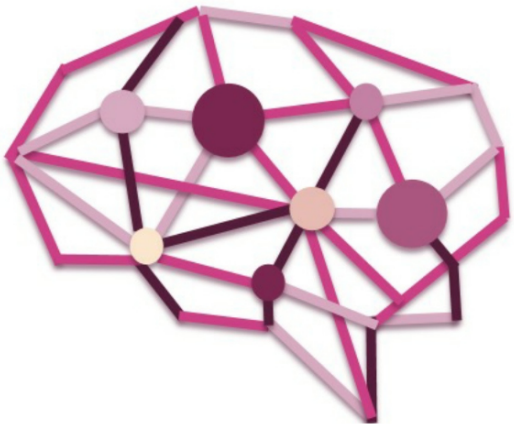
UNIVERSITAT JAUME·I

DOCTORAL THESIS



The Five-Factor Model of Personality and the Structure of Psychopathology in Adolescence

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MAY, 2021

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Programa de Doctorado en Psicología

Escuela de Doctorado de la Universitat Jaume I

Tesis doctoral titulada:

The Five-Factor Model of Personality and the Structure of Psychopathology in Adolescence

Memoria presentada por Paula Etkin
para optar al grado de doctor/a por la Universitat Jaume I

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Mayo, 2021

FINANCIACIÓN

La presente Tesis Doctoral ha sido posible gracias al contrato predoctoral Santiago Grisolía (Grisolia/2017/129) y la ayuda para realizar una estancia internacional de investigación (BEFPI/2019/050). La investigación se ha podido realizar gracias a los proyectos otorgados por del Ministerio de Ciencia, Innovación y Universidades (RTI2018-099800-B-I00), la Generalitat Valenciana (GV/2016/158 y AICO/2019/197) y la Universitat Jaume I (UJI-B2017-74 y UJI-A2019-08).

LICENCIA

“The road goes ever on and on,
down from the door where it began
Now far ahead the road has gone and I must follow, if I can
Pursuing it with eager feet,
Until it joins some larger way
Where many paths and errands meet.”

J. R. R. Tolkien

AGRADECIMIENTOS

A los alumnos, docentes y equipos de dirección de los centros IES El Caminàs e IES Bovalar, por participar voluntaria y comprometidamente con el proyecto de investigación planteado, colaborando en todo lo necesario para agilizar la recogida de datos.

A la Universitat Jaume I y sus docentes por estos años de formación.

A la Generalitat Valenciana, por brindarme la oportunidad de realizar este doctorado y la estancia de investigación en Países Bajos.

To everyone in the Department of Developmental Psychology at Tilburg University, for their generosity during my stay.

AGRADECIMIENTOS PERSONALES

Agradezco enormemente a todo el equipo IDAP, por ser una segunda familia durante estos años de formación y hacer de esta tesis doctoral una experiencia maravillosa. A Laura Mezquita, mi infinito agradecimiento por las largas horas dedicadas a dirigir este trabajo con rigurosidad, paciencia y cariño. A Generós Ortet, tutor y director, por las atinadas correcciones, la dedicación con mi formación y guía a lo largo de este proceso. A Nacho Ibáñez, por sus aportes, acompañamiento y poner su creatividad al servicio de elevar este proyecto.

A los compañeros de doctorado que me acompañaron en este camino, muy especialmente a Fran, Vero, Jordi y Sigrid, por sus consejos y compañía en las horas compartidas en el laboratorio. Un pedacito de esta tesis es suya.

A Angelina Pilatti, por iniciarme en la investigación y hacer posible este camino de aprendizaje del otro lado del océano.

To Elien De Caluwé, for her contribution to this work and hosting me during my research stay. To Sara Johnson and Theo Klimstra, for their kindness and advice.

A mamá, papá y Fefe, por el apoyo incondicional en mis proyectos, sin ustedes no estaría acá. A toda mi familia, que a la distancia no ha dejado de acompañarme. A las llamadas de Titi, los consejos de Euge y las palabras de aliento de todos.

A mis amigas Orne, Meli, Fer, Dai, Cande, Andu, por hacer que la distancia durante estos tres años no sea tan difícil.

A Manu, mi compañero de la vida, por hacer que todo sea siempre un poco mejor. Gracias por acompañarme en esta aventura y en las que vendrán.

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LIST OF ABBREVIATIONS

A:	Agreeableness
ADHD:	Attention Deficit and Hyperactivity Disorder
C:	Conscientiousness
E:	Extraversion
EXT:	Externalizing
FFM:	Five-Factor Model
GFP:	General Factor of Personality
HAP:	Hyperactivity and Attention Problems
HiTOP:	Hierarchical Taxonomy of Psychopathology
INT:	Internalizing
N:	Neuroticism
O:	Openness to Experience
SENA:	Assessing System of Children and Adolescents

ABSTRACT

Mental health problems are one of the main causes of disability in children and adolescents, where symptoms of anxiety, depression, behavior problems, hyperactivity and attention problems are the most frequently reported. For this reason, many studies have addressed these constructs in recent decades in an attempt to shed light on the structure of psychopathology and its possible predictor variables, including early personality traits. However, this field is constantly expanding and there are still unanswered questions, mainly in the non-adult population, about how these variables are related, the mechanisms that underlie these associations, and which theoretical models best explain the structure of psychopathology and its relation with personality traits.

Therefore, in the present work the following objectives were proposed:

1. To explore the structure of psychopathology in adolescents, the location of hyperactivity and attention problems in the models, the associations of personality traits with the factors resulting from the observed structure, and the convergence between a general factor of psychopathology (p) and a general factor of personality (GFP).
2. To study different etiological models (i.e., pathoplasty, complication/scar or continuity) that help us understand the relation between personality traits and the structure of psychopathology (internalization, externalization, hyperactivity-attention problems and the p factor) in the adolescent population.
3. To examine the relation between personality traits and the Bifactor Model of Psychopathology from a developmental perspective. That is, to explore how different personality growth trajectories are related to the Bifactor Model of

Psychopathology and different symptom scales in adolescents in a 3-year longitudinal study.

Consequently, three studies were carried out with adolescents, one cross-sectional and two longitudinal, over 3 years. The Evaluation System for Children and Adolescents (SENA) was used to measure psychopathological symptoms. The JS-NEO-S and the JS-NEO-A60 were employed to assess personality traits according to the Five-Factor Model (FFM: neuroticism, extraversion, openness to experience, agreeableness, conscientiousness). In Study 1, confirmatory factor analyses were carried out by comparing different models that could account for the structure of the evaluated symptoms. Subsequently, regression analyses were performed to explore associations among the resulting factors, personality dimensions and the GFP. For Study 2, a cross-lagged pathway analysis was performed to observe the effects of different hypothesized association models, including three measurement occasions for neuroticism, extraversion, agreeableness and conscientiousness, and three waves of internalizing, externalizing and hyperactivity-attention problems, in addition to p. Finally, for Study 3, latent growth curve models were used to examine individual differences in personality trait trajectories and their links with different symptoms and psychopathological factors.

In Study 1, confirmatory factor analyses showed that the Bifactor Model of Psychopathology, which included p and specific internalizing, externalizing and hyperactivity-attention problems factors, better fitted the data than other models. The main associations found in the regression analyses were: neuroticism and introversion with the internalizing factor; low agreeableness with the externalizing factor; low conscientiousness with hyperactivity and attention problems; high neuroticism, low conscientiousness and low agreeableness with the p factor. The GFP and p were closely related. The factorial structure of the FFM (in Study 2 and Study 3) and the bifactor structure of psychopathology (in Study 3) remained stable over time. In addition, the models explored in Study 2 showed that there were bidirectional associations between personality factors (i.e., Big-Five traits and the GFP) and psychopathology as mostly

continuity, pathoplasty and complication/scar effects were found among them. Finally, the results of Study 3 reflected a slightly decreasing trend for neuroticism and conscientiousness, and a slight increase in agreeableness. The starting point and change in personality did not correlate with one another, but emerged as independent predictors for the psychopathology factors and the 12 symptom scales included in the analyses. Likewise, individual differences in the starting point and change over time of personality traits predicted later psychopathology, which highlights neuroticism (emotional instability) as the main predictor of different types of mental health problems. According to our findings, the Bifactor Model seemed to adequately represent the structure of psychopathology in adolescence. This structure was supported by differential associations of personality traits with each factor. The found associations were observed both cross-sectionally and longitudinally. This reinforces the importance of considering these parameters in future studies, and taking them as risk or protective factors when developing prevention and treatment programs for mental health problems.

Together, the three studies showed close relations between personality traits and psychopathology. Regarding the general factors of the studied constructs, the GFP seemed to represent more adaptive tendencies, high emotional stability, social skills, and even emotional intelligence, while p can be understood as an indicator of vulnerability to different mental health problems, negative emotionality and high comorbidity, and would seem to be related to more unfavorable treatment prognoses. In fact, high scores for both factors can be considered to be extremes of the same spectrum.

