and *positives* reported the highest within-profile stability over time; thus, shifting from the "pure" *negative* profile to more adaptive profiles seems challenging, which might explain the difficulty in intervening and nudging adolescents towards a positive transition.

Impact of a Multicomponent Positive Psychology Intervention on Well-Being: Do Changes in Time Attitudes Influence Well-Being?

The second goal of the study was to test how changes in time attitude profiles following a multicomponent positive psychology intervention influenced adolescents' emotional, social, and psychological well-being. Significant and meaningful relationships with well-being outcomes were reported. All profiles in the intervention group showed higher means on the three well-being domains, with the exception of the *past negative* and *positive* profiles, which partly confirms the second hypothesis of the study. In fact, the *past negatives* did not report significant results in any of the groups. In agreement with previous research (Tejada-Gallardo et al., 2021; Worrell et al., 2019), the *past negatives* were the most adaptive among the negative profiles while *negatives* and *present/future negatives* were commonly associated with more detrimental outcomes. Also, the *past negative* profile has mixed positive and negative feelings, resembling the *optimistic* profile, which is also supported in the results obtained in the control group where means of well-being domains did not differ between these two profiles. Still, further research would be needed to explore in depth the results of the well-being' means on the *past negative* profile after a positive intervention since the results were not the excepted. Among the positive profiles in the intervention group, the *optimistic* showed higher and significant means on the three well-being domains compared to the control group, suggesting that the intervention had a more pronounced impact on this profile compared to the *positive*.

Regarding the specific well-being domains, the positive profiles showed greater means in the eudaimonic component of well-being (i.e., social and psychological). This finding resembles the results of a meta-analytic review indicating that school-based multicomponent positive psychology interventions had the greatest effects on psychological well-being (Tejada-Gallardo et al., 2021). Overall, the intervention led to positive profiles becoming better psychologically adjusted, which is linked to adolescents having identified life objectives to accomplish (González-Carrasco et al., 2019).

An interesting conclusion that can be drawn based on the findings is that the participation of *positive* individuals in a multicomponent positive psychology intervention might be counterproductive, as it would be difficult to substantially increase their levels of well-being (Tomyn et al., 2015). This fact would explain why intervention adolescents in the *positive* profile reported similar well-being than those who did not participate. These results contribute to the debate as to whether positive interventions are equally useful for everyone and gives rise to the question of whether multicomponent positive psychology interventions may have more detrimental than beneficial impacts in terms of promoting well-being when it comes to certain profiles. This trend has led applied researchers to allocate students with higher well-being to control groups and those with lower well-being to intervention groups (Sarriera et al., 2017). Determining how best to increase the well-being of students who already exhibit high well-being seems to be an outgoing challenge that will require further study.

Limitations

Although the findings of this research have contributed to the study of adolescent's time attitudes and well-being through an evaluation of the impact of a multicomponent positive psychology intervention, the present study is not without limitations. First, the results cannot be generalized due to the small sample size and the fact that the participants consisted exclusively of adolescents from two high schools in Catalonia (Spain). Regarding the gathering of data, these were collected from self-report measures, which can bias responses of participants. It is also important to note that follow-up assessments were not performed in order to determine whether the transitions across profiles and the influence on well-being remained stable or changed over time. Further studies on this topic should be conducted to obtain more generalizable findings and evaluate the impact of multicomponent positive psychology interventions on time attitudes in the long term. Concerning the multicomponent positive psychology intervention Get to

Know Me+, the number of sessions might have proven inadequate. Given that previous meta-analyses have established that as more sessions the program has the more prolonged effects will be reported (i.e., more than six sessions; Bolier et al., 2013; Tejada-Gallardo et al., 2020), including more sessions in the program may have resulted in more pronounced long-term effects (Lyubomirsky & Layous, 2013). In the case of the present study, the length of the intervention was adapted based on the limited time that high schools could allocate to this study. Finally, for further interventions, it would be important to consider participants' personal features, such as motivation to participate in a multicomponent positive psychology intervention and the effort they dedicate towards the intervention (Lyubomirsky & Layous, 2013). In summary, there are details of the program that will need to be redefined before its next implementation.

Implications of the Findings

The present study provides evidence of the effectiveness of a school-based multicomponent positive psychology intervention in terms of facilitating transitions to more positive time attitude profiles among adolescents, a salient phenomenon in adolescence. School-based multicomponent positive psychology interventions target not only the well-being of adolescents but also their positive and negative feelings towards the past, present, and future. School-based multicomponent positive psychology interventions are fall under the positive education approach, which recognizes the importance of not only the academic achievement but also the optimal psychological development of children and adolescents (Seligman et al., 2009). Schools should ensure a healthy transition to early adulthood and simultaneously care for students' well-being. The positive education approach seems a promising strategy by which to implement intervention programs intended to promote adolescents' optimal functioning in an attempt to reduce the incidence of mental disorders commonly reported during this transitional stage. Unfortunately, only one school in Australia has implemented permanent positive education practices as a whole-school approach; these practices have been found to yield positive results ("Greelong Grammar School"; O'Connor & Cameron, 2017). Given that schools should extend their priorities beyond simply promoting academic competence (Cohen, 2006), it is imperative that positive practices can be incorporated into school curricula, as they could serve to promote positive psychological development on the part of adolescents (Seligman et al., 2009), ensure a healthy transition into adulthood (O'Connor et al., 2017), and diminish the onset of psychological disorders associated with this life stage (Suldo et al., 2014).

When introducing a school-based multicomponent positive psychology intervention that takes time attitudes into account, it is important to be aware of adolescents clustered in profiles with an average positive present and future (i.e., *optimists*), as the results suggest that adolescents in this profile have more positive and adaptive feelings towards these time frames and would therefore be more likely to benefit from an intervention. By contrast, it seems to be more difficult to promote the well-being of adolescents who report extremely negative feelings towards the past (i.e., *past negatives*) through a multicomponent positive psychology intervention. Also, future research should focus more specifically on interventions intended to influence transitions of individuals clustered in the "pure" *negative* profile into more positive profiles and thus support their optimal psychological functioning.

Conclusion

Having positive feeling towards time has been related to increased levels of well-being in adolescent samples, however, there is a lack of evidence supporting the impact that school-based multicomponent positive psychology interventions have on adolescents' transitions among time attitude profiles and, more specifically, the influence of these changes on the participants' emotional, social, and psychological well-being. Hence, the present study investigated the previous assumptions through the implementation of the Get to Know Me+ intervention program in the school setting and the use of a person-centered approach (i.e., latent profile and latent transition analysis) in order to examine the data. The multicomponent positive psychology intervention prompted more transitions to positive profiles in the intervention group compared to the control group. *Past negatives* and *present/future negatives* were the profiles that were more likely to transition to positive profiles in the intervention group. The prevalence of adolescents who remained in negative profiles was higher in the control group. The current study also contributes to a growing body of research examining how multicomponent positive psychology interventions influence well-being with regard to adolescents' time attitude profiles. The multicomponent positive psychology intervention discussed in this study may enhance the well-being of those in the "pure" *negative*, *present/future negative* and *optimistic* profiles. In summary, the present study provides new evidence indicating that adolescents may benefit from a school-based multicomponent positive psychology intervention and also contributes to extending research on the role of time attitude in these interventions.

Table 6 Summary of intervention contents

Modules and sessions	Session goals	Procedure and activities
1. Well-being	○ Establish supportive group environment ○ Introduce students to the broad aspects of well-being (Lyubomirsky et al. 2005) and the aspects that determine it	Flow activity: Mind map activity: "Which memories do you relate with your favorite fruit"? Central activity: Mind map activity: "What does well-being mean to you"? Group discussion: "What does well-being mean? Why is it important?" Closing: Suggesting ways of increasing well-being through purposeful thoughts
Focus on the positive emotions of the present		
2. Character strengths	○ Define character strengths and virtues (Park et al. 2004) ○ Explore students' character strengths through the VIA questionnaire and apply them to different situations	Flow activity: Identify the character strengths (using a card game) of their best friend/ important person Central activity 1: Identify their own character strengths Central activity 2: Identify and share two character strengths of their group peers using a card game Central activity 3: Select and apply their top two character strengths in three different contexts (family, friends, school) Group discussion: Discuss their previous selections with the class group Closing: Discuss how character strengths are related to well-being and encourage students to use their greatest strengths
3. Dealing with emotions	○ Introduce the components of emotional intelligence (attention, clarity, and regulation) ○ Challenge negative emotions and thoughts through cognitive restructuring and describing past negative experiences (Fava, 1999)	Flow activity: Identify and define each component of emotional intelligence Central activity: Emotional action process. Identify a conflict situation; recognize the emotions, thoughts, and behavior that the situation evoked; finally, suggest and plan more adaptive responses to future similar situations. Group discussion: Share the central activity with the class group Closing: Discuss the importance of acknowledging their freedom to change and adapt their responses to distressful situations and highlight the contribution of positive emotions to well-being
Turn back to the positive emotions of the past		
4. Gratitude	○ Introduce gratitude and its contribution to well-being through prosocial behavior (Froh et al., 2009) ○ Connect with and appreciate positive emotions ○ Learn to integrate actions and expressions of gratitude in their daily lives	Flow activity: *The Desert Island*: "What would you bring with you to a desert island?" Importance of reminding themselves of the most important things in their life Central activity: Gratitude letter Group discussion: Voluntarily share the gratitude letter with the class group Closing: Remind why gratitude can be important for improving well-being. Challenge students to make a gratitude visit during the week
Move forward to the positive emotions of the future		
5. Optimistic thinking	○ Introduce optimism and optimistic thinking ○ Learn methods to achieve and/or increase an optimistic explanatory style (Sheldon & Lyubomirsky, 2006)	Flow activity: Identify and share an important memory, person, and wish Central activity: My best possible self Group discussion: Voluntarily share the central activity and discuss the importance of optimistic thinking with the class group Closing: Remind students that hope can help them focus on positive goals for their futures and prevent feelings of helplessness through the belief that there are ways to meet those goals
6. Goal setting	○ Compile the activities and exercises learned through the program ○ Frame life in terms of goal establishment and plans to achieve those goals	Flow activity: Go through and revise the previous program activities and exercises via a snowball effect Central activity: Personal action plan: Establish the steps needed to reach their best selves Group discussion: Share the action plan with the class group Closing: Remind students of how all the activities and exercises covered throughout the program helped increase their well-being. Encourage them to keep on practicing and completing all their work.

Acknowledgements We would like to acknowledge the support of the two high-schools from Lleida that made possible this research and the dedicated staff and adolescents who participated in the study.

Authors' Contributions CTG conceived of the study, participated in its design, performed the measurement and the statistical analysis, interpreted the data, and coordinated and drafted the manuscript; ABB participated in the study design, performed the measurement, interpreted the data, and helped to draft the manuscript; CA participated in the study design and its coordination and helped to draft the manuscript. All authors read and approved the final manuscript.

Funding This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. Open Access funding provided thanks to the CRUE-CSIC agreement with Springer Nature.

Data Sharing and Declaration The datasets generated during and/or analyzed during the current study are available in the OSF repository.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in this study involving human participants were in accordance with the ethical standards of the Medical Research Ethics Committee of the University of Lleida and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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Appendix: The Get to Know Me+ Program

The Get to Know Me+ is an intervention program consisting of six weekly sessions that target different components of well-being (i.e., well-being, character strengths, positive emotions, gratitude, optimism, and goal setting; see Table S1 for a detailed plan). The primary goals of the program are to enhance the well-being of adolescents and to promote optimal psychological functioning by means of positive education (Waters 2011) and the development of positive feelings towards time (past, present, and future). Each session took approximately an hour and was divided into four parts: (1) an activity intended to allow students to enter a flow state (10 min), (2) a central activity targeting the component of well-being (30 min), (3) a group-class discussion about the activity (15 min), and (4) a closing part —*what is the take-home message*? (5 min). To control for the effects of time and participation, the control group attended a different class while the program was implemented in the intervention group. The psychologists involved in the intervention individually provided the students from the control group the results of the Values in Action (VIA) strengths questionnaire, with the students subsequently sharing their opinions on the results (Table 6).

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Supplementary material 1: Data Analytic Plan

Preliminary Analysis

Confirmatory factor analysis (CFA) models for time attitudes and the outcome of interest (i.e., well-being) were estimated using the robust maximum likelihood (MLR) estimator. This estimator provides standard errors and tests of fit that permit the parameter estimation from non-normality of continuous observed variables (Finney & DiStefano, 2013). Research indicates that this estimator should be used when the number of response categories for each item is equal to or greater than five (Raykov, 2012).

Before saving the factor scores for our main analyses, we first verified that the measurement models operated in the same manner across time points (Time 1 and Time 2: $N = 213$). These models included six factors for time attitudes (past positive, past negative, present positive, present negative, future positive, and future negative) and three factors for well-being (emotional, social, and psychological). Next, we estimated longitudinal models through sequential tests of measurement invariance (Millsap, 2011). For both constructs (time attitudes and well-being), we assessed (1) configural invariance, (2) weak invariance (loadings), (3) strong invariance (loadings and thresholds), and (4) strict invariance (loadings, thresholds, and uniquenesses).

Given the known oversensitivity of the chi-square test of exact fit ($\chi 2$) to sample size and minor model misspecifications (Marsh et al., 2005), we relied on goodness-of-fit indices to describe the fit of the alternative models (Hu & Bentler, 1999): the comparative fit index (CFI), the Tucker-Lewis index (TLI), and the root mean square error of approximation (RMSEA). Values greater than .90 for the CFI and TLI indicate an acceptable fit, although values greater than .95 indicate good model–data fit in general. For the RMSEA, values < .08 indicate reasonable model–data fit; however, values < .06 indicate good model–data fit. In a similar vein, chi-square difference tests also have a known sensitivity to sample size and minor model misspecifications, and research recommends combining this information with changes in CFIs and RMSEAs (Chen, 2007) in tests of measurement invariance. The recommended cut-off scores between two subsequent models when attending to support an invariance hypothesis are $\Delta CFI \leq .010$ and $\Delta RMSEA \leq .015$.