RESUMEN

Los problemas de salud mental son una de las principales causas de discapacidad en niños y adolescentes, siendo los síntomas de ansiedad, depresión, problemas de conducta, hiperactividad e inatención los más frecuentemente informados. Por esto, múltiples estudios han abordado dichos constructos en las últimas décadas, intentando arrojar luz sobre la estructura de la psicopatología y sus posibles variables predictoras, entre ellas los rasgos tempranos de la personalidad. Sin embargo, este campo se encuentra en constante expansión y aún existen preguntas sin resolver, fundamentalmente en población no adulta, acerca de cómo estas variables se relacionan, los mecanismos que subyacen a esas asociaciones y cuáles son los modelos teóricos que mejor explican la estructura de la psicopatología y su relación con los rasgos de personalidad.

Por ello, en el presente trabajo se propusieron los siguientes objetivos:

1. Explorar la estructura de la psicopatología en adolescentes, la ubicación de los problemas de hiperactividad y atención en los modelos, las asociaciones de los rasgos de personalidad con los factores resultantes de la estructura observada y la convergencia entre un factor general de psicopatología (p) y un factor general de personalidad (GFP).
2. Estudiar diferentes modelos etiológicos (i.e., patoplastia, complicación/cicatriz o continuidad) que nos ayuden a entender la relación entre los rasgos de personalidad y la estructura de la psicopatología (problemas de internalización, externalización, hiperactividad/problemas de atención y el factor p) en población adolescente.
3. Examinar la relación de los rasgos de personalidad con el modelo bifactorial de psicopatología desde una perspectiva del desarrollo. Es decir, explorar cómo las

distintas trayectorias de crecimiento de la personalidad se relacionan con el modelo bifactorial de la psicopatología y distintas escalas de síntomas, en adolescentes, en un estudio longitudinal de tres años.

Consecuentemente, se realizaron tres estudios con adolescentes, uno transversal y dos longitudinales a lo largo de tres años. Se utilizaron el Sistema de Evaluación para Niños y Adolescentes (SENA) para evaluar síntomas psicopatológicos y el JS-NEO-S y JS-NEO-A60 para medir los rasgos de personalidad según el Modelo de Cinco Factores (FFM; neuroticismo, extraversión, apertura a la experiencia, amabilidad y responsabilidad). En el primer estudio, se realizaron análisis factoriales confirmatorios, comparando diferentes modelos que pudieran dar cuenta de la estructura de los síntomas evaluados. Posteriormente, se realizaron análisis de regresión para explorar las asociaciones entre los factores resultantes, las dimensiones de personalidad y el GFP. Para el segundo estudio, se realizó un análisis de vías *cross-lagged* para observar los efectos de diferentes modelos de asociación hipotetizados, incluyendo tres ocasiones de medición para neuroticismo, extraversión, amabilidad y responsabilidad; y tres oleadas de problemas de internalización, externalización e hiperactividad/problemas de atención, además de p. Finalmente, para el tercer estudio, se realizaron modelos de curva de crecimiento latente, con el fin de examinar las diferencias individuales en las trayectorias de los rasgos de personalidad y sus vínculos con diferentes síntomas y factores psicopatológicos.

En el primer estudio, los análisis factoriales confirmatorios mostraron que un modelo bifactorial de psicopatología, que incluía p y factores específicos de internalización, externalización e hiperactividad/problemas de atención, se ajustaba mejor a los datos que otros modelos. Las principales asociaciones encontradas en los análisis de regresión fueron: neuroticismo e introversión con el factor internalizante; baja amabilidad con el factor externalizante; baja responsabilidad con hiperactividad y problemas de atención; alto neuroticismo, baja responsabilidad y baja amabilidad con el factor p. El GFP y p mostraron estar sustancialmente relacionados. Por otra parte, la estructura factorial del modelo de cinco

factores (Estudios 2 y 3) y la estructura bifactorial de la psicopatología (Estudio 2) se mantuvieron estables a lo largo del tiempo. Adicionalmente, los modelos explorados en el segundo estudio (i.e., Cinco Grandes Factores y el GFP) indicaron que existen asociaciones bidireccionales entre los factores de personalidad y psicopatología, ya que se hallaron efectos (mayormente) de continuidad, patoplastia y complicación/cicatriz. Por otra parte, los resultados del tercer estudio reflejaron una tendencia ligeramente decreciente para el neuroticismo y la responsabilidad, así como un ligero aumento en la amabilidad. El punto de inicio y el cambio en la personalidad no correlacionaron entre sí, emergiendo como predictores independientes para los factores de psicopatología y las 12 escalas de síntomas incluidos en los análisis. Asimismo, las diferencias individuales en el punto de inicio y cambio en el tiempo de los rasgos de personalidad predijeron la psicopatología posterior, destacándose el neuroticismo (inestabilidad emocional) como el principal predictor de distintos tipos de problemas de salud mental. De acuerdo con nuestros hallazgos, el modelo bifactorial parece representar adecuadamente la estructura de la psicopatología en la adolescencia. Dicha estructura fue apoyada por asociaciones diferenciales de rasgos de personalidad con cada factor. Las asociaciones halladas se observaron tanto transversal como longitudinalmente. Esto refuerza la importancia de considerar estos parámetros en futuros estudios y como factores de riesgo o de protección a la hora de desarrollar programas de prevención y tratamiento para problemas de salud mental.

En conjunto, los tres estudios dan cuenta de la estrecha relación entre los rasgos de personalidad y la psicopatología. En cuanto a los factores generales de los constructos estudiados, el GFP parece representar tendencias más adaptativas, alta estabilidad emocional, habilidades sociales e incluso inteligencia emocional, mientras que p puede entenderse como un indicador de vulnerabilidad a distintos problemas de salud mental, emotividad negativa, alta comorbilidad y se relacionaría con pronósticos de tratamiento más desfavorables. En este

sentido, las puntuaciones altas en ambos factores pueden considerarse como extremos de un mismo espectro.

GENERAL INTRODUCTION

The present thesis is framed within the Doctoral Studies in Psychology of the Universitat Jaume I (Spain) and is the result of efforts made to contribute to an actively growing knowledge field in which the complex constructs of personality and psychopathology intersect. Although this field is constantly expanding, our knowledge still lacks some answers and continues to pose more questions about such associations and the mechanisms underlying them.

The general objective of this work was to study associations between personality traits and psychopathological symptoms in adolescents. To study these connections, an exhaustive bibliographic review was carried out in relation to these variables and three empirical studies (one cross-sectional, two longitudinal) were carried out in a population of adolescents, who were assessed between 2015 and 2019.

The importance of this work lies in its relevance and its contribution to a field characterized by recent discussions on taxonomy, theoretical models, and the genesis of these processes. Furthermore, studying these processes may lead to important clinical advances that can help to develop protocols for the detection, prevention and treatment of mental health problems in this population, which is considered most vulnerable.

This work is arranged as follows: Chapter 1 is a general section that offers a review of scientific literature antecedents involving the main variables studied in this thesis. Chapter 2 sets the overall and specific objectives for the following studies, along with the hypotheses for each one. Chapters 3, 4, and 5 present the three empirical studies that make up this thesis, which respectively detail the methodology followed in the different research works, the performed analysis and the obtained results. Chapter 6 offers a general discussion about the results by linking them altogether and with the existing scientific literature. This chapter also includes one section that discusses possible clinical implications and another section about some limitations

of the present work and, consequently, suggests future research lines. Lastly, Chapter 7 briefly summarizes the main conclusions reached by this thesis.

CHAPTER 1

THEORETICAL BACKGROUND

Psychopathology

Mental disorders have a strong impact on society because of their high social, economic and health costs (Layard, 2012; Trautmann et al., 2016). Direct costs are often associated with the "visible costs" inside the healthcare system, such as diagnosis and treatment, while indirect costs refer to income losses due to mortality, disability and lost production owing to, for instance, absence from work or early retirement (Trautmann, et al 2016). With youngsters, psychological disorders are one of the major causes of disability for those aged between 10-19 years (WHO, 2012). Moreover, suffering from mental health problems has major effects on children and adolescents' development, and tends to be associated with several other health and social problems (WHO, 2012). These may include difficulties in social and academic functioning, such as dropping out of school early (Melkevik, et al., 2016; Seiffge-Krenke, 2017), overall poor quality of life (Atilola, et al., 2018) and disorders developing later in adulthood (Navarro & García-Villamisar, 2014).

In disability-adjusted life years (DALYs) terms, mental and substance use disorders emerge globally as the leading cause of disability in youths (Erskine et al., 2015). This is a measure of overall disease burden, expressed as the number of years lost due to ill health, disability or early death. Recently, Erskine and colleagues (2015) found that these diagnoses ranked 6th from 55.5 million DALYs (5.7%), attributable to mainly depressive, anxiety, conduct and substance use disorders. The number of DALYs (in thousands) reported in their study are displayed in Figure 1.

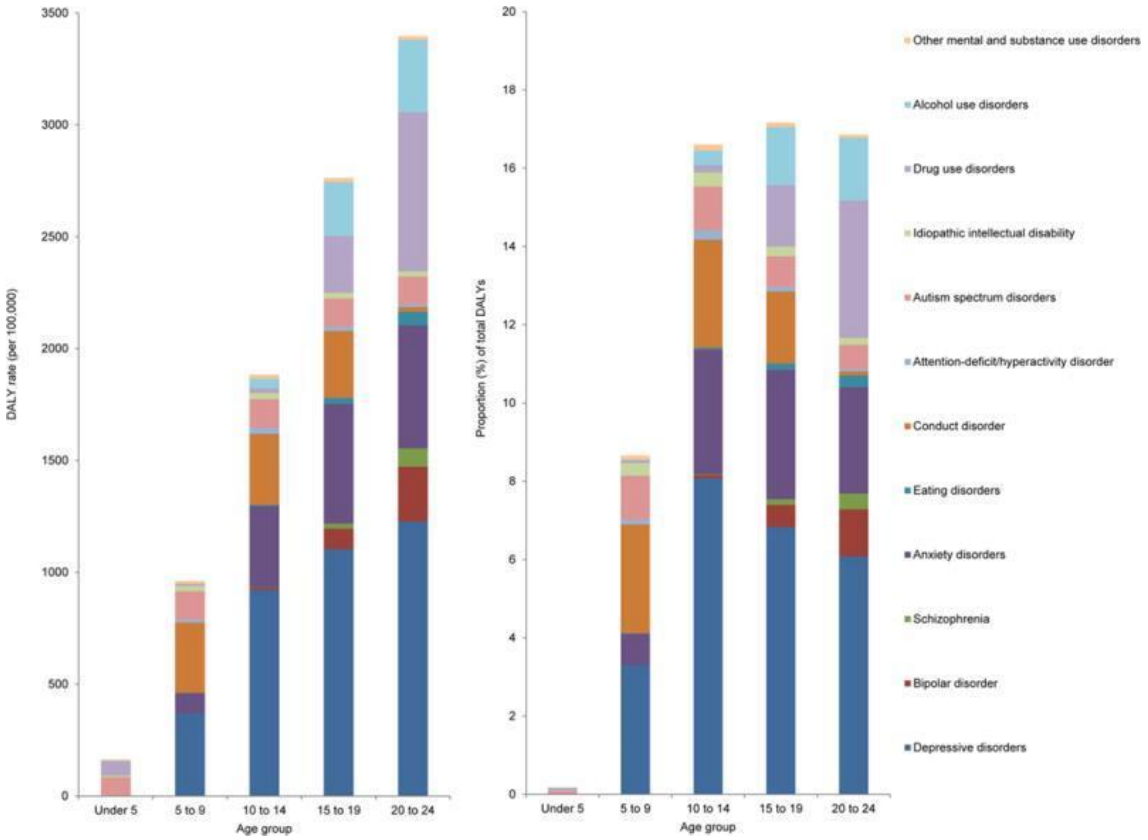

Figure 1. Disability-adjusted life year rates (per 100000) and proportions (%) for mental and substance use disorders across childhood and adolescence (Erskine et al., 2015).

Since the creation of specified diagnostic criteria for mental disorders back in the 1970s, the number of large-scale mental health surveys has grown and provided several population estimates of their prevalence (Steel et al., 2014). Furthermore, empirical evidence suggests that mental illness needs to be considered a major public health problem because around 50% of the population in middle- and high-income countries will present one mental disorder or more during their life span (Trautmann et al., 2016). A systematic review on this issue calculated pooled prevalence estimates from surveys across 63 countries, and showed that between 25% and 32% of respondents had experienced a common mental disorder at some point in their life span. As for regional variations, the authors suggested that common mental disorders are highly and globally prevalent, with English-speaking countries displaying the highest life span prevalence estimates (Steel et al., 2014).

In the same study, Steel et al. (2014) also found consistent gender effects with women showing higher rates for mood (7%) and anxiety (8%) disorders, and men with higher rates for substance use disorders (2-7%). A more recent study also pointed out a high prevalence of some disorders for men, such as autism or substance use, while other symptoms, such as depression and anxiety, to be more frequent in women (Hartung & Lefler, 2019). Consistently, other studies have revealed that females normally report greater predisposition to internalizing problems (Carragher et al 2016; Hengartner, 2018; Wichstrøm, 1999), while males tend to report higher mean levels of externalizing disorders (Carragher et al 2016). Nevertheless, gender differences do not seem to be significant for the liability of thought disorders and general psychopathology (Carragher et al 2016).

Different hypotheses aim to explain these tendencies. On the one hand, sampling bias can lead to differential gender prevalence rates as a result of the low inclusion levels of men or women (Arnett et al., 2015; Hartung & Lefler, 2019). Besides, it would seem that when research is conducted in clinical samples, the gender prevalence rate is usually exaggerated compared to community ones, particularly as for those disorders that differentially impact more men or women (Hartung & Lefler, 2019). On the other hand, another hypothesis suggests that gender differences as rates may be based on actual differences between men and women. For instance, for some disorders like autism spectrum disorder, biological sex accounts for the differential ratio (Werling & Geschwind, 2013), while for other disorders like eating disorders, differences might be significantly impacted by social and cultural factors (Keel & Forney, 2013; Hartung & Lefler, 2019). Considering this cultural influence on psychopathology, it has been suggested that girls rather than boys might be socialized to become more affected by interpersonal concerns (Morris et al., 2007).

Psychopathology in Youths

Although adolescence has traditionally been considered a period of intense conflict, this negative vision has been more recently turned into a more complex conceptualization after

considering not only its vulnerability aspects, but also growth and flexibility aspects (Arnett, 1999; Hollenstein & Lougheed, 2013). Puberty, a period characterized by important biological, psychological and social changes, starts with greater sensitivity to social experiences (Schriber & Guyer, 2016), but also substantial improvements in cognitive abilities (Crone & Dahl, 2012). In adolescence, tendencies toward risk-taking and sensation-seeking increase, accompanied by marked sensitivity to social evaluation, and all these characteristics may contribute to negative health consequences, such as problematic substance use, accidents, aggressive behavior, and even suicide attempts (Crone & Dahl, 2012). This vulnerability can be attributed, in part, to the maturational changes that occur in the brain circuits responsible for the response to stress and adversity (Schriber & Guyer, 2016). Although many of these symptoms and disorders are limited to teenage years and disappear closer to the age of 20, other mental health problems in adolescence often precede mental disorders in young adulthood (Patton et al., 2014).

Specifically in children and adolescents, anxiety-related disorders appear to be the most frequent (Merikangas et al., 2009; WHO, 2012), similarly to the adult population. Worldwide prevalence rates for children and adolescents are around 6% for anxiety disorders and 3% for depressive symptoms (Polanczyk, et al., 2015), while behavior disorders and hyperactivity-attention problems have a prevalence between 3% and 6% (Merikangas et al., 2009; Polanczyk et al., 2015). In a meta-analysis (Polanczyk et al., 2015) that included 41 studies, and was conducted in 27 countries all around the world, the authors concluded that the worldwide prevalence of mental disorders in childhood and adolescence was 13% (with significant heterogeneity for all pooled estimates), which implies that mental disorders affect a significant number of youths worldwide. Nonetheless, studies on psychopathology development in early life stages also seem to indicate that psychopathology in childhood usually appears as a non specific tangle of diffuse emotional and behavioral problems which, over time, tend to differentiate into more specific symptoms and disorders (Forbes et al., 2019). In an effort to

better understand and characterize adult psychopathology, and more recently child psychopathology, much importance has been attached to study its structure as a study field.

Structure of Psychopathology

Mental disorders do not always appear isolated. In fact research in every age group points out the existence of high comorbidity in many common mental disorders. For instance, anxiety and depression display a very high co-occurrence (Cummings et al., 2014; O'Neil et al., 2010; Ranøyen et al., 2018; Gomez et al., 2019; Assmann et al., 2018), with a 57% overlap rate for clinically referred children (Gomez et al., 2019). There is also evidence for high comorbidity between conduct and oppositional defiant disorders, with more than 60% of diagnosed conduct disorder cases meeting oppositional defiant disorder criteria (Lahey et al., 1992; Maughan, et al., 2004; Rowe et al., 2010). According to other studies, oppositional defiant symptoms seem to precede conduct disorder symptoms in about 50% of conduct disorder cases (Rowe et al., 2010). Moreover, conduct disorder is at high risk for comorbidity with substance use (OR = 5.9) and impulse-control disorders (OR = 7.7) in the general population (Nock et al., 2006). In parallel, conduct problems may co-exist with different symptoms, such as depression (McDonough-Caplan, et al., 2018) or anxiety (Lindner et al., 2018). In short, these data suggest that the commonest clinical disorders co-occur more frequently than can be expected by chance (Krueger & Markon, 2006) and these high rates of comorbidities undermine the notion of syndromes representing distinct etiologies (Kupfer et al., 2002). Consequently, the literature in the field seems to suggest this comorbidity could be due to the existence of a common underlying structure (South, et al., 2010; Krueger & Markon, 2006).