Latent Profile Analysis and Latent Transition Analysis

The number of profiles retained at each measurement time and for each group is predicted based on multiple sources of information, including a consideration of whether the profiles are meaningful and aligned with theory and statistical adequacy

(Marsh et al., 2009; Morin, 2016). Several statistical indices can also be used to support the choice of the retained profiles: (1) the Akaïke information criterion (AIC); (2) the consistent AIC (CAIC); (3) the Bayesian information criterion (BIC); (4) the sample-size adjusted BIC (aBIC); (5) the adjusted Lo-Mendell-Rubin's likelihood ratio test (aLMR); and (6) the bootstrap likelihood ratio test (BLRT). The AIC, CAIC, BIC, and aBIC are used to compare competing models, and lower values indicate an overall better profile solution. However, these indicators often keep improving with the addition of more profiles. In these cases, information criteria should be graphically presented through "elbow plots" to better observe the improvement related to the addition of profiles (Morin et al., 2011). The aLMR and BLRT were used to compare the models of the *k* profile and the *k* − 1 profile; when these tests are statistically significant, the model with higher profiles should be retained (Nylund et al., 2007). Entropy is an indicator that highlights the precision of the classification of individuals into latent profiles, with values ranging from 0 (lower accuracy) to 1 (higher accuracy; Tein et al., 2013). Although higher values indicate greater precision in the assignment of individuals to profiles, entropy alone should not be used to determine the optimal number of profiles (Lubke & Muthén, 2007).

Results

Preliminary Analysis

Table S2 reports the results of the CFA models. These results supported the measurement models of time attitudes and the outcome of interest at each time point. Their complete measurement invariance for the longitudinal models across both time points (i.e., strict invariance) was also accepted, as none of the changes in the goodness-of-fit indices exceeded the recommended cut-off values (ΔCFI ≤ .010; ΔTLI ≤ .010; ΔRMSEA ≤ .015). To ensure that the latent profiles estimated at each time point were based on fully comparable measures of time attitudes, the factor scores used in the main analyses were saved from the model of strict measurement invariance. The outcome scores (emotional, social, and psychological well-being) of the most invariant model were also saved. Strict measurement invariance is required to ensure that construct measurement remains equivalent across time points for models based on factor scores (e.g., Millsap, 2011). Table S3 reports the correlations estimated between the factor scores retained from the most invariant measurement model.

Latent Profile Analysis and Latent Transition Analysis

Fit indices for the LPA models at both measurement time points are presented in Table S4 (control group) and Table S5 (experimental group). The AIC and aBIC fit

indices continued to decrease with the addition of profiles at each time point in both groups. In contrast, in the control group, the CAIC suggested five profiles and the BIC six profiles (Time 1), while, at Time 2, both fit indices suggested five profiles. In the experimental group, the CAIC and BIC suggested four profiles (Time 1), while, at Time 2, the CAIC suggested four profiles and the BIC five profiles. Finally, the aLMR suggested four profiles (Time 1) and three or five profiles (Time 2) for the control group, while, for the intervention group, the fit indices suggested three profiles (Time 1) and five profiles (Time 2). The BLRT suggested six profiles (Time 1) and seven profiles (Time 2) for the control group and seven profiles (Time 1) and five profiles (Time 2) for the experimental group.

We relied on elbow plots to graphically observe the improvement resulting from the addition of profiles (see Figures S1–S4). These figures showed that the improvement in fit reached a clear plateau at around five profiles. However, the four- and six-profile solutions were also examined, and the results supported the five-profile solution at the statistical and theoretical levels. Compared to the four-profile solution, the five-profile solution resulted in the addition of a new significant profile. By contrast, the addition of an additional profile (six profiles) required the division of an existing profile into two smaller ones. The five-profile solution was then retained at both measurement time points and for each group, providing support for the configural similarity of this LPA. The entropy retained for the control group was .92 (Time 1) and .93 (Time 2), while that for the intervention group was .96 (Time 1) and .97 (Time 2), indicated that the profiles have a high level of accuracy.

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Supplementary Material 2: Results

TABLE S2. GOODNESS-OF-FIT STATISTICS OF THE LONGITUDINAL CONFIRMATORY FACTOR ANALYTIC (CFA) MODELS

Description	$\chi2_{(df)}$	CFI	TLI	RMSEA	90% CI	$\Delta x2$ (df)	ΔCFI	ΔTLI	ΔRMSEA
AATI-TA									
Time 1	$387.960_{(237)}$	.941	.931	.055	[.045-.064]	—	—	—	—
Time 2	$403.133_{(237)}$	.934	.923	.057	[.048-.067]	—	—	—	—
Configural invariance	$958.193_{(478)}$	.905	.890	.069	[.062-.075]	—	—	—	—
Weak invariance	$986.479_{(496)}$	.903	.892	.068	[.062-.074]	$31.008_{(18)}$	–.002	.002	–.001
Strong invariance	$1025.354_{(514)}$	.899	.891	.068	[.062-.074]	$37.291_{(18)}$	–.004	–.001	.000
Strict invariance	$1037.094_{(538)}$	.901	.899	.066	[.060-.072]	$95.216_{(24)}$	.002	.008	–.002
MHC-SF									
Time 1	$142.278_{(74)}$	.920	.902	.066	[.049-.082]	—	—	—	—
Time 2	$169.237_{(74)}$	.920	.902	.078	[.062-.093]	—	—	—	—
Configural invariance	$312.544_{(148)}$	.920	.902	.072	[.061-.083]	—	—	—	—
Weak invariance	$321.807_{(159)}$	.921	.909	.069	[.058-.080]	$8.594_{(11)}$	.001	.007	–.003
Strong invariance	$328.371_{(170)}$	.923	.917	.066	[.055-.077]	$11.281_{(11)}$	.002	.008	–.003
Strict invariance	$350.473_{(184)}$	.919	.920	.065	[.055-.075]	$18.574_{(14)}$	–.004	.003	–.001

Note: AATI-TA = Adolescent and Adult Time Inventory-Time Attitudes; MHC-SF = Mental Health Continuum-Short Form; $\chi2$ = chi-square test of exact fit; df = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; 90% CI = 90% confidence interval of the RMSEA; $\Delta\chi2$ = chi-square difference test using MLR manual steps.

TABLE S3. LATENT CORRELATIONS FROM THE FULLY INVARIANT LONGITUDINAL MODEL

	PsP_T1	PsN_T1	PrP_T1	PrN_T1	FrP_T1	FrN_T1	PsP_T2	PsN_T2	PrP_T2	PrN_T2	FrP_T2	FrN_T2	Em_T1	So_T1	Psy_T1	Em_T2	So_T2	Psy_T2
PsP_T1	-																	
PsN_T1	-.896**	-																
PrP_T1	.427**	-.307**	-															
PrN_T1	-.370**	.464**	-.825**	-														
FrP_T1	.147*	-.011	.481**	-.345**	-													
FrN_T1	-2.59**	.308**	-.510**	.629**	-.645**	-												
PsP_T2	.729**	-.688**	.283**	-.290**	.047	-.198**	-											
PsN_T2	-.625**	.699**	-.280**	.393**	.015	.259**	-.769**	-										
PrP_T2	.250**	-.199**	.620**	-.561**	.376**	-.427**	.413**	-.241**	-									
PrN_T2	-.230**	.285**	-.598**	.685**	-.289**	.521**	-.275**	.499**	-.708**	-								
FrP_T2	-.059	.131	.237**	-.202**	.546**	-.437**	.147*	.057	.561**	-.308**	-							
FrN_T2	-.143*	.196**	-.397**	.505**	-.345**	.595**	-.215**	.455**	-.418**	.758**	-.481**	-						
Em_T1	.351**	-.264**	.729**	-.627**	.493**	-.504**	.224**	-.203**	.584**	-.519**	.317**	-.379**	-					
So_T1	.373**	-.297**	.575**	-.511**	.509**	-.456**	.212**	-.167*	.454**	-.348**	.294**	-.245**	.853**	-				
Psy_T1	.336**	-.275**	.709**	-.635**	.504**	-.567**	.208**	-.179**	.570**	-.496**	.357**	-.390**	.921**	.850**	-			
Em_T2	.317**	-.245**	.547**	-.481**	.384**	-.424**	.399**	-.258**	.703**	-.501**	.455**	-.391**	.670**	.569**	.633**	-		
So_T2	.310**	-.217**	.463**	-.406**	.470**	-.455**	.338**	-.177**	.589**	-.379**	.493**	-.340**	.613**	.645**	.599**	.868**	-	
Psy_T2	.267**	-.201**	.545**	-.489**	.429**	-.480**	.358**	-.232**	.672**	-.510**	.518**	-.453**	.658**	.587**	.668**	.927**	.905**	-

Note: **p < .01, *p < .05; PsP = Past Positive; PsN = Past Negative; PrP = Present Positive; PrN = Present Negative; FrP = Future Positive; FrN = Future Negative; Em = Emotional Well-being; So = Social Well-being; Psy = Psychological Well-being; T1 = First point of measurement; T2 = Second point of measurement.

TABLE S4. RESULTS FROM THE LATENT PROFILE ANALYSIS MODELS ESTIMATED SEPARATELY AT EACH TIME WAVE FOR THE CONTROL GROUP

	LL	#*fp*	Scaling	AIC	CAIC	BIC	aBIC	aLMR *p*	BLRT *p*	Entropy
Time 1										
1 profile	-842.273	12	0.932	1708.545	1755.320	1743.320	1705.361	Na	Na	Na
2 profiles	-614.660	25	1.063	1279.320	1376.766	1351.766	1272.685	<.001	<.001	.934
3 profiles	-550.292	38	0.902	1176.584	1324.702	1286.702	1166.499	<.001	<.001	.941
4 profiles	-500.004	51	0.917	1102.009	1300.799	1249.799	1088.473	.042	<.001	.940
5 profiles	-470.052	64	0.993	1068.104	1317.566	1253.566	1051.119	.352	<.001	.917
6 profiles	-432.532	77	0.968	1019.065	1319.199	1242.199	998.629	.142	<.001	.943
7 profiles	-414.567	90	0.885	1009.134	1359.940	1269.940	985.248	.428	.666	.961
Time 2										
1 profile	-893.987	12	1.008	1811.974	1858.748	1846.748	1808.789	Na	Na	Na
2 profiles	-679.122	25	1.071	1408.245	1505.691	1480.691	1401.610	<.001	<.001	.955
3 profiles	-576.449	38	0.935	1228.898	1377.016	1339.016	1218.813	<.001	<.001	.976
4 profiles	-532.765	51	1.086	1167.530	1366.320	1315.320	1153.995	.429	<.001	.911
5 profiles	-489.839	64	1.092	1107.679	1357.141	1293.141	1090.693	<.001	<.001	.926
6 profiles	-460.671	77	0.989	1075.342	1375.906	1298.475	1054.906	.559	<.001	.940
7 profiles	-437.620	90	0.922	1055.239	1406.045	1316.045	1031.354	.009	<.001	.954

Note: Na = not applicable; LL = Model LogLikelihood; *#fp* = Number of free parameters; Scaling = scaling factor; AIC = Akaïke Information Criteria; CAIC = Consistent AIC; BIC = Bayesian Information Criteria; aBIC = Sample-Size adjusted BIC; aLMR = adjusted Lo-Mendell-Rubin likelihood ratio test; BLRT = Bootstrap Likelihood Ratio Test.

TABLE S5. RESULTS FROM THE LATENT PROFILE ANALYSIS MODELS ESTIMATED SEPARATELY AT EACH TIME WAVE FOR THE EXPERIMENTAL GROUP

	LL	*#fp*	Scaling	AIC	CAIC	BIC	aBIC	aLMR *p*	BLRT *p*	Entropy
Time 1										
1 profile	-494.246	12	0.919	1012.491	1052.925	1040.925	1003.088	Na	Na	Na
2 profiles	-390.691	25	1.073	831.381	915.618	890.618	811.791	.001	<.001	.942
3 profiles	-355.939	38	0.927	787.877	915.916	877.916	758.100	.061	<.001	.975
4 profiles	-324.563	51	0.882	751.126	922.968	871.968	711.162	.105	<.001	.982
5 profiles	-299.749	64	0.983	727.498	943.242	879.142	677.347	.607	<.001	.955
6 profiles	-273.110	77	0.948	700.220	959.667	882.667	639.882	.310	<.001	.963
7 profiles	-257.740	90	0.839	695.480	998.730	908.730	624.955	.297	<.001	.956
Time 2										
1 profile	-506.247	12	0.845	1036.493	1076.927	1064.927	1027.090	Na	Na	Na
2 profiles	-408.875	25	0.858	867.750	951.986	926.986	848.160	<.001	<.001	.985
3 profiles	-364.077	38	0.943	804.154	932.193	894.193	774.377	.077	<.001	.947
4 profiles	-327.968	51	0.844	757.935	929.777	878.777	717.972	.039	<.001	.967
5 profiles	-299.773	64	0.906	727.546	943.190	879.190	677.395	.125	<.001	.967
6 profiles	-280.954	77	0.908	715.907	975.355	898.355	655.570	.400	.034	.969
7 profiles	258.527	90	0.831	697.053	1000.303	910.304	626.529	.873	.076	.980

Note: Na = not applicable; LL = Model LogLikelihood; *#fp* = Number of free parameters; Scaling = scaling factor; AIC = Akaïke Information Criteria; CAIC = Consistent AIC; BIC = Bayesian Information Criteria; aBIC = Sample-Size adjusted BIC; aLMR = adjusted Lo-Mendell-Rubin likelihood ratio test; BLRT = Bootstrap Likelihood Ratio Test.