One of the first studies about the structure of psychopathology was conducted by Achenbach (1966), who performed exploratory factor analyses in a sample of 300 children aged 4–15. He found two factors (see Figure 2), the first one named "externalizing" comprised items representing conflict with the environment (i.e., antisocial and conduct disorders), while the second factor named "internalizing" represents problems within the self (i.e., mood and anxiety

disorders). These first "bottom-up" studies on the structure of psychopathology, and carried out in terms of symptoms (Achenbach, 1966; Achenbach, 1978; Achenbach & Edelbrock, 1984), preceded a large number of studies that advocate a structure of two transdiagnostic factors of internalization and externalization (with minor variations) of the most prevalent mental disorders in both adults (Carragher et al., 2015; Eaton et al., 2010; Krueger & Markon, 2006; Krueger, 1999; Mezquita et al., 2015; for a review, see Carragher et al., 2015) and youths (Achenbach, 2011; Carragher, et al, 2016; Cosgrove et al, 2011; Lahey et al., 2004; Sánchez-Sánchez et al., 2016).

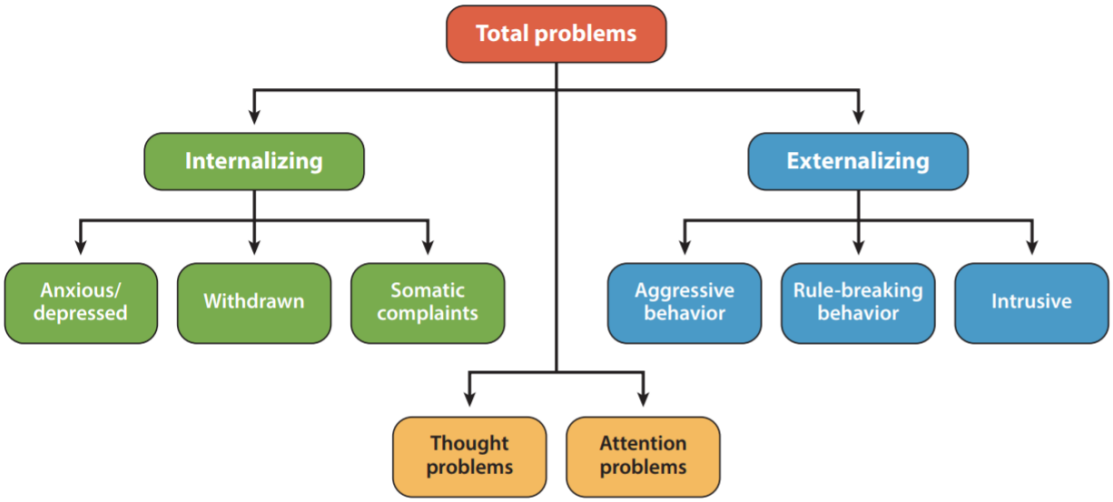

Figure 2. Hierarchy of the empirically-based structure of psychopathology, adapted from the Achenbach System of Empirically Based Assessment (ASEBA) problem scales (Achenbach, 2020).

One of these key studies on the structure of psychopathology was performed by Krueger (1999). In this research work, which was carried out with adults, the found structure of psychopathology was a structural model of two correlated factors of internalization (hierarchically branched into distress and fear) and externalization using categorical diagnostics based on DSM criteria (Krueger, 1999). This work introduced an approach to explore the structure of psychopathology in adults, from which subsequent studies derived and replicated those results. In another research work conducted with adults, Kramer et al. (2008) examined the latent structure of 11 syndromes by applying confirmatory factorial invariance models to

find the best-fitting model. The internalizing factor comprised symptoms of depression, anxiety, social phobia, bulimia, panic, agoraphobia, hypochondriasis and obsessive-compulsive disorder, while the externalizing factor comprised antisocial behavior, drug abuse and alcohol abuse. Similarly to the findings reported by Krueger (1999), later studies with adults (Cox et al., 2002; de Jonge, et al., 2018; Miller et al., 2008; Slade & Watson, 2006) also provided evidence for a model with internalizing and externalizing factors, and fear and distress as internalizing subfactors, to describe the structure of common mental disorders across different countries.

Therefore, most studies on the latent structure of common psychological disorders exhibit similar models, with some variations, because the location of less common disorders is not altogether clear. In this regard, some studies have shown that eating disorder symptoms appear to be best grouped under the internalizing factor (Forbush et al., 2017), specifically under the distress subfactor (Mitchell, et al., 2014); and posttraumatic stress disorder is loaded on an anxious/misery subfactor (Cox, et al., 2002; Miller et al., 2008). Obsession-compulsion symptoms are usually included less in these factor models, but have shown significant associations with internalizing problems (Snorrason et al., 2020). Psychotic experiences appear to be aligned with a separate distinct factor according to various studies (de Jonge et al., 2018; Kotov et al., 2011; Wright, et al., 2013), whereas manic episodes and bipolar disorders have displayed comorbidity across both distress and thought disorder domains under the internalizing factor (Keyes et al., 2013).

Additionally, the number of correlated factors increases if personality disorders are included in these models. Thus four-factor models have emerged that integrate symptoms from Axis I and II disorders from the DSM rubrics within a common framework. They show a distinction between internalizing and externalizing disorders, and also the factors characterized by anhedonic introversion and cognitive-relational disturbance (Røysamb, et al., 2011), or by thought disorder and pathological introversion (Markon, 2010).

Different studies have extended these models of correlated factors to children and adolescent populations (Doyle et al., 2016; Forbush et al., 2010; Lahey et al., 2004; Verona et al., 2011; Watts et al., 2019), and evidence both internalizing and externalizing spectra, with some variations due to the symptom scales included in each one. Some studies show that anxiety symptoms form part of the same syndrome, such as depression, while separation anxiety, fear and compulsions constitute a separate dimension, additionally to disruptive behaviors (Lahey et al., 2004). The effectiveness of a three-factor model constituted by fear, distress and externalizing factors in children and adolescents has been found (Doyle et al., 2016). In a more recent study carried out with youths, support is for a correlated factors model comprising the internalizing subfactors of distress (generalized anxiety and major depression) and fears (agoraphobia, obsessive compulsive disorder, panic, separation anxiety, social anxiety and specific phobia) and an externalizing factor (conduct disorder, hyperactivity, impulsivity, inattention and oppositional defiant disorder) (Watts et al., 2019). Other studies include depression and anxiety in the same internalizing factor, an externalizing factor that comprises conduct disorder, attention deficit and oppositional defiant disorder, and a substance use factor (Verona et al., 2011). Less common disorders and symptoms in this structure are understudied, but as in adults, symptoms of eating problems load onto the internalizing factor (Forbush et al., 2010). Psychotic-like experiences have revealed no significant correlation with internalizing problems in adolescents (Maharani & Turnip, 2018), and appear to constitute a separate factor in correlated models (Carragher et al., 2016; Jones et al., 2018).

So even when different models of the structure of psychopathology have been found, the factors that systematically emerge in all empirical studies are internalizing and externalizing factors (Eaton et al., 2013; Hicks, et al., 2004; Krueger et al., 2007). This structure seems to remain stable over time (Hatoum et al., 2018), and persists across different age and gender groups, and when using symptom scales, symptom counts of psychiatric diagnostic categories or categorical diagnoses (Achenbach 2020; Mezquita et al., 2015).

Although these two spectra seem to be related to different types of mental problems, there is evidence for a substantial co-occurrence between them (Lee & Bukowski, 2012; Lee & Stone, 2012; Lilienfeld, 2003; Oland & Shaw, 2005). This evidence supports the notion of a common vulnerability factor contributing to developmentally stable covariance between internalizing–externalizing symptoms (Willner, et al., 2016). Therefore, in addition to traditional internalizing and externalizing factors, a growing body of contemporary research suggests that the psychopathology structure can be better accounted for by a bifactor model, in which a common general factor, along with other factors (i.e., internalizing, externalizing, etc.), emerges (Caspi et al., 2014, Lahey et al., 2012). Lahey et al. (2012) have noted shared variance between psychopathology suprafactors, and they empirically tested the viability of a general factor of psychopathology to give way to bifactor models of the structure of psychopathology. They tested a model by specifying correlated externalizing, distress and fear factors along with a general factor to capture what these disorders have in common in a sample of adults. This general factor accounted for independent variance regarding future psychopathology. In a later study, Caspi and colleagues (2014) examined the higher-order structure of psychopathology using longitudinal data from adolescents to middle-age adults to show this general dimension, called the p factor, which is similar to the known *g* factor of intelligence (Caspi et al., 2014). In that study and subsequent ones that replicated their results, this p factor arose by overarching the classic internalizing and externalizing factors in adult populations (Caspi et al., 2014, Greene & Eaton, 2017; Lahey et al., 2012; Lahey et al., 2018; Niarchou et al., 2017), but also in children (Martel et al., 2017; Olino et al., 2018; Pettersson et al., 2018) and adolescents (Carragher et al., 2016; Castellanos-Ryan et al., 2016; Gomez et al., 2019; Laceulle et al., 2015; Lahey et al., 2015; McElroy et al., 2018; Murray et al., 2018; Niarchou et al., 2017; Tackett et al., 2013). Although these studies repeatedly show a good model fit, including the internalizing and externalizing factors along with a p factor, other broad factors tend to emerge in the few studies that have included symptoms of psychotic-like experiences (Afzali et al., 2017;

Carragher et al., 2016; Haltigan et al., 2018; Niarchou et al., 2017; Sunderland et al., 2020) and ADHD problems (Haltigan et al., 2018; Mann et al., 2020; Murray et al., 2018; Niarchou et al., 2017), which have shown a good fit as separate factors.

Regarding the composition of this p factor, evidence suggests that the child/adolescent general factor tends to display a stronger component of externalizing problems *versus* adults due to not only developmental differences, but also differences in instruments and sources across studies (Levin-Aspenson et al., 2020). In children, this p factor composition varies across studies and development stages. While some studies indicate that it is predominantly characterized by internalizing (Lahey et al., 2015; Olino et al., 2018), others suggest that it is defined by general dysphoria (McElroy et al., 2018) and has substantial contributions of externalizing and autism spectra (Martel et al., 2017; McElroy et al., 2018; Pettersson et al., 2018). Although most studies show a good fit for the models that include the p factor, as explained by Levin-Aspenson et al. (2020), the composition of this general factor in adolescence is even less consistent across studies, and might be due to relevant differences in assessed content. In some studies with adolescent samples, the internalizing dimension marks the p factor, with contributions from externalizing (McElroy et al., 2018; Tackett et al., 2013) and thought disorder (Laceulle et al., 2015), but in other studies it is defined primarily by externalizing (Castellanos-Ryan et al., 2016; Murray et al., 2016) or non specific dysphoria (Patalay et al., 2015). Thus several studies indicate that the structure of youths' common psychopathology is well characterized by a model including a general psychopathology factor, as well as specific internalizing and externalizing factors (see Figure 3), which seems to also fit data from clinical samples of children and adolescents (Gomez et al., 2019).

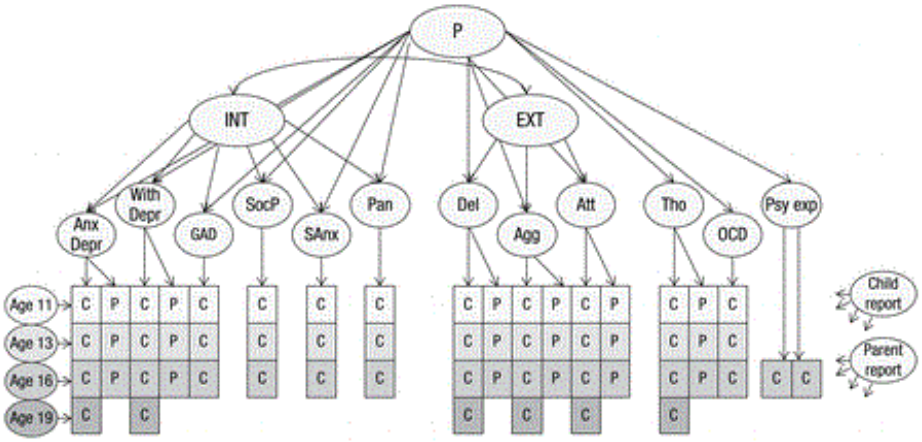

Figure 3. General Factor of Psychopathology, retrieved from Laceulle et al., 2015.

Several studies have offered explanations about the theoretical and practical implications of the p factor. The p factor appears to capture the individual's general liability to mental disorders (Caspi et al., 2014), which reflects non specific the etiological processes and biopsychological mechanisms underlying several forms of psychopathology (Böhnke & Croudace, 2015), but no simple methodological artifact (Lahey et al., 2015; Levin-Aspenson et al., 2020; Tackett et al., 2013). Behavior genetics appear to incur a risk to this general factor of psychopathology (Allegrini et al., 2020; Rosenström, et al 2019; Waldman et al., 2016). However, no clear consensus has been reached and debate continues about what a general factor of psychopathology represents, with authors arguing that it is only a non specific dysfunction following different problems with distinct etiologies (Widiger & Oltmanns, 2017) or a mere statistical summary of covariance among symptoms (Murray et al., 2016).

Briefly, empirical evidence indicates the existence of a bifactor model of psychopathology (see Figure 4) in which a general factor of psychopathology emerges. This p factor reflects the general vulnerability to psychopathology in children (Lahey et al. 2015; Martel et al., 2017; McElroy et al., 2018; Olino et al., 2018; Pettersson et al., 2018; Tackett et al. 2013), adolescents (Castellanos-Ryan et al., 2016; Carragher et al., 2016; Gomez et al., 2019; Laceulle et al., 2015; Lahey et al., 2015; McElroy et al., 2018; Murray et al., 2016; Niarchou et

al., 2017; Patalay et al. 2015; Tackett et al., 2013) and adults (Caspi et al., 2014, Greene & Eaton, 2017; Lahey et al., 2012; Lahey et al., 2018) to support the notion of a certain continuity of psychopathology across the life span (Carragher et al., 2016). In fact, this bifactor structure appears to remain stable over time and to describe temporal changes in general psychopathology (Gluschkoff et al., 2019; Olino et al., 2018). Furthermore, other studies in adolescents have found longitudinal associations between externalizing and internalizing problems that might be due to continuity processes in underlying general psychopathology (Snyder et al., 2017).

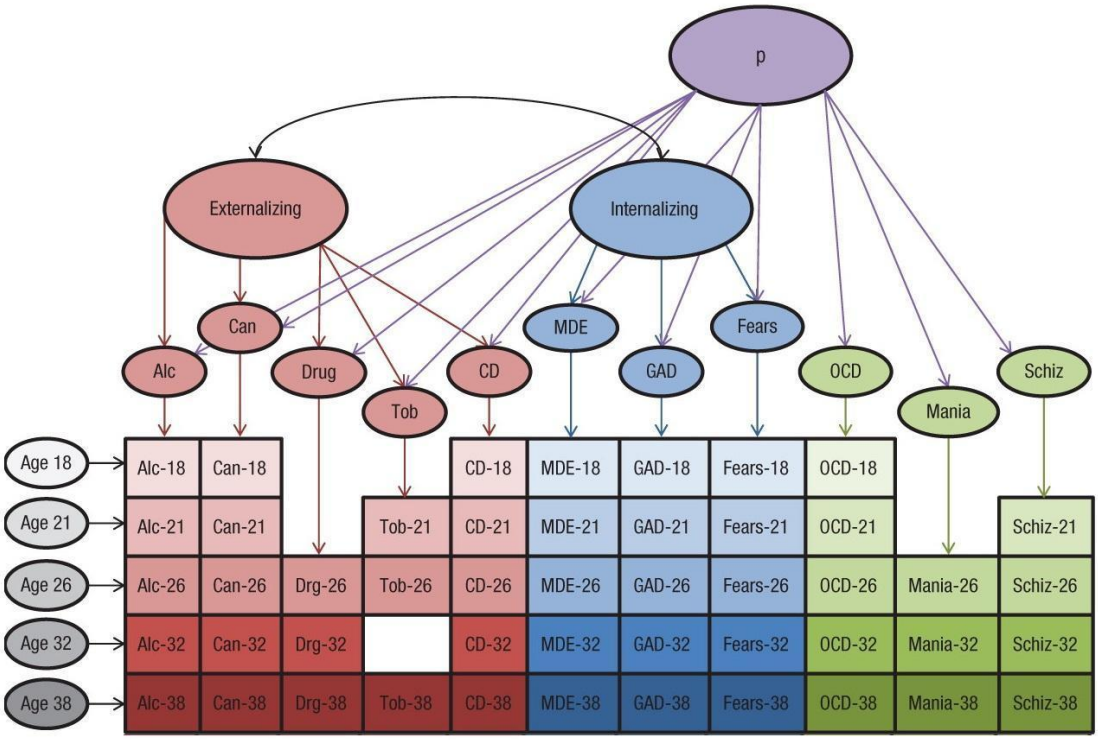

Figure 4. Bifactor model of psychopathology, retrieved from Caspi et al. (2014).

More recently, this empirical evidence that supports dimensionality (i.e., distribution of symptoms along a continuum vs. strict categories of disorders) and the structure of psychopathology (e.g., bifactor model of psychopathology) has influenced the taxonomic organization of psychopathology. In line with this, Kotov et al. (2017) proposed a Hierarchical Taxonomy of Psychopathology (HiTOP; for a review, see Conway et al., 2019; Krueger et al., 2018), in which they presented a hierarchical and dimensional model to organize

psychopathological symptoms. This approach aimed to portray the co-occurrence of the commonest disorders, the existing heterogeneity within disorders, and frequent diagnostic instability (Kotov et al., 2018). It is presented as a contraposition of a more authoritative nosology, reflected in official psychiatric manuals that usually organize disorders into strictly separated categories from a set of pre-assumed theoretical rubrics (Krueger et al, 2018). The HiTOP emerges as a phenotypic model with five levels that combines symptoms, signs and maladaptive behaviors in components and maladaptive traits which are, in turn, combined into dimensional syndromes, and then into subfactors, broader factors or spectra, and finally a superspectra or general (p) factor of psychopathology (Kotov, et al, 2018). Hence spectra (e.g., internalizing) constitute the most basic separable factors beyond a general predisposition to psychopathology (Brandes & Tackett, 2019; Kotov et al., 2017). The HiTOP model is displayed in Figure 5.