TABLE S6. DETAILED RESULTS FROM THE FINAL LATENT TRANSITION SOLUTION (DISPERSION SIMILARITY)

	Profile 1 (11,26%)		Profile 2 (17,37%)		Profile 3 (9,85%)		Profile 4 (15,49%)		Profile 5 (46%)	
	Mean	**CI**	**Mean**	**CI**	**Mean**	**CI**	**Mean**	**CI**	**Mean**	**CI**
PsP	-.699	[-.870; -.527]	.207	[.077; .463]	-.1520	[-2.036; -1.004]	-.550	[-.778; -.322]	.606	[.546; .667]
PsN	1.195	[.956; 1.433]	-.426	[-.583; -.270]	1.960	[1.504; 2.417]	.587	[.107; 1.068]	-.706	[-.749; -.664]
PrP	-.719	[-.883; -.555]	-.762	[-.979; -.546]	.071	[-.174; .317]	-.002	[-.177; .174]	.563	[.478; .648]
PrN	.924	[.811; 1.038]	.507	[.377; .637]	.107	[-.127; .342]	.046	[-.135; .228]	-.403	[-.458; -.349]
FrP	-.363	[-.486; -.239]	-.406	[-.517; -.294]	.396	[.264; .529]	.118	[-.120; .356]	.168	[.102; .235]
FrN	1.118	[.941; 1.294]	.414	[.283; .545]	-.137	[-.300; .026]	-.030	[-.183; .124]	-.314	[-.371; -.258]

Note: PsP = Past Positive; PsN = Past Negative; PrP = Present Positive; PrN = Present Negative; FrP = Future Positive; FrN = Future Negative; Profile 1 = Negatives; Profile 2 = Present/Future Negatives; Profile 3 = Past Negatives; Profile 4 = Optimists; Profile 5 = Positives

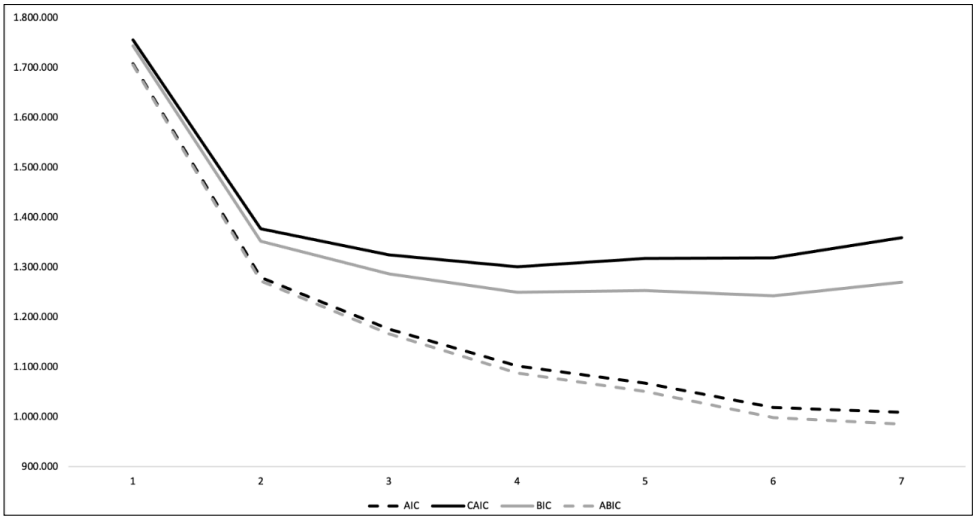

Figure S1. Elbow Plot of the Information Criteria for the Latent Profile Analyses at Time 1 (Control group)

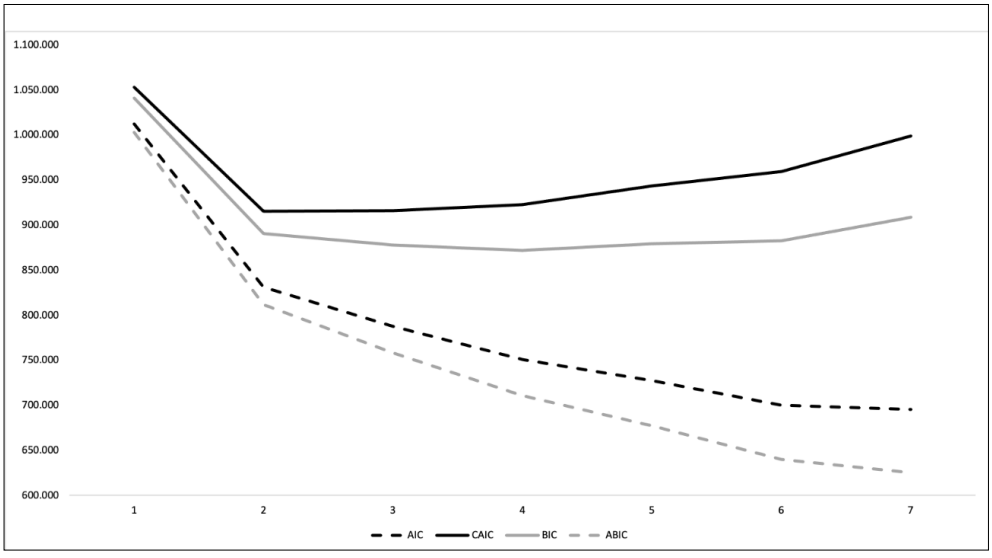

Figure S2. Elbow Plot of the Information Criteria for the Latent Profile Analyses at Time 1 (Experimental group)

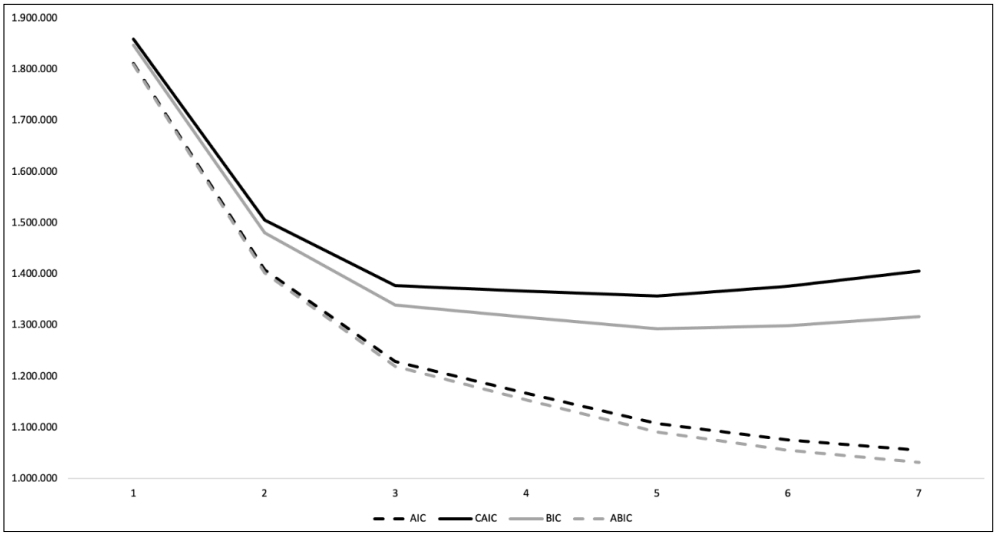

Figure S3. Elbow Plot of the Information Criteria for the Latent Profile Analyses at Time 2 (Control Group)

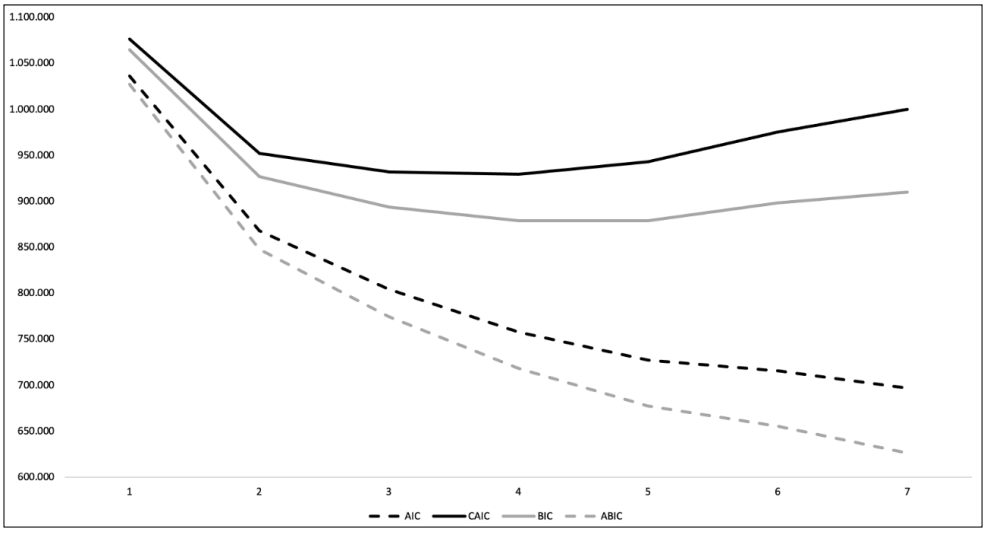

Figure S4. Elbow Plot of the Information Criteria for the Latent Profile Analyses at Time 2 (Experimental group)

5.1.4 CHANGES IN THE STRUCTURE OF MENTAL HEALTH AFTER A MULTICOMPONENT POSITIVE PSYCHOLOGY INTERVENTION IN ADOLESCENTS: A LONGITUDINAL NETWORK ANALYSIS

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Submitted to *the Journal of Happiness Studies.*

ABSTRACT

The effectiveness of multicomponent positive psychology interventions (MPPIs) on adolescents' mental health (i.e., well-being and psychopathology) has been studied with the use of standard procedures. However, little is known about potential mechanisms underlying the efficacy of MPPIs. We relied on network analysis (NA) to explore changes in the general dynamics of mental health after a school-based MPPI. Adolescents from two high schools in Spain were randomly allocated to the 6-week intervention group (n = 85) or to the control group (n = 135). NA showed that the structures of the two differentiated communities of mental health changed after the intervention. The group moderation effects were substantially higher in the intervention group at Time 2 involving the elements of emotional well-being, psychological well-being, and stress. The present study supports the usefulness of NA in analyzing structural patterns of change in adolescents' mental health after an MPPI.

Keywords: Network analysis; Multicomponent positive interventions; Mental health; Well-being; Psychological distress.

Introduction

Can school-based multicomponent positive psychology interventions (MPPIs) change the structure of mental health? If so, to what extent? Positive psychology interventions (PPIs) originated as scientifically based interventions that focus on strengthening positive emotions, thoughts, and behaviors through activities that can be easily implemented in daily routines (Schotanus-Dijkstra et al., 2015). Compared to PPIs, MPPIs are composed of at least two positive activities targeting different components of well-being (e.g., gratitude and optimism). A meta-analytic review of school-based MPPIs of adolescents showed small to moderate effects immediately after the intervention and in the long term on well-being and psychological distress (Tejada-Gallardo et al., 2020). MPPIs are framed under the fledgling science of positive psychology, which involves the study of optimal human functioning that can be pursued through hedonic well-being —feeling good— or eudaimonic well-being —functioning well in life. Although this positive approach to well-being has been widely accepted by the scientific community, the conventional view of mental health as the absence of psychological symptomatology and negative outcomes is still widespread (Seligman & Csikszentmihalyi, 2000).

Despite the deep-rooted medical approach of illness prevention, there is an increased recognition of the conceptualization of complete mental health as defined by the dual-factor model (Keyes, 2009), that is, the presence of well-being and the absence of psychopathology. Therefore, it is of interest to understand in a more detailed manner how the structure of adolescents' mental health, based on the dual-factor model, can change after a school-based MPPI. Such research can illuminate the potential mechanisms underlying the efficacy of these interventions and identify the best routes for driving positive changes in mental health.

MPPIs in the School Setting

Adolescents spend a greater part of their time in schools than in other formal institutions where they interact with their peers (Seligman et al., 2009). Consequently, schools can be of assistance in the emotional, social, and psychological development of adolescents (Waters, 2011), and thriving at school is one of the main goals of school mental health practitioners. Teaching and building happiness in the educational context can serve as effective tools to promote adolescents' optimal psychological functioning (Boniwell, 2013). Devoting special attention to happiness in this setting responds to calls to promote and protect youth mental health and provides a set of evidence-based practices that improve adolescent mental health (Suldo, 2016).

School-based MPPIs are strategies that aim to address the promotion of mental health and prevention of mental illnesses in children and adolescents (Waters, 2011). These strategies help practitioners and teachers identify adolescents with low well-being, which, in some cases, indicates risk of psychopathological symptoms (Suldo

& Shaffer, 2008). Consistent with the dual-factor model (Keyes, 2009), well-being and psychopathology are understood as two separate continuums of mental health (Greenspoon & Saklofske, 2001; Suldo et al., 2016), which should be worked equally. Given the well-grounded effectiveness of school-based MPPIs (Tejada-Gallardo et al., 2020), transition and adaptation to young adult life are healthier when adolescents experience positive mental health and relatively minor symptoms of psychopathology. Hence, implementation of MPPIs in the school setting have been proposed as a basis to promote the mental health of adolescents (Seligman et al., 2009). Schools should also be seen as proactive institutions in the use of comprehensive and multifaceted approaches needed to build and protect students' mental health and promote healthy developmental pathways for the transition to adulthood (O'Connor et al., 2017).

To successfully introduce MPPIs into academic curricula, further research is needed to scrutinize their benefits. Studies investigating the effectiveness of positive psychology programs have typically used mean differences and effect sizes (e.g., Tejada-Gallardo et al., 2020). These standard procedures to assess the efficacy of treatments or interventions may not reveal deep differences in how interventions work (Cheung & Slavin, 2016), although they align with existing research that has illuminated their efficacy. However, whether and how the structure and dimensions of mental health change after the implementation of an MPPI remain understudied. To address this gap, the network psychometrics approach can be applied to the study of MPPIs to better understand the underlying complexity of adolescents' mental health.

Network Analysis in Mental Health

A growing number of empirical studies using a network approach have emerged over the last years (Fried & Cramer, 2017). Psychological disorders have been studied under the premise of network analysis (NA), which conceptualizes them as complex systems of interconnected symptoms (e.g., fatigue leads to insomnia, which evokes concentration problems, which prompts psychomotor agitation). By contrast, traditional latent approaches assume that a latent entity (e.g., anxiety) gives rise to symptoms (e.g., fatigue and concentration problems).[6] The NA approach focuses on psychological constructs without considering the effects of latent causes and embraces the full complexity of a system (Borsboom & Cramer, 2013). Happiness and optimism have also been represented as networks organized on the observable indicators that define psychological characteristics (i.e., items or subscales; Osborn & Campbell, 2020).