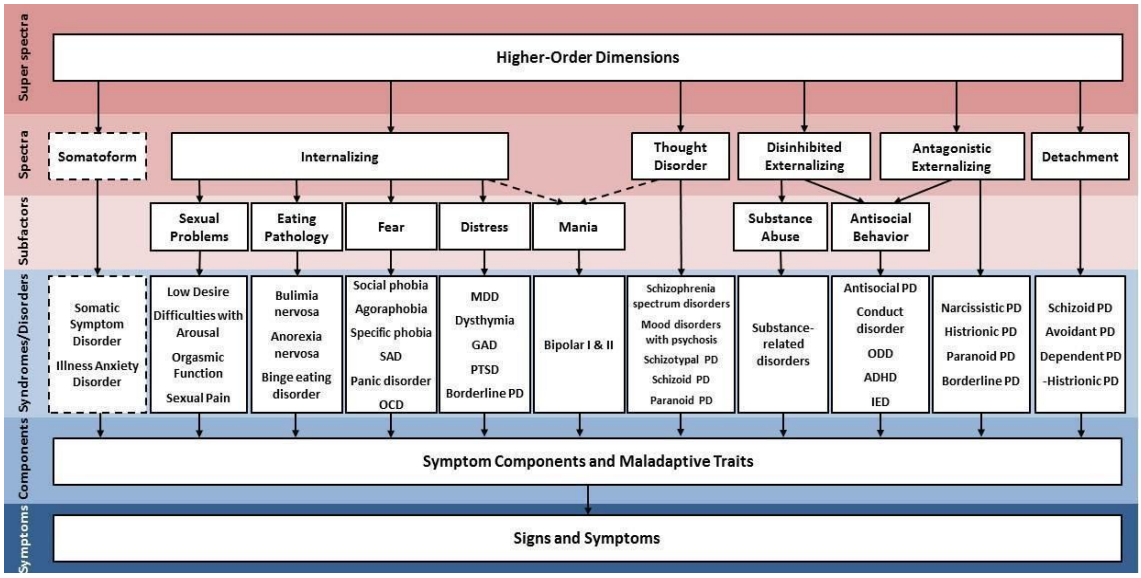

Figure 5. HiTOP Model, retrieved from Kotov et al., 2017.

Later other authors (Forbes et al., 2019) have simplified HiTOP by including only the most prevalent disorders that emerge throughout development (see Figure 6). Forbes et al. (2019) reviewed empirical evidence for the existence of a general factor of psychopathology

and theories about its nature. These authors suggested that reducing general psychopathology early in the life course might provide opportunities to prevent different forms of later psychopathology from developing. By focusing on common shared risks, this model provides a systematic structure for early intervention across development, and increases intervention efficiency by leveraging the emergence of general psychopathology in childhood.

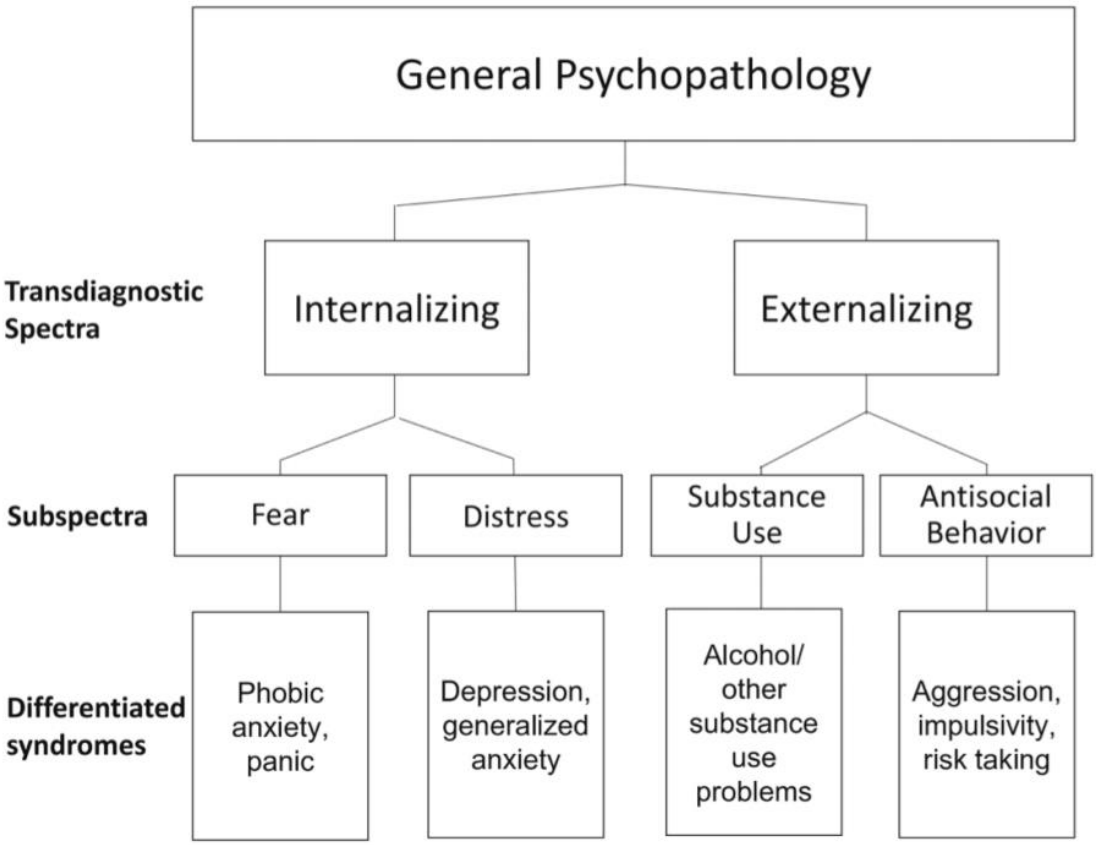

Figure 6. Adaptation of the HiTOP model (Forbes et al., 2019).

It is noteworthy that even when many empirical results have accumulated on the adequacy of a bifactor model, the HiTOP model is hierarchical. The hierarchical organization has been chosen rather than a bifactor one for different reasons. As different studies point out, the bifactor model raises questions about its interpretability. It appears to fit slightly better than other models (Bonifay et al., 2017) because of its flexibility because it can exhibit a good fit even if the pattern of loadings does not represent a bifactor structure (Bornovalova et al., 2020).

Therefore, classic fit indices have been biased in favor of a bifactor model, which indicates that this overfitting might not be reliable (Greene et al., 2019). This superior performance could mean that not only important data trends are being modeled, but also unwanted noise is being captured (Bonifay et al., 2017). Furthermore, these small differences in models' fit are not as relevant as construct validity (Watts et al., 2019). For these reasons, it is important to bear in mind the exact aim when considering a bifactor model approach. One may use the model as a way to study a scale's psychometric characteristics to theoretically inform distinct constructs and a general factor, but using the bifactor model to represent the general and group factor structure of psychopathology is a very different matter (Bonifay et al., 2017). Thus researchers should be cautious, carefully investigate these issues and resist placing an overemphasis on good fit before establishing the bifactor model as a foundational structure in the field (Bonifay et al., 2017).

In parallel a recent work by Smith et al. (2020) reviewed the existing empirical evidence for the stability and criterion validity of the p factor, and discussed its associations with the general factors of personality and personality disorders. These authors posited that the general interpretations of this factor fail to explain the full range of typically included psychopathological symptoms, and that p probably represents an impairment index that might inform about the duration and intensity of individuals' treatments (Smith, et al., 2020). Despite these critics, some authors posit that bifactor models are useful when properly applied and interpreted (Bornovalova et al., 2020). For instance, they might answer important research questions because these models allow the separation of general variance from unique variance, and have been useful in reliability analysis from multifaceted inventories, and to guide interpretations of total *versus* subtest scores (Bornovalova et al., 2020).

It is noteworthy that the HiTOP model is a recent taxonomy proposed by previous empirical studies, but needs further research. The HiTOP model has not been empirically obtained, but constructed from interpreting the results of different empirical works in which the

structure of psychopathology has been studied from a limited group of symptoms (Achenbach, 2020). Thus, changes in the structure may very likely occur depending on the amount and heterogeneity of symptoms that each researcher chooses to analyze. Despite the fact that HiTOP is a good tool to move from categorical classifications to an approximation to the dimensionality of psychopathology, discussion is not closed. Overall, this hierarchical approach is technically a different type of statistical model as the p factor in both models is related to all symptoms/disorders, and the implications for both models are not that different (Forbes et al., 2019).

Lastly on the recent taxonomical discussions in the field, although the overall structure of psychopathology is well-established when conduct-related disorders, anxiety and depression are included, the location of attention deficit and hyperactivity disorder (ADHD) in the structure is less clear. No consensus on this matter has been reached, with mixed evidence as to whether these problems should be considered part of the externalizing or internalizing dimension (Snyder et al., 2017). Most studies tend to consider ADHD or inattention and hyperactivity-impulsivity symptoms in the externalizing factor (Carragher et al., 2014; Cosgrove et al., 2011; Laceulle et al., 2015; Tackett et al., 2013). However, ADHD symptoms usually present the lowest factor loadings in such studies (Lahey et al., 2017; Snyder et al., 2017), or they even show negative factor loadings on the externalizing factor (see Figure 7) when testing bifactor models (Castellanos-Ryan et al., 2016). ADHD symptoms have also been associated with internalizing problems (Greenbaum & Dedrick, 1998; Sellbom, et al., 2020), and some studies have proposed as being a separate factor from internalizing and externalizing spectra (Achenbach et al., 2001; Mann et al., 2020; Sánchez-Sánchez et al, 2016; Sellbom et al., 2020; Snyder et al., 2017). These data generally suggest that the location of ADHD symptoms in the structure of psychopathology needs to be further examined.

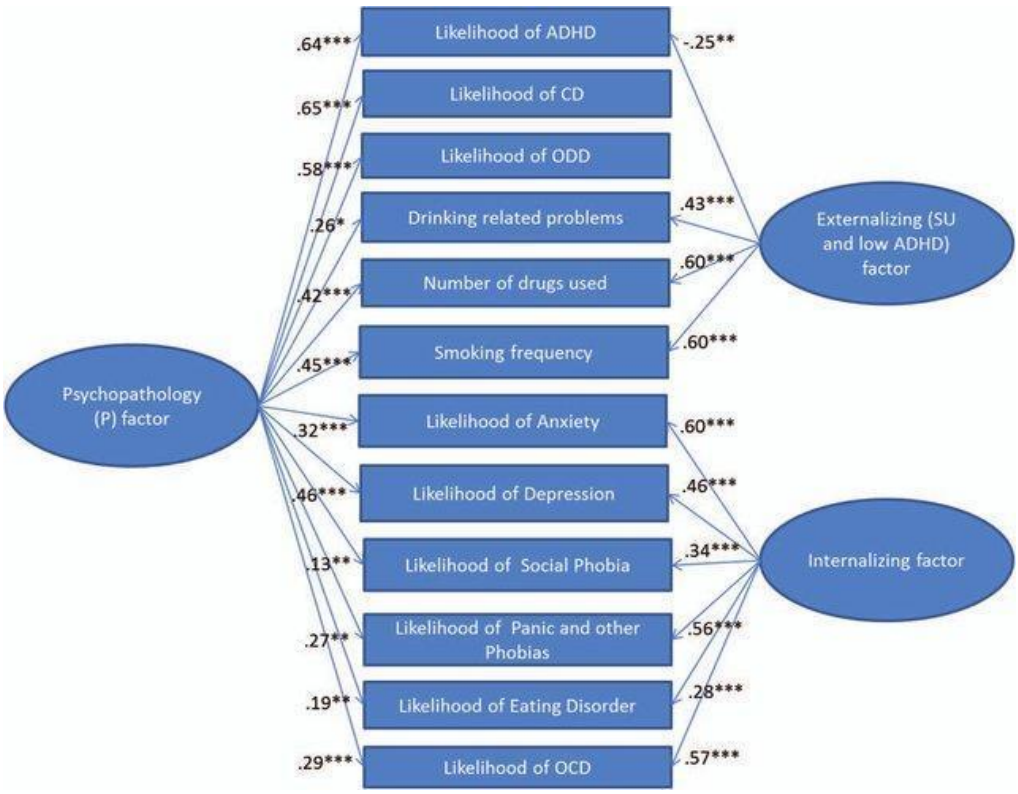

Figure 7. Bifactor model of psychopathology in adolescents, retrieved from Castellanos-Ryan et al. (2016).

Overall, studies on internalization and externalization factors, and on p, have contributed to change the psychopathology conception from mental disorders as discrete and specific entities to a more dimensional and non specific perspective. Despite these findings, and the robustness of a dimensional approach vs. a categorical approach to the psychopathology conceptualization, there are still gaps in the number of syndromes, factors and spectra that should be included in the newest psychopathology taxonomies. This has led to more researchers starting to defend the value of transdiagnostic interventions (Forbes et al., 2019; Gluschkoff et al., 2019). More importance has recently been attached to evidence for the continuous *versus* discrete nature of psychopathological constructs (Krueger et al., 2018). Yet despite these findings, no consensus has been reached about which and how many dimensions should be considered. In line with this, genetic studies have contributed some clarity to discussion. Evidence from genetic informative studies can help to clarify the nature and etiology of these

factors, and can then provide a better understanding and organization of the structure of psychopathology.

Genetic and Environmental Etiological Influences

In recent decades, behavior genetics has gained importance in the study of psychological variables after highlighting the importance of genetic influences to explain personality characteristics and psychopathology (Knopik et al., 2017; Turkheimer, 2000). This field includes different methodological designs, such as adoption and twin studies (Knopik et al., 2017). These strategies are known as quantitative genetics and aim to describe the importance of the environmental and genetic influences for traits, phenotypes and disorders. These pieces of evidence allow us to analyze to what extent variation in a given phenotype (i.e., trait or symptom) is influenced by genetic (i.e., heritability) and environmental factors.

Classic twin studies use the differences between monozygotic and dizygotic twins to break down variance into genetic and environmental factors. These components of variance are: additive genetic influences, non-additive genetic influences (i.e., genetic dominance and epistasis), shared environment and non-shared environment (Neale & Cardon, 1992; Verweij et al., 2012). These studies are a valuable source of information on the genetic basis of complex variables, and twin registers constitute an excellent resource for assessing genetic variation in susceptibility to disease and genotype-environment interactions (Boomsma et al., 2002). In relation to this matter, behavioral traits seem to be heritable to a greater or lesser extent (Chabris et al., 2015; Turkheimer, 2000). With the most prevalent mental disorders in childhood and adolescence, individual differences are usually explained by genetics and a non-shared environment, rather than by a shared environment (Knopik et al., 2017).

Behavior genetics has supported the structure of psychopathology in adults (Hicks et al., 2004; Kendler et al., 2003; Rosenström et al., 2019), and youths (Cosgrove et al., 2011; Gjone & Stevenson, 1997; Lahey et al., 2011; Marceau & Neiderhiser, 2020; Waldman et al., 2016; Waszczuk et al., 2020; Young et al., 2000). For instance, the findings of Young et al.

(2000) indicated that a variety of adolescent problem behaviors share a common underlying genetic risk. This was the first twin analysis to examine the factors underlying ADHD, conduct disorder, and substance use. They concluded that a broad overarching these symptoms is highly heritable and is not influenced significantly by shared environmental factors. However, a residual correlation between conduct disorder and substance experimentation has been explained by shared environmental effects. The covariance between internalizing and externalizing spectra seems to be accounted for mainly by shared environmental influences in young children (Gjone & Stevenson, 1997). In later twin studies in adolescents (Cosgrove et al., 2011; Marceau & Neiderhiser, 2020), support was found for a model that posited latent factors of internalizing and externalizing symptoms to explain interrelationships among psychiatric disorders. These factors, and especially the severity of problems, proved to be heritable and influenced significantly by genetics, followed by shared and non shared environmental influences.

In more recent years, twin studies have begun to study and support a structure of psychopathology, including a general factor of psychopathology, apart from classic broad internalizing and externalizing factors. Lahey et al. (2011) worked with 1571 pairs of twins (9-17 years of age), and showed that the best-fitting genetic model was composed of three genetic factors: internalizing (with the highest factor loadings of agoraphobia and obsessive-compulsive disorder), externalizing (with the highest factor loadings of conduct disorder and oppositional defiant disorder) and a general factor of psychopathology (all disorders showed significant and salient factor loadings). This study supported the genetic influence underlying the bifactor structure of psychopathology in children and adolescents, with only a minor influence of sharing environmental influences on psychopathology factors. That is, it supported the “generalist genes, specialist environments" model, which implies that prevalent child and adolescent psychopathology dimensions mostly share their genetic liabilities, but are differentiated by non shared experiences. However, evidence across twin studies is mixed, with

support also for “specialist genes” (Marceau & Neiderhiser, 2020). Regarding structure of psychopathology findings, similar results to those reported by Lahey et al. (2011) have been found in more recent studies conducted with adolescents. These studies suggest a stable genetic factor to represent common liability, and to account for the co-occurrence between different symptoms (Waszczuk et al., 2020). Moreover, this general factor and specific externalizing and internalizing dimensions characterize youth psychopathology at both the phenotypic and etiologic levels (Waldman et al., 2016). Genetic influences apparently to constitute this common liability over time, with minor and specific environmental influences (Waldman et al., 2016.; Waszczuk et al., 2020), and such heritability suggests that the p factor emerges as a valid construct, and not merely as an artifact of measurement error (Waldman et al., 2016). Similarly, studies with twin adults (Rosenström et al., 2019) reveal a joint structure of disorders, and normal and pathological personality traits, including a general risk factor, internalizing problems and traits, and externalizing problems and traits with high heritability estimates, but no significant effects for a shared environment.