The network approach has not only been used to conceptualize mental disorders but also to analyze changes in the patterns of different constructs after psychological interventions, although the results are mixed. Few studies have examined the changes in

6. These examples have been extracted from psychopathology research because the network approach has scarcely been implemented in well-being research.

network structures and their dynamics after a pharmacological treatment or therapy (e.g., Mindfulness-Based Cognitive Therapy: Schweren et al., 2018; Snippe et al., 2017); the studies that exist demonstrated no changes in network symptoms. Yet, a study analyzing the changes of patterns in positive and negative outcomes after a positive intervention for depression showed that the overall structure of the network was significantly different at posttest (Blanco et al., 2020). Unfortunately, this study did not take Berkson's bias into account (De Ron et al., 2019) and, thus, the results should be interpreted cautiously.

How Can the Network Approach Contribute to the Study of Mental Health?

The network approach has recently been introduced in the study of different psychological phenomena (Fried et al., 2017), offering an alternative approach to assessing the dimensionality of constructs without necessarily detecting a common latent variable. This approach has several advantages, such as allowing the observation of patterns of change over time, determining dimensions and allocating items within these dimensions (Epskamp et al., 2018). The application of this statistical technique allows representation of the associations (i.e., edges and total or partial correlations) between variables of interest (i.e., nodes; Epskamp et al., 2018) in a graph.

Considering the applicability of NA to the study of mental health, it is possible to investigate the complexities of these constructs, in that mutual interactions (edges) between positive indicators —well-being— and negative indicators —psychological distress— (nodes) may be present after a school-based MPPI. In this sense, the network approach can add valuable knowledge on an intervention's impact on the associations between nodes of mental health and illuminate potential mechanisms underlying the efficacy of MPPIs. Relying on the NA approach, we seek to investigate whether the dynamic network structure of mental health changes over time and whether this network differs between an intervention and control group.

The Present Study

The goal of the present study was to analyze to what extent an MPPI can change the structure of mental health as conceptualized by the dual-factor model (i.e., presence of well-being and absence of psychological distress), through the lens of NA in two groups of adolescents (intervention and control). To this end, two outcomes were assessed: well-being (emotional, social, and psychological) and psychological distress (depression, anxiety, and stress). We have no previous evidence to sustain our expected hypotheses; however, research on MPPIs showed higher effects on subjective and psychological well-being at posttest compared to follow-up assessments. As such, and based on previous research on MPPIs and mental health, we expect to find changes in the general dynamic associations of well-being and psychological distress, with potential modifications (i.e., benefits) for subjective and psychological well-being at posttest measurements.

Methods

Participants and Procedure

The participants were 220 adolescents (intervention group, n = 85; control group, n = 135) from two high schools in western Catalonia (Spain). The overall mean age was 14.98 years (*SD* = 0.62). Further demographic data is presented in Table 1. The responses of the intervention participants were only included in the analyses if they attended at least four of the six program sessions. Hence, from the initial sample, only 79 participants from the intervention group (51.8% females) and 134 from the control group (44.4% females) were retained for further statistical analyses. Informed consent signed by parents or tutors was required from all participants, and they were informed that they could withdraw from the study at any time. A total of six positive psychology sessions were offered from October 2019 to December 2019. The Get to Know Me+ intervention was implemented by two Ph.D. psychology students. Measures were taken one week before the intervention (pretest), one week after the intervention (posttest), and two months after the intervention ended (follow-up). The present study was approved by the University Ethics Committee under the code CEIC-2157.

Table 1. Sample demographics reported at baseline assessment

	Intervention (N = 85)		Control (N = 135)	
Demographic	**N**	**%**	**N**	**%**
Gender				
Female	44	51,8	60	44,4
Male	41	48,2	73	54,1
Other	0	0	2	1,5
Ethnicity				
Hispanic, Latino or other	6	7,0	8	5,9
Spanish origin	69	81,2	118	87,4
Not Hispanic	10	11,8	9	6,7
Socioeconomic status				
Low	16	18,8	36	26,7
Average	56	65,9	86	63,7
High	13	15,3	13	9,6
Family composition				
Both parents together	59	69,4	111	82,2
Only one of the parents	20	23,5	24	17,8
Other family member	6	7,1	0	0

The Get to Know Me+ Program

This intervention is a face to face 6-week program featuring aspects with a strong connection to subjective and psychological well-being (i.e., well-being, character strengths, emotions, optimism, gratitude, and goal setting), based on empirical grounds identified in well-being research (see Table S1 for session planning[7]). The main goals of the program are: (1) to enhance the well-being of adolescents during the transition process to young adulthood; (2) to help adolescents overcome the challenges that they face personally and socially, promoting an optimal psychological functioning; and (3) to develop positive feelings towards time (past, present, and future). According to previous meta-analysis of MPPIs, the more sessions included in these programs (at least six sessions), the more efficacious they are (Bolier et al., 2013; Tejada-Gallardo et al., 2020). However, The Get to Know Me+ program used in this study had a limited duration of six weeks due to the schools' schedules. The study version of the program was designed to function as an integrated whole composed of the principles of well-being under three modules: (1) focus on the positive emotions of the present; (2) deal with the positive emotions of the past; and (3) move forward towards the positive emotions of the future. Each session consisted of three parts with an introductory flow activity, a central activity to put in practice the principle of well-being, and the closing of the session.

Measures

Well-being was assessed by the Mental Health Continuum-Short Form (MHC-SF; Keyes et al., 2008; Spanish adaptation of Echeverría et al., 2017). The MHC-SF assesses emotional, social, and psychological well-being during the previous month. This scale consists of 14 items, and respondents rate the frequency of each feeling in the past month on a 6-point Likert scale (1 = never, 6 = every day). The following sample items are representative of each subscale: "In the past month, how often did you feel happy?," for emotional well-being; "In the past month, how often did you feel that you had something important to contribute to society?," for social well-being; and "In the past month, how often did you feel that you liked most parts of your personality?," for psychological well-being. The Cronbach's α reliability estimates of the MHC-SF for Time 1 were .77 for emotional well-being, .71 for social well-being, and .79 for psychological well-being. For Time 2, the estimates were .86 for emotional well-being, .80 for social well-being, and .82 for psychological well-being. For Time 3, they were .85 for emotional well-being, .80 for social well-being, and .82 for psychological well-being.

7. With the intention of not repeating content throughout the thesis, the session planning is only presented once in the introduction section (Table 1).

Psychological distress was assessed by the Depression, Anxiety, and Stress Scale (DASS-21; Lovibond & Lovibond, 1995; Spanish adaptation of Daza et al., 2002). The DASS-21 assesses the levels of symptomatology associated with depression, anxiety, and stress during the previous week. This scale consists of 21 items, and responses are based on a 4-point Likert scale (0 = did not apply to me at all, 3 = applied to me very much or most of the time). The following sample items are representative of each subscale: over the past week, "I couldn't seem to experience any positive feeling at all," for depression; "I was worried about situations in which I might panic and make a fool of myself," for anxiety; and "I find it hard to wind down," for stress. The Cronbach's α reliability estimates of the DASS-21 for Time 1 were .84 for depression, .73 for anxiety, and .76 for stress. For Time 2, the estimates were .88 for depression, .83 for anxiety, and .79 for stress. For Time 3, they were .89 for depression, .83 for anxiety, and .84 for stress.

Statistical Analyses

Moderated Network Estimation

To estimate group differences in network models applying the Moderated Network Model (MNM) approach, we used the *mgm* R-package version 1.2-9 (Haslbeck & Waldorp, 2020). Visualization of networks is accomplished with nodes (variables) and edges (connections), in which the width of edges indicates the strength of the connections. In our case, edges represented conditional dependencies between two variables after controlling for all other variables of the network. We used Gaussian Graphical Models (GGM), which represent the unique associations between two variables after conditioning on the rest of variables of the network (Epskamp et al., 2018). This means that a negative connection between emotional well-being and depression, for instance, can be taken as an indication that an individual scoring high on emotional well-being will tend to score low on depression and that this cannot be explained by the other variables.

The MNM approach enables the fitting of networks using variables of mixed types (Mixed Graphical Models; MGM), in which one variable acts as a moderator of the pairwise interaction between two nodes. We fitted a moderated MGM for each time-point measurement (pre, post, and follow-up) that included a grouping variable with two categories (moderator) and six continuous variables corresponding to measures of mental health and psychological distress. The grouping variable (i.e., control or intervention group) was introduced as a categorial moderator, allowing a comparison of group differences by conditioning on the moderator. For instance, this answered the question, "*Does the relationship between emotional well-being and depression differ between the control and intervention groups?"* or "*Do differences in the relationship between emotional well-being and depression depend on allocation to the control or intervention group?"* The moderated networks were conditioned on the grouping variable using the function *condition* of the *mgm* R-package (Haslbeck & Waldorp, 2020).

We specified the values of the moderator to represent the control (1) and experimental (2) groups for the three timepoints. *mgm* implements a regularization parameter in the ℓ1-regularized nodewise regression algorithm. We selected the regularization parameter with cross-validation with a hyperparameter of γ = 0.25 and AND-rule to combine estimates across nodewise regressions. Cross-validation is a less conservative model selection preferable with small samples because it has greater sensitivity in revealing results but at the risk of lower specificity; that is, there is a higher probability of identifying true edges in the network but a higher chance of including false edges (Epskamp & Fried, 2018).

Stability of Edge-Estimates

To test the stability of the estimated parameters in the MNMs, we used the function *resample* of the *mgm* R-package (Haslbeck & Waldorp, 2020), which obtains empirical sampling distributions using the nonparametric bootstrap—in our study, we applied 50 bootstrap samples. The function *plotRes* returns a plot of the bootstrapped sampling distribution of each 2-way and 3-way interaction. Small variance in the sampling distribution suggests that the network is stable, and nonzero values with 95% confidence intervals that exclude zero indicate likelihood of moderation effects in the network model (see Haslbeck et al., 2019; Haslbeck & Waldorp, 2020 for more details). To confirm the presence of moderation effects, we compared the sampling distributions with simulated data from a null model with no moderation effects (see Supplementary material). Analyses were carried out in *Rstudio* version 1.3.1093 (Rstudio Team, 2020).* The code and database to reproduce the study are available at Open Science Framework.

Results

Sample Characteristics

Table 2 shows the descriptive statistics. We also assessed Cohen's and independent samples *t*-tests comparing intervention and control participants.[8]

8. Following Cohen's d guidelines, the intervention only showed a small effect size on social well-being (d = .20). Regarding the t-test, no significant differences between groups were present, with the exception of the anxiety outcome.

TABLE 2. WELL-BEING AND PSYCHOLOGICAL DISTRESS WITHIN CONDITIONS AND ASSESSMENTS

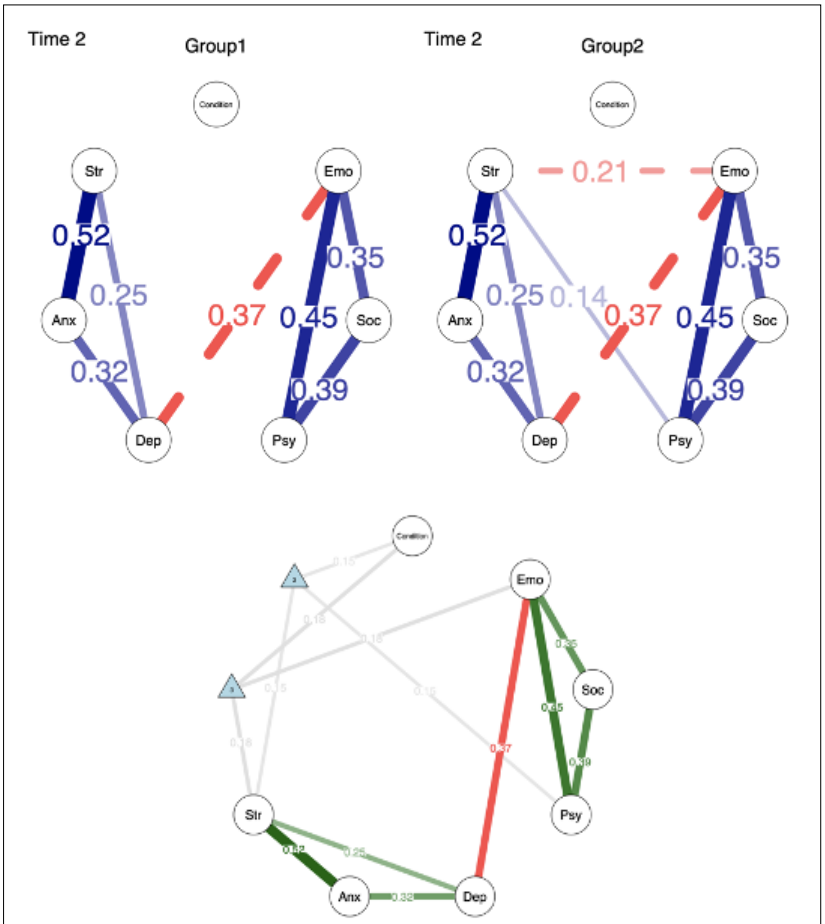
	Baseline control (n = 135) Baseline intervention (n = 85)	**Post-test control (n = 134) Post-test intervention (n = 79)**	**Follow-up control (n = 119) Follow-up intervention (n = 79)**
Outcome	**M (SD)**	**M (SD)**	**M (SD)**
Emotional Well-being			
Control	4.70 (.86)	4.65 (1.08)	4.73 (.97)
Intervention	4.79 (.79)	4.79 (.83)	4.75 (.84)
Social Well-being			
Control	3.77 (.91)	3.85 (1.03)	3.89 (1.00)
Intervention	3.69 (.90)	3.89 (1.03)	3.92 (.92)
Psychological Well-being			
Control	4.56 (.82)	4.51 (.87)	4.58 (.83)
Intervention	4.56 (.84)	4.69 (.71)	4.64 (.77)
Depression			
Control	0.77 (.63)	0.76 (.67)	0.78 (.72)
Intervention	0.82 (.66)	0.82 (.70)	0.74 (.71)
Anxiety			
Control	0.75 (.54)	0.76 (.66)	0.84 (.71)
Intervention	0.93 (.65)	0.85 (.65)	0.89 (.71)
Stress			
Control	1.11 (.63)	1.08 (.62)	1.13 (.71)
Intervention	1.19 (.63)	1.12 (.66)	1.12 (.68)

Network Analysis

Moderated Network Models

The visualizations of the MNMs for each timepoint measurement are presented in Figure S1. Blue edges represent positive linear relationships, red edges represent negative linear relationships, and grey edges represent relationships related to the moderator. Two communities were differentiated in the networks, corresponding to well-being and psychological distress. Moderation (3-pairwise) effects appeared only at Time 2 involving the variables of stress, emotional well-being, and psychological well-being (see Figure 1). Unlike for the control group, there was a negative association between emotional well-being and stress and a positive relationship between psychological well-being and stress in the intervention group. This suggests that group

condition moderated the effect of stress with emotional and psychological well-being. Of note, the negative (and positive) relationship of depression to psychological well-being (and stress) vanished over time, apparently not due to the intervention effects. Despite the lack of connection of one psychological distress component, the two networks were generally more connected (e.g., higher estimates) from Time 1 to Time 3 in each group.



Note: Soc = Social well-being; Psy = Psychological well-being; Emo = Emotional well-being; Dep = Depression; Anx = Anxiety; Str = Stress.

Figure 1. In the top panel, moderated network models at Time 2, separately presented by groups (Condition: Group 1 = Control, Group 2 = Experimental). In the bottom panel, factor graph represents the 3-way interactions (moderations) as factor nodes and pairwise interactions as edges between variables at Time 2.

Figure 2 presents the bootstrapped sampling distributions of the MNMs. The left plot shows the pairwise effects and the right plot the moderation effects. Values represent the proportion of bootstrap samples in which a given parameter was estimated as nonzero, and the lines show the 5% and 95% quantiles. The placement of the values indicates the mean of the sampling distributions. Pairwise and moderation effects were reasonably stable over time, and moderation effects were substantially stronger at Time 2, as several values were far from zero. To ensure evidence of the moderation effects, we compared our data model (moderation effects are present) against a null model (moderation effects are absent). We simulated data with a matched sample size from a standard pairwise model in which no moderation effects were present (Figure S2). The bootstrap sampling distributions from the null MNM (representing Time 2) were generally close to zero (Figure S3), reinforcing that the presence of moderation effects was due to the intervention and not sampling variation. (See Figure 2)

Discussion

The present research analyzed the structure and network dynamics of mental health based on the dual-factor model (i.e., positive indicator, well-being; negative indicator, psychological distress) after a school-based MPPI (Get to Know Me+) to gain a more thorough understanding of the potential mechanisms underlying the efficacy of these interventions. Previous research examined the effectiveness of MPPIs in adolescents employing standard procedures (i.e., mean differences and effect sizes; Tejada-Gallardo et al., 2020), which preclude identifying changes in the structure and dynamics of adolescents' mental health after a school-based MPPI. To achieve our purpose, we relied on the network psychometrics approach—more specifically, we employed MNM—to compare group changes in the structure of mental health at post-test and follow-up assessment. We found differences across groups after the intervention, addressed in more detail in the remaining discussion.

Changes in the Structure of Mental Health After an MPPI

The structure of mental health in both groups was composed of two differentiated communities that resemble the theoretical underpinnings of the dual-factor model (Keyes, 2009): well-being (emotional, social, and psychological) and psychological distress (depression, anxiety, and stress). According to this model, mental health is conceptualized as an emergent property arising from the mutually connected indicators of well-being and psychological distress. The two communities were bridged by negative connections of depression with emotional and psychological well-being.

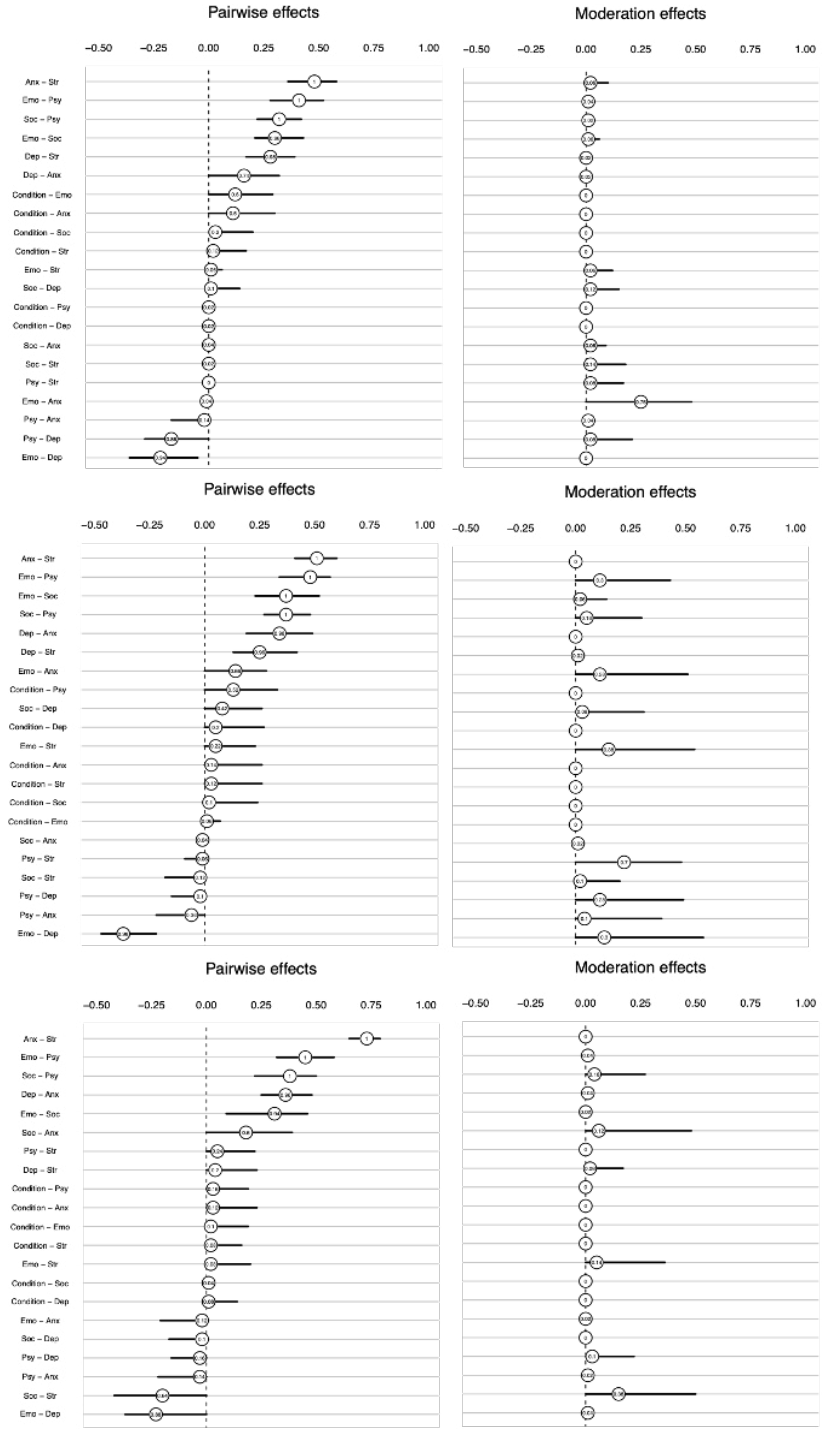


Figure 2. Bootstrapped sampling distributions at Time 1, 2 and 3 (in order).

But, after the implementation of the MPPI, we found differences in the connections of these indicators across groups. First, there was an increase in the coefficients, suggesting that the structure of the communities was denser at Time 2 than at Time 1. Second, compared to the control group, stress was associated positively with psychological well-being and negatively with emotional well-being in the intervention group. However, the moderation effects of the MPPI vanished over time, and, at the follow-up assessment, both groups reported the same network structure of mental health. At this point, the connections of stress with emotional and psychological well-being were no longer present, nor was the positive connection between depression and stress.

These findings highlight the role of stress, a psychological symptom that can either be seen as a barrier or a motivator to establish goals in adolescents (Gutowski et al., 2018), in mental health. Adolescents usually report higher levels of stress compared to children (Stroud et al., 2009) and adults (APA stress report, 2014), which may be a consequence of the high demands that adolescents face during this transitionary stage. For instance, life purpose has been considered a developmental asset and an indicator of thriving (Bronk & Finch, 2010), notwithstanding that, at the same time, it increases adolescents' perceived levels of stress (Hughes, 2006). This fits within the scope of our research and demonstrates the complex role of stress in connecting with hedonic and eudaimonic aspects of well-being. Having purpose in life is a correlate of nearly every component of well-being (Bronk, 2014), but being unable or unwilling to find it can generate a sense of meaningless, and living without meaning, goals, or values can subsequently trigger psychological distress (Frankl, 1959). Similarly, identifying and pursuing one's purpose and meaning in life can increase levels of stress due to the generally (socially) imposed need to achieve them (Hughes, 2006).

The convergence of our findings should be interpreted in the context of adolescence. On one hand, the relevance of experiencing positive emotions and pleasant moments in daily life is well documented (Kahneman & Deaton, 2010). To be more specific, positive emotions can boost the activation of social and personal resources (Fredrickson, 1998) and promote subjective (emotional) well-being (Fredrickson & Joiner, 2018). With reference to our intervention, the positive emotions evoked by hedonic activities during the MPPI may have enriched the thought-action repertories of adolescents to build useful personal resources. These resources can serve as a means of meeting the psychological demands on adolescents during eudaimonic activities, such as visualizing their future. On the other hand, although engaging in positive activities that boost psychological well-being may help in identifying and pursuing adolescents' purpose in life, attempting to achieve important goals can also have counterproductive effects. In fact, important challenges in one's life can be appraised as threats and can increase perceived stress levels (Hughes, 2006).

The Get to Know Me+ program covered hedonic and eudaimonic components of well-being (e.g., pleasure, life meaning, or positive relationships), following previous studies that reinforced the idea of activating both routes to well-being in positive interventions (e.g., Blanco et al., 2020; Burckhardt et al., 2016). Considering the results,

we can infer that our MPPI elicited positive emotions (emotional well-being) in adolescents immediately after the intervention, which may have buffered the stress evoked when working through eudaimonic activities like establishing meaningful goals or finding ways to develop strengths. These assumptions align with previous work on the predictive role of positive affect on eudaimonic well-being (Garcia & Siddiqui, 2009; Martela et al., 2018). Taken together, school-based MPPIs are valuable tools to promote relevant aspects of mental health and therefore helpful for increasing momentary positive affectivity and managing stressful symptoms that arise during the adolescent developmental stage.

Limitations

The present study is not without limitations. First, the design of the study employed a randomized-controlled trial in which adolescents were randomly allocated to the intervention group. In this situation, adolescents do not normally engage actively in the activities proposed and, consequently, are not likely to make deliberate efforts to obtain substantial results (Sheldon & Lyubomirsky, 2019). Hence, well-being interventions are likely to be more effective among individuals who participate voluntarily. It may be of interest to conduct future studies only with adolescents genuinely willing and motivated to participate in the intervention. Additionally, training in well-being techniques is likely to be more effective among people in need of improvement (Bergsma et al., 2020). We did not previously screen adolescents' levels of well-being, and, as a result, a percentage of adolescents allocated in the intervention group may have already been experiencing high levels of mental health (i.e., flourishing). In this case, improving their levels of well-being would be a challenging task (Sarriera et al., 2017). In addition, because the network structure represents undirected relationships, it is not possible to clarify directionality in them. Thus, future work may wish to investigate network structure using momentary assessment to capture temporal and contemporaneous interactions between indicators.

Conclusion

Applying a network perspective can be a valuable approach to studying the patterns of changes in adolescents' mental health after a school-based MPPI. Our combination of findings provides support for the conceptual premise that mental health is an interactive and dynamic network of well-being and psychological distress indicators, wherein the introduction of the network approach offers the possibility of exploring patterns of change in the network structure of adolescents' mental health from pre- to post-intervention. The results highlighted changes immediately after the intervention in relation to hedonic and eudaimonic aspects of well-being. Because this is the first

study attempting to analyze patterns of change in the network structure of mental health after a school-based MPPI in adolescents, further research is needed on the topic.

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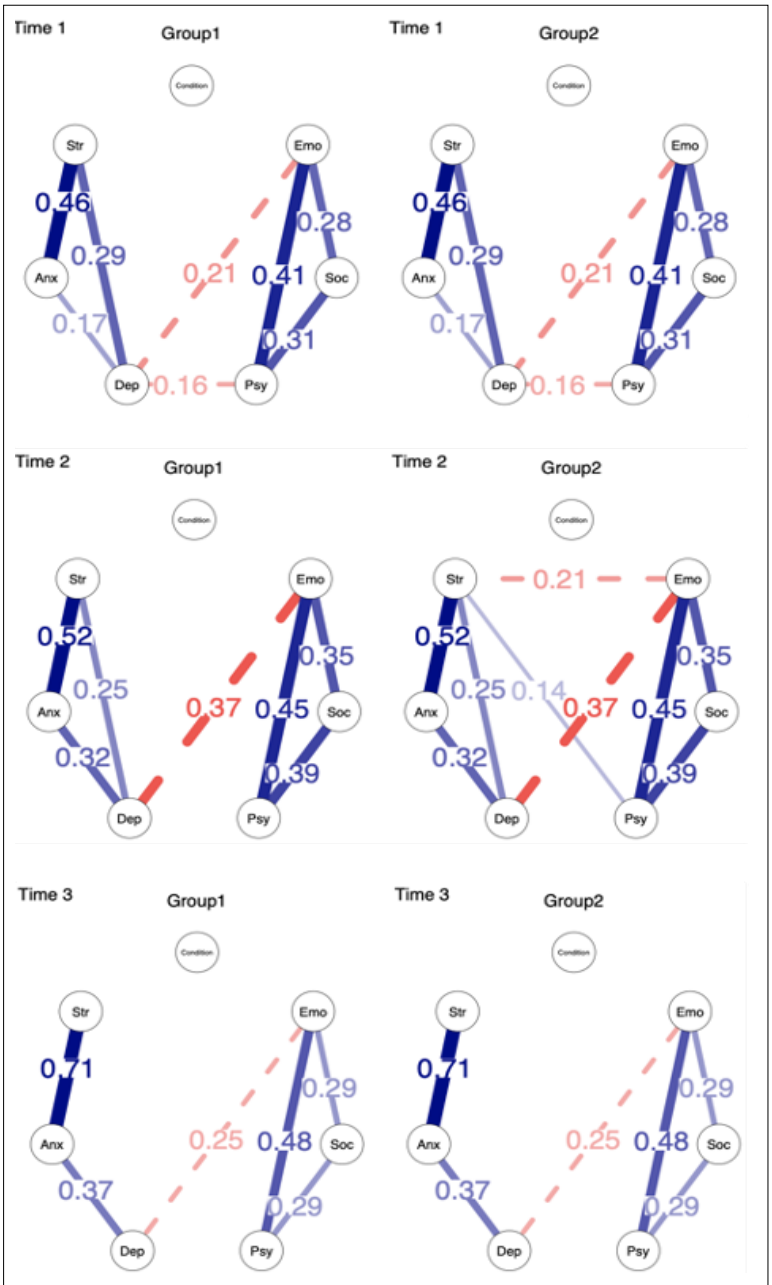
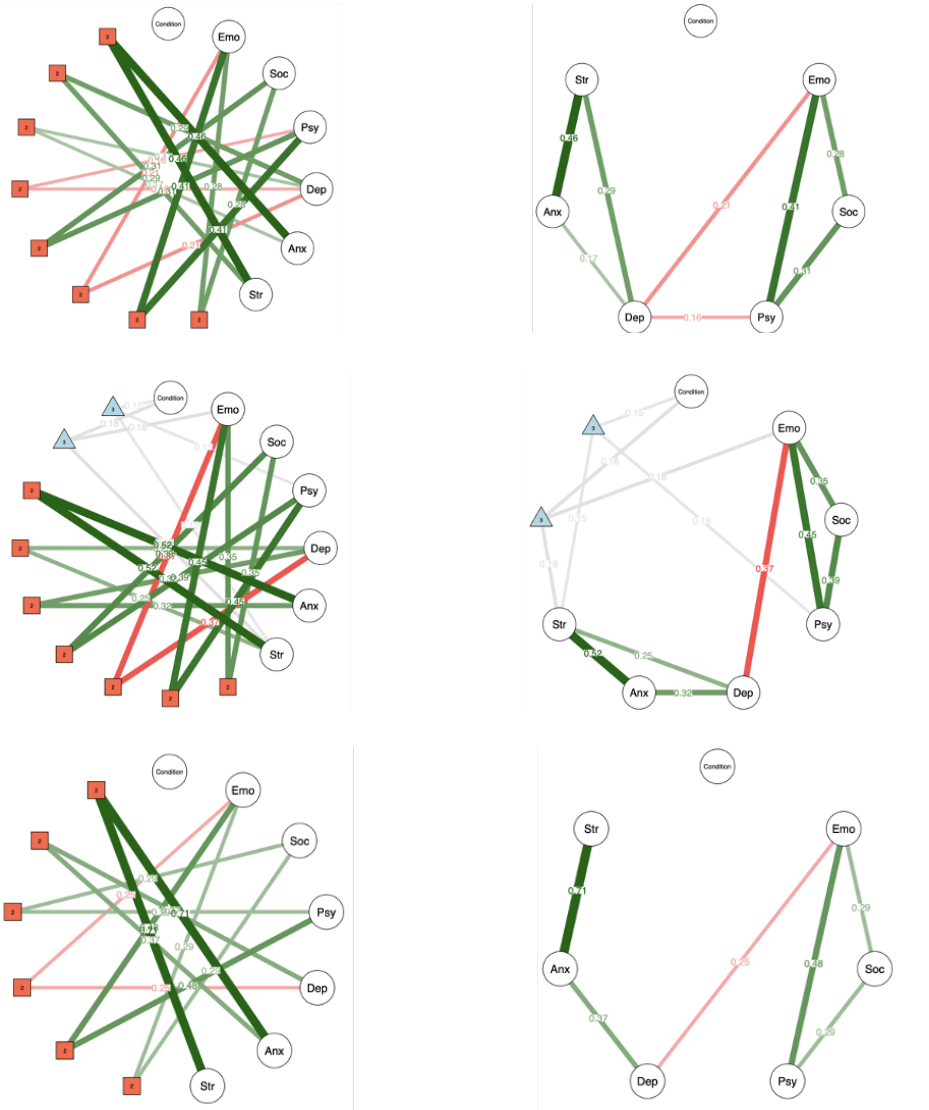
Supplementary material



Note: Emo = Emotional well-being; Soc = Social well-being; Psy = Psychological well-being; Dep = Depression; Anx = Anxiety; Str = Stress.

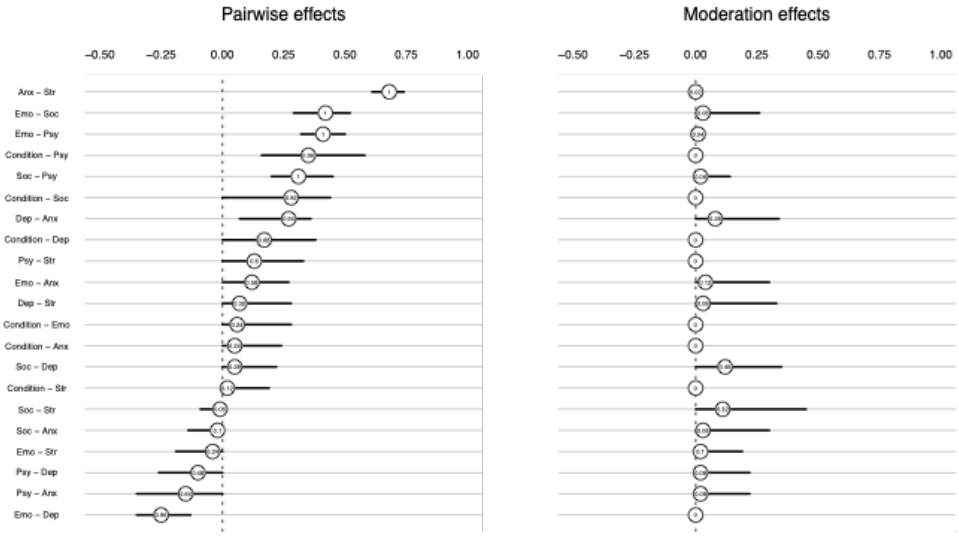
Figure S1. Moderated network models for Time 1, 2 and 3, separately presented by groups (Condition: 1 = Control, 2 = Experimental).

Factor graphs allow a powerful visualization of moderated networks by including 3-way and 2-way interactions as additional nodes.



Note: In the left panel, white nodes represent the network variables, red squares represent pairwise interactions, and blue triangles represent 3-way interactions (moderations). In the right panel, 3-way interactions (moderations) are presented as factor nodes and pairwise interactions as edges between variables. Abbreviations are described in Figure S1. Condition is the grouping variable (control or experimental group

Figure S2. Factor graphs of the MNM at Time 1, 2 and 3.



Note: Abbreviations are described in Figure 1. Condition is the grouping variable (control or experimental group)

Figure S3. Bootstrapped sampling distributions at of the null model.

6 Discussion

6.1 General discussion

The present thesis had two main objectives: first, Section 1 contributed to establishing the grassroots of the thesis by means of reviewing all the available literature about the effects of MPPIs on adolescents' mental health in the school context. Besides measuring these effects on indicators of mental health, this section also expanded the line of inquiry by examining the role of adolescents' time attitudes on mental health. Second, Section 2 contributed by means of experimental and longitudinal studies to the promotion of adolescents' mental health through a school-based MPPI program. This allowed to analyze the longitudinal impact of an MPPI on the transition probabilities between time attitude profiles and to examine the changes in the network structure of mental health in adolescents.

Section 1

As previously mentioned in the introduction section, the literature about school-based MPPIs is scarce. Only nine studies were included in the systematic review and meta-analysis. Hence, Study 1 thoroughly investigated the effects of school-based MPPIs on SWB, PWB, depression, anxiety, and stress symptoms in adolescents through a meta-analysis. Results indicated that PWB and depression symptoms were the two constructs on which the MPPIs had major effects in both the short and the long term. More specifically, small but significant effects on SWB were found in the short term, which resemble the findings in adult samples (Hendriks et al., 2019, Koydemir et al., 2020). The long-term effects of these interventions showed that PWB as well as depression symptoms had sustained moderate effects. These findings contrasted with previous studies on PPIs and MPPIs in adult samples (Bolier et al., 2013; Chakhssi et al., 2018), suggesting that further studies are needed to broaden the field of study and ascertain whether the results can be replicated. Conversely, anxiety and stress symptoms did not report any significant effect either in the short or in the long term. According to the findings related to the hedonic and eudaimonic tradition, MPPIs showed an effect on SWB right after the intervention. Nevertheless, this effect dissipated over time and a deeper and more sustained sense of meaning and fulfillment was reinforced (i.e., PWB). Adolescents tend to seek both small and momentary pleasures (hedonic tradition) and life objectives for accomplishing (eudaimonic tradition;

González-Carrasco et al., 2019), which may explain the results of MPPIs in the short and in the long term.

Another contribution from Section 1 is in regard to the practical implications that can contribute to the benefits of MPPIs. In summary, MPPIs in combination with another type of positive intervention resulted in more beneficial effects compared to interventions with an MPPI alone. Also, studies using a placebo control group showed larger effects compared to those with a wait list control group. Aspects concerning the methodology employed in the studies that could influence the effects of the intervention were also investigated. For instance, using a non-randomized control trial, not assessing follow-up in the studies or not following an assessment of internal validity safeguards would increase the effectivity of empirical studies. Although the effects reported in the studies following such methods may be significant, all these are considered methodological limitations of the studies which favor the likelihood of the studies being publishable. This is known as the "file-drawer problem" (Dalton et al., 2012) which increases publication bias. In this sense, further studies should follow a more restrictive methodology with the placement of safeguards within research studies to report more reliable results. Nevertheless, it is worth mentioning that these categorical moderators included few studies in the analysis and were only significant for SWB and depression symptoms.

Section 1 also expanded the role of time attitudes in adolescents' mental health using a person-centered approach, which treats individual members in a holistic fashion and thus identifies sub-groups of population based on certain characteristics of participants. The study of time attitudes offers new possibilities to explore whether having a more positive or negative time attitude profile influences adolescents' mental health. In Study 2, four profiles of adolescents' time attitudes emerged: *negatives*, *present/future negatives*, *past negatives*, and *positives*. The findings demonstrated that adolescents reported higher scores for well-being indicators and lower scores for psychological distress indicators when they had positive feelings towards time. In contrast, they reported lower scores for well-being indicators and higher scores for psychological distress indicators when they had negative feelings towards time. Previous literature also supports the assumption that positive time attitude profiles are associated with an optimal psychological functioning of adolescents (Konowalczyk et al., 2018; Worrell et al., 2019). According to the dual-factor model of mental health, among the positive indicators, PWB was the domain that reported higher scores across all profiles. As previously commented throughout the theoretical background of the thesis, PWB may be one of the most relevant aspects of mental health during late adolescence (González-Carrasco et al., 2019); having meaningful goals during transitional stages helps adolescents face various demands and, in most cases, eases the pursuit of a fulfilling life (Vittersø, 2016). Regarding the role of negative indicators, depression was the dimension with the lowest scores across profiles, which is in line with the research indicating that depression is the most prevalent form of psychological distress among adolescents and that it has a negative relationship with optimal development (Birmaher et al., 1996). This is why depression has been associated throughout the literature

with poorer social relationships and academic outcomes, substance abuse, increased risk of suicide, and malfunctioning in adolescents (Beesdo et al., 2009; Birmaher et al., 1996; Derdikman-Eiron et al., 2011), among others. The findings regarding the depression dimension also highlight the paramount concern in mental health and societal progress given the high rates of adolescents affected in recent years by this affection (WHO, 2017).

In brief, having positive feelings towards time may ensure the mental health and optimal psychological functioning of adolescents. These findings encourage the need to promote positive feelings towards the past, present, and future in order to enhance the mental health of adolescents. For this reason, the sessions of the Get to Know Me+ program were divided into the three time frames (i.e., focus on the positive emotions of the present, deal with the positive emotions of the past, and move forward towards the positive emotions of the future). In light of the findings of this Section 1, researchers and professionals should engage in (and continue) to study, develop, and implement mental health promotion programs for adolescents in order to improve well-being and reduce psychological distress (Clarke et al., 2015).

Section 2

In the following lines we aim to address the findings in Section 2 regarding the experimental part of the thesis. Study 3 investigated the impact of the Get to Know Me+ intervention on transition probabilities among adolescents' time attitude profiles using the LTA, a longitudinal extension of the LPA person-centered approach. Within Study 3, the relation of time attitude profiles with EWB, SoWB, and PWB was also analyzed after the MPPI. Five profiles emerged in this study: *negatives*, *present/future negatives*, *past negatives*, *optimists*, and *positives*. Before proceeding further, it is of great importance to acknowledge that adolescents tend to focus rather on negative feelings towards their present experiences (what is happening), their past recollections (what has happened), and their future expectations (what is yet to come; McKay et al., 2019; Morgan et al., 2016). In fact, it is common among adolescents to transition through this life stage to more negative profiles over time (Konowalczyk et al., 2018). Following this trend, the *negative* profile from Study 3 received almost the same percentage of transitions from positive profiles in the control and intervention groups. However, and despite this common susceptibility to transition to negative profiles, the *present/future negative* and *past negative* profiles of the intervention group only received approximately half of the transitions compared to those of the control group. Regarding transitions from negative to positive profiles, more transitions to the *positive* and *optimistic* profiles were found in the intervention group compared to those allocated in the control group after the MPPI. These findings supported the beneficial impact that the implementation of a school-based MPPI had on the transition probabilities of adolescents to emotional and evaluative feelings towards the past, present, and future. But

did these transitions, and as a consequence the intervention program, influence the adolescents' EWB, SoWB, and PWB?

Results from the implementation of the Get to Know Me+ intervention also demonstrated significant and meaningful relationships of time attitude profiles with EWB, SoWB, and PWB. Even though the explanatory similarity showed similar relations between profiles and well-being outcomes across measurement time points, differences between groups at post-test were observed. The *negative*, *present/future negative*, and *optimistic* profiles showed significant and higher scores on the three well-being domains compared to the control group. Regarding the *past negative* and *positive* profiles, the results were similar between groups. The *past negative* is considered the most adaptive profile among the negatives since the *negative* and *present/future negative* profiles are associated to more detrimental outcomes (Tejada-Gallardo et al., 2021a; Worrell et al., 2019). This reinforces the characteristics of the *past negative* profile as having mixed positive and negative feelings towards time (resembling the *optimistic* profile). In fact, scores for well-being outcomes did not differ between *past negatives* and *optimists* in the control group. Still, further research would be needed in order to explain the well-being results of the *past negative* profile in the intervention group. A reasonable explanation in the case of the *positive* profile is that participation in an MPPI by adolescents with a *positive* profile might be counterproductive, as it would be difficult to substantially increase their levels of well-being (Tomyn et al., 2015). This would explain why adolescents in the intervention group and clustered in the *positive* profile reported similar well-being levels to those from the control group. These results contribute to the debate as to whether positive interventions are equally useful for everyone and gives rise to the question of whether MPPIs may have more detrimental than beneficial impacts in terms of promoting well-being when it comes to certain profiles, and thus well-being levels. One remarkable finding was that the eudaimonic components of well-being (SoWB and PWB) were more endorsed by both positive profiles (*optimists* and *positives*), and more declined in the negative profiles (*negatives* and *present/future negatives*). This resembles the results from Section 1 (Studies 1 and 2), indicating that, on the one hand, the effects of the MPPI were more substantial in the PWB domain, especially in the long run. On the other side, the *positive* profile (in the cross-sectional study) tends to be more related to the PWB domain than to EWB and SoWB. Although the statistical procedure of LTA helped deepen in the impact of a school-based MPPI on the transition probabilities among time attitude profiles and adolescents' well-being, a different approach to studying the experimental part of the thesis was also employed.

Study 4 examined the results from the Get to Know Me+ intervention but, in this case, using a different statistical procedure: the NA. This technique offered a broader understanding of the potential mechanisms underlaying changes in the mental health indicators after an MPPI. Previous empirical evidence has engaged in the causes, effects, and correlations of the indicators of mental health; however, preceding investigations have not studied the indicators and/or dimensions of the concept in its nature (Fabian, 2021). The network approach offered the advantage of exploring causal

relationships without relying on a latent entity structure to shed light on this question. The first finding of Study 4 supported the proposed structure of mental health as conformed by positive and negative indicators, since two differentiated communities emerged; one composed of EWB, SoWB, and PWB and the other composed of depression, anxiety, and stress symptoms. Depression was the only component that connected negatively with EWB and PWB. This supports previous results of the thesis in which depression appeared to be the most detrimental psychological distress indicator in relation to well-being (Study 2).

After the MPPI, NA revealed significant changes in the network structure of mental health and connectivity of the network in the intervention group. On one side, the network at Time 2 became more densely interconnected than at Time 1 and compared to the control group, suggesting that an increase in density in a mixed network might be an indicator of intervention effects. On the other side, stress was associated positively with PWB and negatively with EWB compared to the control group. The role of stress emerged as an important component after the MPPI, despite this dimension not arising as a relevant indicator throughout the thesis. There are different reasons that may explain the emergence of stress in Study 4. First, the dimension of stress from the DASS-21 is considered the most different subscale compared to depression and anxiety (Jovanović et al., 2019). These authors also suggest that calculating specific scores on the stress subscale of the DASS-21 might be considered erroneous since the subscale is best conceived as a measure of general distress in adolescent samples. The theoretical grounds of the network approach conceive the network as a whole and can thus help to overcome the limitation of construct validity of the subscale and to better understand its dimensionality. In this sense, the NA assesses the constructs based on the causal relationships displayed among the components that form the network (i.e., mental health indicators) and not on latent variables. As a result, it was possible to observe a different pattern of the relation between the stress dimension and well-being indicators compared to the other studies that form part of the thesis.

Second, stress is considered a psychological symptom that can be conceived either as a barrier or a motivator to establish and accomplish goals in adolescence (Gutowski et al., 2018). Due to the high demands that adolescents face during this developmental stage, stress is more reported by adolescents compared to children (Stroud et al., 2009) and adults (American Psychological Association, 2014). This may be related to aspects such as the need for life purpose, which can be seen as an indicator of thriving (Bronk & Finch, 2010), but it also leads to increases in adolescents' perceived stress levels (Hughes, 2006). In this sense, stress can be connected to both the hedonic and the eudaimonic traditions of well-being (as in Study 4) but in a positive (in relation to EWB) or in a negative (in relation to PWB) manner. The relevance of experiencing positive emotions and pleasant moments in daily life is well documented (Kahneman & Deaton, 2010) and may boost the activation of social and personal resources as well as promote EWB (Fredrikson, 1998; Fredrickson & Joiner, 2018). These positive emotions evoked by hedonic activities during the MPPI may

have enriched the thought-action repertories of adolescents to build useful personal resources. These resources can also serve as a means of meeting the psychological demands on adolescents during eudaimonic activities, such as visualizing their future (Sheldon & Lyubomirsky, 2006). On the other hand, although engaging in positive activities that boost PWB may help to identify and pursue adolescents' purpose in life, attempting to achieve important goals can also have counterproductive effects (e.g., goals -> threats -> stress; Hughes, 2006).

In summary, the general body of the present thesis helped us broaden, advance, and deepen in the study of adolescents' mental health from different theoretical and methodological points of view. A variety of approaches and statistical procedures were implemented with the goal of providing a more thorough understanding of the topic. Even though the four research studies are only a tiny drop in the ocean, they laid the foundations of school-based MPPIs as the sum of the work already carried out in the school context. We can thus suggest that this thesis has contributed to demonstrating that school-based MPPIs do have an effect on the mental health of adolescents, especially on SWB in the short term, and on PWB and depression symptoms, again in the long term. At the same time, time attitude is a phenomenon which helped conceive adolescents' mental health and demonstrated that adolescents can transition towards more positive profiles after the implementation of an MPPI, which suggests that how they feel about their past, present, and future can influence their mental health. Finally, the NA showed changes in the network structure of mental health after the MPPI, specifically in EWB, PWB, and stress. Still, further research should continue to expand this topic and produce consistent results on the matter.

6.2 Limitations

The present thesis, structured in four studies, has widen the spectrum of the study of adolescents' mental health. However, several limitations need to be acknowledged in reference to the studies and the thesis itself. Regarding the main limitation of the systematic review and meta-analysis, the number of studies included is low, however, other restraints should also be considered. For instance, the quality of the studies included (only two were rated as having a low risk of bias) should be carefully borne in mind since the findings reported can have certain limitations. To note, the inclusion criteria were also very restrictive due to the goal of the study. For this reason, results should only be interpreted in light of the chosen features. As we concluded in the systematic review and meta-analysis, further research studies should follow RCTs in order to increase the quality of studies through rigorous methodology and reporting of results. In addition, we only found two studies that incorporate an evidence-based positive intervention to the MPPI, which resulted in more positive effects than an MPPI alone. Hence, future studies should follow these lines of inquiry.

In reference to the other three studies, all data were collected from self-reported measures, which can bias participants' responses. In all three studies, the MHC–SF was used. Even though this scale has been proven lately not to show discriminant validity between the dimensions (Franken et al., 2018; Żemojtel-Piotrowska et al., 2018), it is also well-known that an overlap exists between the experience of hedonic and eudaimonic well-being (Deci & Ryan, 2008) and also high statistical covariance is present in between the two traditions (e.g., Waterman et al., 2008). It would be better if future studies were to include more, differentiated measures to characterize the two traditions. Also, the sample size from the three studies was small and generalizations of results cannot be drawn. In order to not lose participants from pre- to post-test (Studies 3 and 4) and to lower the risk of bias, future research should follow an intention-to-treat analysis including all the participants from both groups (intervention and control) in the analysis, regardless of their adherence or subsequent withdrawal from treatment (Gupta, 2011). Regarding Study 2, due to its cross-sectional design, causality cannot be attributed to the results. Future longitudinal studies are also proposed to further study the changes in the patterns of the profile over time and its relationship with mental health. Although Study 3 was indeed a longitudinal study, its limitation lies in the fact that a follow-up assessment was not analyzed. Study 4 presented network structures that represented undirected relationships which prevent clarifying directionality. Future studies may include momentary assessment tools to capture temporal and contemporaneous interactions between indicators (Wen et al., 2017). Even though RCTs are the most rigorous design option, individuals who are "forced" to participate and engage in the activities proposed in the intervention program do not subsequently make efforts to obtain substantial results (Sheldon & Lyubomirsky, 2019). It would be interesting to conduct the experimental studies with participants that are genuinely interested in participating in them. Another limitation concerns the screening of levels of adolescents' well-being prior to the intervention because training in well-being techniques is more effective among individuals with room for improvement (Bergsma et al., 2020; Sarriera et al., 2017). Finally, the contamination effect is another obstacle that we faced. This effect arises when individuals randomly assigned to different conditions cause some individuals to receive features of the intervention group not assigned to them (Sarriera et al., 2017). This would be overcome by separating intervention and control groups in different schools.

When it comes to talking about the limitations of the intervention program itself, some of them should be highlighted. As suggested by the literature on MPPIs, the more sessions the program has, more prolonged effects will be reported (Boiler et al., 2013; Tejada-Gallardo et al., 2020b). Future work should involve the inclusion of new sessions in an attempt to result in more pronounced long-term effects (Lyubomirsky & Layous, 2013). Also, the reduced schedule of the sessions (1 hour) would be considered as a limitation since spending more time in the sessions would imply greater effects (Lyubomirsky & Layous, 2013). The problem here is that when interventions are implemented in the school setting, the schedules are very restrictive. That is why considering the inclusion of these types of programs in the school curriculum, as high-

lighted by the positive education basis, would allow enjoying further time to implement them.

All the abovementioned issues could potentially limit generalizing the thesis results. Even though the target was an adolescent population, further research on the effectiveness of MPPIs in other samples and contexts might be valuable to achieve external generalizability.

7 Conclusions

The results of the four studies and the thesis as a whole provide new evidence on the impact of MPPIs on adolescents' mental health. In summary, the main conclusions are:

- MPPIs are an effective tool to improve SWB and PWB and to reduce depression symptoms of adolescents in the school setting.
- The long-term effects of MPPIs involve increases in PWB and decreases in depression symptoms.
- A combination of an MPPI with another evidence-based positive intervention would have a greater effect compared to an MPPI alone.
- It is recommended to develop longer intervention programs (at least 6 sessions) in order to yield longer-lasting effects.
- Time attitudes are a meaningful construct in the study of adolescents' mental health. Positive time attitudes are related to high levels of well-being and low levels of psychological distress.
- The constructs targeted in the MPPI can be structured under the three time frames (positive feelings towards the past, present, and future).
- Adolescents participating in the MPPI program prompted more transitions to positive profiles compared to those allocated to the control group.
- Participating in the MPPI enhanced the well-being of adolescents clustered in the most negative profiles (*negatives* and *present/future negatives*) and the *optimistic* profile compared to those who did not engage in the MPPI.
- The application of the network perspective might be considered a valuable approach in the study of adolescents' mental health, especially to study changes in the network structure of mental health.
- The network model of mental health allowed to observe changes in the relationship between EWB, PWB, and stress after an MPPI.
- In general terms, the thesis has brought to the fore the importance of PWB (as a positive indicator of mental health) and depression symptoms (as a negative indicator of mental health) when studying adolescent samples.
- The findings of the present thesis have opened new avenues in the study of adolescents' mental health.

7.1 Future research

As some scholars have suggested (e.g., Boiler et al., 2013; Luybomirsky & Layous, 2013; Tejada-Gallardo et al., 2020b), a variety of internal and external features in positive interventions can influence the effects and the impact on adolescents' mental health. Future studies should consider the following suggestions in an attempt to overcome the limitations presented previously. Regarding internal factors of the intervention program, more sessions need to be included in order to sustain the effects of the MPPI on adolescents' mental health (Boiler et al., 2013; Tejada-Gallardo et al., 2020b). According to the scientific literature, forgiveness activities are considered important during the adolescent period. It has been demonstrated that the elderly and the middle-aged are more willing to forgive than children, adolescents, and young adults (Steiner et al., 2011). Hence, promoting forgiveness in adolescents may help them increase their SWB and PWB (Datu, 2014; Shourie & Kaur, 2016) and reduce their levels of depression and anxiety (Nsamenang et al., 2013). Forgiveness together with gratitude have been recommended to target positive emotions from the past (Miller & Nickerson, 2008). Hope activities have been designed to cultivate positive emotions for the future. Marques et al. (2009) suggested that children's hopeful thinking is positively associated to mental health. For this reason, working on hope with adolescents may help them to achieve their goals through purposive behavior (Waters, 2011) and, as a consequence, enhance their mental health. Apart from introducing forgiveness and hope sessions to the intervention program, the scientific literature has also advised maintaining the activities learned in the sessions during consecutive days in-between sessions. This may help to enhance and sustain the effects of the intervention program (Lyubomirsky & Layous, 2013). Regarding the assessment of the intervention, it would also be advisable to include measures of each of the skill domains targeted in the intervention program to enable tests of the mechanistic processes accounting for mental health change over time (Heintzelman et al., 2020).

With all this in mind, a future line of study is to improve the intervention itself with all previous recommendations. Therefore, Appendix 1 (Table 5) presents a proposal of the re-structured MPPI with several modifications: 1) the introduction of two new sessions (i.e., forgiveness and hope); 2) a take-home activity for each session and; 3) the change of the name of the MPPI to "GROW", since educational staff and adolescents considered the previous name of "Get to Know Me+" to be too long and difficult to remember. The main reason for this modification is because adolescents also repeated constantly the word "grow" in their qualitative evaluations of the intervention, and stated that our program helped them gain resources for optimal well-being.

Positive activities that have optimal internal features are likely to promote sustained mental health. However, personal attributes of the person who is engaging in the intervention are also important (Lyubormirsky & Layous, 2013). Given that older people benefit more from positive interventions than younger individuals, perhaps because they are more committed to the activities (Sin & Lyubomirsky, 2009), future studies

should include adolescents who are willing to engage in them effortfully. One option can be to measure their levels of motivation to further explain the results obtained. Also, adolescents' initial well-being levels when they engage in a positive intervention also predict how much they will benefit from it (Sarriera et al., 2017). Adolescents with low levels of well-being or with moderate psychological distress symptoms would benefit the most from these interventions (Froh et al., 2009; Seligman et al., 2005). This might be explained because there is room for improvement compared to adolescents who already have optimal mental health. Future studies would also include pre-screening measures of well-being to overcome doubtful results.

Within this field of research and inquiry, the implementation of the MPPI would also be expanded to adolescents from other contexts to enhance mental health during transitional life circumstances. Future pilot studies can be implemented in youth from two different groups in need of accompaniment; 1) youth at risk of social exclusion, and 2) youth with a psychological pathology in clinical settings. Social exclusion is a multi-dimensional, multi-causal, and dynamic phenomenon, which refers to the most marginalized groups in society covered by the social protection system (Jahnukainen, 2014). It is a dynamic process that causes inequality and is mainly associated with poverty and academic failure, which directly implies not meeting minimum requirements for access to the working world (Artuch-Garde et al., 2017). All the previous considerations hinder adolescents from achieving optimal and rightful mental health. Belonging to these groups has been associated to lower well-being, less self-esteem, and less hope towards the positive outcomes for their future (Gross-Manos, 2017). Hence, positive interventions on vulnerable youth are necessary and up until now, few studies have been conducted on this matter (e.g., Teodorczuk et al., 2018). Regarding clinical settings, positive interventions have mainly focused on adult populations (Chakhssi et al., 2018). Traditional psychology is still very present in this setting, focusing on ameliorating symptoms rather than also enhancing well-being and optimal functioning (Duckworth et al., 2005). Youths suffering from psychopathology are also considered at risk of exclusion, achieving poor school performance, and suffering from social stigma (Reicher & Matischek-Jauk, 2019), all of which exacerbate their psychological distress. Also, youths are immersed in a transitional period of life involving rapid physical, biological, psycho-social, and cognitive developmental changes (Burger & Samuel, 2017). Hence, further studies should also target this specific population group with the main goal of promoting their mental health from a positive standpoint. The intervention proposed in Appendix 1 would need to be adapted to each context group.

In order to continue studying the mental health of adolescents and to contribute to the scientific literature, different approaches and statistical procedures can be proposed. Ecological momentary assessment (EMA) would be a valuable methodology to study mental health "in the moment" and also longitudinally since it reduces the recall bias inherent in self-report measures (retrospective assessments; Wen et al., 2017). It also has several advantages compared to self-reports, not only "in the moment" but also "in the context" are beneficial when gathering data. This means that the data provided is from the natural setting and is relevant to the social environment,

thus being more ecologically valid (Shiffman et al., 2008). A recent systematic review and meta-analysis on EMA of well-being (de Vries et al., 2021) included 53 articles and only one study targeted an adolescent sample (Bejarano et al., 2019). Hence, it might be interesting for future studies to include this methodological strategy. Different apps are already available for smartphones with this purpose and their use is very straightforward, especially for adolescents who are digitally literate.

Another statistical approach that would be interesting to include in the study of adolescents' mental health is social network analysis (SNA). This method is increasingly applied in the social sciences in areas such as psychology, health or in business organizations. SNA is a structural approach based on interactions among social actors (e.g., individuals, teams or organizations) and can combine quantitative, qualitative, and graphical data in its study. This allows a fuller description of the social world and the relationships between actors. Similarly to the network approach, the SNA uses the network composed of a set of actors (or nodes) and a set of ties that connect the nodes (Lusher, 2011; Lusher & Robins, 2013). The relations that emerge in these connections can be divided into different types: similarities, social relations, mental relations, interactions, and flows. Mental relations are the type of relation that would be interesting to include in the study of adolescents' mental health (Borgatti & Ofem, 2010). These relations are often considered private and unobservable, for instance being perceived as a leader or being liked by others (Flakus et al., 2021; Rogoza et al., 2021). The introduction of the SNA method to the study of first-year high school adolescents would explain how the formation and maintenance of social relationships based on their mental health evolve in a (for them) "new" social context during the academic year. This approach not only uses self-reports but also peer-nominations (e.g., what classmates do you consider to be happy?). Put differently, how adolescents' mental health predicts being seen as a happy individual and how this influences the formation (short-term) and maintenance (long-term) of social relationships at zero-acquaintance level. This proposal may also serve as a vehicle to reinforce the importance of promoting well-being in adolescents as a cornerstone in the generation and maintenance of social relationships.

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9 Appendices

APPENDIX 1

TABLE 5. SUMMARY OF THE GROW PROGRAM

Modules and sessions	Session goals	Procedure and activities
	Introductory session	
1. Well-being	• Establish a supportive group environment • Introduce students to the broad aspects of well-being (Lyubomirsky et al., 2005) and the aspects that determine it	**Introduction to the session:** Brief program introduction and conceptualization of well-being **Flow activity – "Warming up the engines":** Mind map activity: "Which memories do you relate with your favorite fruit"? **Central activity – "On the move"**: Mind map activity: "What does well-being mean to you"? **Closing – "Take-home message"**: Suggesting ways of increasing well-being through purposeful thoughts and final take-home message **Take home activity – "Now it's your turn":** During the week, they have to compile 5 different situations that made them feel good.

Focus on the positive emotions of the present		
2. Character strengths	• Define character strengths and virtues (Park et al., 2004) • Explore students' character strengths through the VIA questionnaire and apply them to different situations	**Introduction to the session:** Previous session recall and introduction to character strengths **Flow activity – "Warming up the engines"**: Identify the character strengths (using a card game – INNSOC cards) of their best friend/important person **Central activity 1 – "On the move"**: Identify their own character strengths **Central activity 2 – "On the move"**: Identify and share two character strengths of their group peers using a card game **Closing – "Take-home message"**: Discuss how character strengths are related to well-being and encourage students to use their greatest strengths. Final take-home message **Take home activity – "Now it's your turn":** Choose one character strength and use it in different manners every day during the week.
3. Dealing with emotions	• Introduce the components of emotional intelligence (attention, clarity, and regulation) • Challenge negative emotions and thoughts through cognitive restructuring and describing past negative experiences (Fava, 1999)	**Introduction to the session:** Previous session recall and introduction to positive emotions and emotional intelligence **Flow activity – "Warming up the engines"**: Using the metaphor of the sea waves and cake to explain the three different components of emotional intelligence **Central activity – "On the move"**: Emotional action process. Identify a conflict situation; recognize the emotions, thoughts, and behavior that the situation evoked; finally, suggest and plan more adaptive responses to future similar situations through emotional management techniques **Closing – "Take-home message"**: Discuss the importance of acknowledging their freedom to change and adapt their responses to distressful situations and highlight the contribution of positive emotions to well-being. Final take-home message **Take home activity – "Now it's your turn":** Extend the central activity with two more situations that have happened to you during the week.

Turn back to the positive emotions of the past		
4. Forgiveness	• Introduce forgiveness to promote healthy and supportive interpersonal relationships (McCollough, 2000) • Cultivate forgiveness and empathy through a four-stage model: uncovering phase, decision phase, work phase, and deepening phase	**Introduction to the session:** Previous session recall and introduction to forgiveness **Flow activity – "Warming up the engines"**: "Two truths and a lie" game. Introduction to the act of lying, which can create conflict and give rise to problem solving/ conflict resolution issues **Central activity – "On the move"**: 1st, 2nd, and 3rd stages of the model of forgiveness (think about a difficult situation with a person, recall the emotions, put yourself in someone else's position) **Closing – "Take-home message"**: Why forgiveness is important to make us feel better and therefore to improve our well-being. Final take-home message **Take home activity – "Now it's your turn":** Write a letter to the person who you want to forgive (4th stage of the forgiveness model)
5. Gratitude	• Introduce gratitude and its contribution to well-being through prosocial behavior • Connect with and appreciate positive emotions • Learn to integrate actions and expressions of gratitude in their daily lives	**Introduction to the session:** Previous session recall and introduction to gratitude **Flow activity – "Warming up the engines"**: *The Desert Island*: "What would you take with you to a desert island?" Importance of reminding themselves of the most important things in their life **Central activity – "On the move"**: Gratitude letter **Closing – "Take-home message"**: Remind why gratitude can be important for improving well-being. Challenge students to make a gratitude visit during the week. Final take-home message **Take home activity – "Now it's your turn": "**The gratitude diary". Write three good things that happen every day during a week

Move forward to the positive emotions of the future		
6. Optimistic thinking	• Introduce optimism and optimistic thinking • Learn methods to achieve and/or increase an optimistic explanatory style	**Introduction to the session:** Previous session recall and introduction to optimism **Flow activity – "Warming up the engines":** Introduce optimistic explanatory style through the self-fulfilling prophecy **Central activity – "On the move"**: How optimistic and pessimistic explanatory styles work and engage in a practical activity. Explain the connection between our thoughts and our feelings and behaviors **Closing – "Take-home message"**: Remind how having an optimistic explanatory style can help them to improve their well-being as well as accomplish their future goals. Final take-home message **Take home activity – "Now it's your turn":** Choose two situations in which you had a limiting thought, choose evidence that supports it, evidence that refutes it, and an alternative optimistic thought
7. Hope	• Introduce hope • Learn methods to conceptualize clearer goals, establish paths to these goals and summon the motivation to reach them	**Introduction to the session:** Previous session recall and introduction to hope **Flow activity – "Warming up the engines"**: Identify and share an important memory, person, and wish **Central activity – "On the move"**: Best possible selves. Project themselves into the future and try to imagine that they have met all their goals in every domain of their life **Closing – "Take-home message"**: Remind how hope can help us focus on positive goals for our futures and prevent feelings of helplessness through the belief that there are ways to meet those goals. Final take-home message **Take home activity – "Now it's your turn":** Collect pictures/videos of those aspects that make you feel good and you want to maintain in your life
8. Goal setting	• Compile the activities and exercises learned through the program • Frame life in terms of goal establishment and plans to achieve those goals	**Introduction to the session:** Previous session recall and introduction to goals and purposes **Flow activity – "Warming up the engines"**: Go through and revise the previous program activities and exercises via a snowball effect **Central activity – "On the move"**: Personal action plan: Establish the steps needed to become their best selves **Closing – "Take-home message"**: Remind students of how all the activities and exercises covered throughout the program helped increase their well-being. Encourage them to keep on practicing and completing all their work. Final take-home message

APPENDIX 2

Approval of the experimental study by the UdL Research Ethics Committee

Institut Català de la Salut
Hospital Universitari Arnau de Vilanova

De: president del CEIm

A: Carles Alsinet Mora

Assumpte: projecte CEIC-2157 titulat **"La mejora del bienestar, el desarrollo del talento y el crecimiento personal de adolescentes en etapas de transición"**

Us adjuntem l'aprovació del vostre projecte que va estar avaluat pel CEIm a la reunió de 9 d'octubre de 2019, acta 12/2019.

Tanmateix, us assabento de les següents consideracions en relació a l'expedient del vostre projecte:

- Cal aportar la versió definitiva del projecte presentada a la convocatòria, assenyalant els canvis rellevants que s'hagin pogut introduir des de l'aprovació del projecte.
- Cal aportar la documentació addicional requerida:
    - Quaderns de recollida de dades indicant cóm s'emmagatzemarà aquesta informació i els mecanismes per assegurar la confidencialitat

Us demanem que aporteu aquests documents al més aviat possible.

També us informem que és potestat del Comitè fer seguiment del desenvolupament del projecte, així com de les modificacions del mateix, si és el cas.

La manca de la documentació requerida, i les desviacions no autoritzades del projecte, poden suposar la revisió del dictamen favorable i l'emissió d'una revocació de l'autorització.

Cal informar al CEIm de la marxa del projecte, de l'acabament de l'estudi i dels resultats.

Atentament,

Joan Antoni Schoenenberger

Lleida, 9 d'octubre de 2019

Generalitat de Catalunya
Departament de Salut

Institut Català de la Salut
Hospital Universitari
Arnau de Vilanova

El Comitè de Ética de Investigación en la reunión del 9 de octubre de 2019, acta 12/2019, informó favorablemente la solicitud del proyecto de investigación titulado **" La mejora del bienestar, el desarrollo del talento y el crecimiento personal de adolescentes en etapas de transición"** de código CEIC-2157, con Carles Alsinet Mora como investigador principal, y consideró:

- Se cumplen los requisitos necesarios de la idoneidad del protocolo en relación a los objetivos del estudio y que están justificados los riesgos y molestias previsibles para los sujetos participantes.
- La capacidad del investigador y los medios de que dispone son apropiados para llevar a cabo el estudio.
- Es adecuado el procedimiento para obtener el consentimiento informado a los sujetos que participan en el estudio.

Lleida, 9 de octubre de 2019

Joan Antoni Schoenenberger

Presidente

Se presentará la documentación requerida para completar el expediente

Generalitat de Catalunya
Departament de Salut

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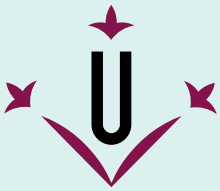

Universitat de Lleida