Overall, as presented in this section, heritability studies have helped to better understand the etiology of the structure of psychopathology. They consistently suggest that genetic factors generally confer vulnerability to different broad factors and specific dimensions of psychopathology, which would mean that the comorbidity or co-occurrence of psychopathology would be explained mostly by common genetic factors. While twin studies have been fundamental to understand the nature of the structure of psychopathology, advances in evaluating psychopathology have been fundamental for a transition from categorical diagnostic systems (e.g., DSM) to more dimensional approaches (e.g., HiTOP) to start and, consequently, reflect the continuous nature of psychopathology, as suggested in biological studies.

Psychopathology Assessment

Throughout the 20th century and in more recent years, the most widely used manual to diagnose psychopathology has been the Diagnostic and Statistical Manual of Mental Disorders (DSM). However, the current DSM version (DSM-5; APA, 2013) faces critics for not considering the latest advances in neuroscience and behavioral science (Cuthbert, 2014). Research suggests that even though there are significant associations between DSM diagnoses and scores of empirical-based scales, the DSM criteria for diagnosis differ from these scales, mainly because they vary according to different factors like the training evaluator, procedure, data sources and age (Achenbach et al., 2001). Both the DSM and the International Statistical Classification of Diseases and Related Health Problems (ICD), with an 11th version (ICD-11; World Health Organization, 2019), systems have become the *de facto* standard for submitting studies and grant applications, partly due to conservative review processes that tend to exclude deviations from these orthodox frameworks. This success has, thus, become a barrier because groundbreaking nosological approaches cannot be developed as long as research is conducted only within the constraints of ICD/DSM categories (Cuthbert, 2014).

In an attempt to solve this problem and recognize the need for a more dimensional approach, the third section of the DSM-5 proposes some scales to dimensionally evaluate symptoms, and emphasizes their usefulness for improving the clinical decision-making process, to better understand the mental disorders context and to stimulate future research. This third manual section includes dimensional measures on the severity or frequency of 13 groups of symptoms (depression, anger, mania, anxiety, somatic symptoms, suicidal ideation, psychosis, sleep disturbances, memory, repetitive thoughts and behaviors, dissociation, personality functioning, drug use). However, these scales cover only a few symptoms, and lack different populations. So it is still necessary to provide validity and reliability evidence for its scores. Therefore, currently the usefulness of the DSM-5 continues to be relegated to diagnostic criteria for categorical diagnoses and as a descriptive dictionary on psychopathology (Echeburúa et al., 2014). Moreover, as indicated, there is still no instrument that systematically evaluates all the

symptoms included in the HiTOP model. This project, which is being constructed by the consortium (Krueger et al., 2018), will have to undergo validation and adaptation processes for each age group. Meanwhile, the HiTOP consortium lists a series of "Friendly measures" that are considered to be consistent with the HiTOP model (https://hitop.unt.edu/clinical-tools/hitop-friendly-measures), among which we find the Achenbach System of Empirically Based Assessment (ASEBA; Achenbach, 2009).

Regarding youth's psychopathology, two of the most known empirically based instruments worldwide are the Child Behavior Checklist for Ages 6-18 (CBCL/6-18 REF) and the Youth Self-Report (YSR; Achenbach et al., 2001). The CBCL is a widely used assessment tool that consists in a caregiver report of children's behavioral and emotional characteristics and has been translated into several languages to be used in different cultures (Nalipay et al., 2019). The YSR is a self-report instrument designed to obtain systematized information directly from children and adolescents (aged between 11 and 18 years) on various skills and behavior problems. It follows a similar format to the CBCL. Apart from problem items, both instruments, which form part of the ASEBA system, include items that assess competencies, adaptive functioning and personal strengths (Achenbach, 2020), and have been widely used in clinical practice and research. Despite the ASEBA system being internationally acknowledged, access to the assessment tools for the different age groups in its Spanish version is not easy, and the vast majority of materials are not translated into Spanish, which hinders their use in clinical practice. In addition, there are only published norms for the CBCL questionnaire (Unitat d'Epidemiologia i de Diagnòstic en Psicopatologia del Desenvolupament, 2016), but as we pointed out, the CBCL answers are reported by parents and not self-reported by children and adolescents. Although evidence suggests that self-ratings and ratings from adults on children psychopathology present high cross-informant correlations (Achenbach et al. 2005; De Los Reyes & Kazdin, 2005), there is also evidence for substantial differences between parent ratings and self-reports (Göllner et al., 2017). This is an important issue given that self-insight is

particularly relevant for internalizing problems because they are less visible to parents (Freeman et al., 2011; Rapoport et al., 2000). In an attempt to bridge all these gaps, other instruments that assess a wide range of symptoms and subfactors of symptoms have been developed in Spain, such as the Assessment System for Children and Adolescents (SENA; Fernández-Pinto, et al., 2015).

The SENA (Fernández-Pinto, et al., 2015) was developed to measure a wide range of psychological problems, along with factors of vulnerability and psychological strengths. This instrument has a wide application age range that goes from 3 to 18 years, and includes different scales and norms that vary according to age and data source (self-report, parents, teachers). Regarding the structure of psychopathology, studies that employ the adolescent SENA version have found that a three-factor correlated model better fits data than other competing models (Sánchez-Sánchez et al, 2016). In this study, the internalizing factor comprises the symptom scales of depression, anxiety, social anxiety, somatic complaints, post-traumatic symptoms, anger, attention problems and obsession-compulsion symptoms. The externalizing factor contains the scales of aggression, defiant behavior, antisocial behavior, hyperactivity and anger. The third factor, called executive functions problems, comprises attention problems and hyperactivity/impulsivity.

Although psychopathology, and its structure in relation to different variables, has been extensively studied in recent decades, there is still a great deal left to be investigated. Among these issues, one of the most studied constructs in relation to psychopathology is personality, which is closely related and bears a direct resemblance to psychopathology regarding structure (Krueger et al., 2018; 2020) as both domains appear to be hierarchically-organized (Brandes & Tackett, 2019). It has been stated that the similarity between the HiTOP model and the Five-Factor Model (FFM) of personality is not accidental, and indicates that personality forms the empirical infrastructure for developing specific symptoms (Krueger et al., 2018; 2020). Therefore, as shown by the growing literature, personality traits are considered among the most

relevant factors involved in the pathogenesis of psychopathology (for a review, see Muris & Ollendick, 2005). Therefore in the subsequent sections, existing evidence for the relation between the personality model that currently accumulates more empirical evidence, the FFM, and the structure of psychopathology, is presented.

Personality

Five-Factor Model of Personality

Ashton (2018) defines personality as people's different ways of behaving, thinking and feeling. Similarly, according to Roberts and Mroczek (2008), personality traits can be understood as relatively enduring patterns that differentiate individuals. This does not mean a person will always exhibit these same psychological characteristics, but suggests a relatively strong predisposition to present them in various situations and over a fairly long period of time (Ashton, 2018). Among the personality models available nowadays, the FFM (McCrae & Costa, 2010) has recurrently been suggested as the best fitting model to describe the personality structure (John et al., 2008; Widiger et al., 2018).

The FFM (see Figure 8) comprises traits known as neuroticism, extraversion, openness to experience, agreeableness and conscientiousness, and assumes that the basic personality dimensions among them are independent (McCrae & Costa, 2010). Neuroticism can be defined as emotional instability and is represented by the tendency to experience negative feelings, such as anxiety, irritability and depression. This trait encompasses facets of impulsiveness, self-consciousness, vulnerability anxiety, depression and hostility. Extraversion is a trait characterized by sociability, gregariousness, actively seeking stimulation and positive energy, and it refers to an individual's outer-directed interpersonal behavior. Its characteristic facets are: warmth, gregariousness, assertiveness, activity, excitement-seeking and positive emotions. Openness is characterized by creativeness, active imagination, an interest in cultural events, appreciation of life experiences, intellectual curiosity and non-traditional beliefs. Openness

encompasses facets of fantasy, esthetics, feeling, actions, ideas and values. Agreeableness is related to compassion, cooperativeness, being warm toward others and empathy, and comprises facets of trust, straightforwardness, altruism, compliance, modesty and tender-mindedness. Finally, conscientiousness reflects goal-directed behavior, organization, carefulness, achievement and self-discipline, and its facets include competence, order, dutifulness, achievement striving, self-discipline and deliberation (Costa & Widiger, 1994; De Moor et al, 2012; McCrae & Costa, 1997; Tackett, 2006).

Whereas personality psychologists have traditionally studied the FFM in adult populations, and developmental psychologists have classically dealt with studying temperament (e.g., Rothbart et al., 2000), the consolidation of the FFM has led to much interest in studying if the FFM emerges at earlier ages, such as adolescence, and even in childhood (De Pauw, 2017). For this reason, the following section presents the advances made in assessing the FFM in child-adolescent populations.

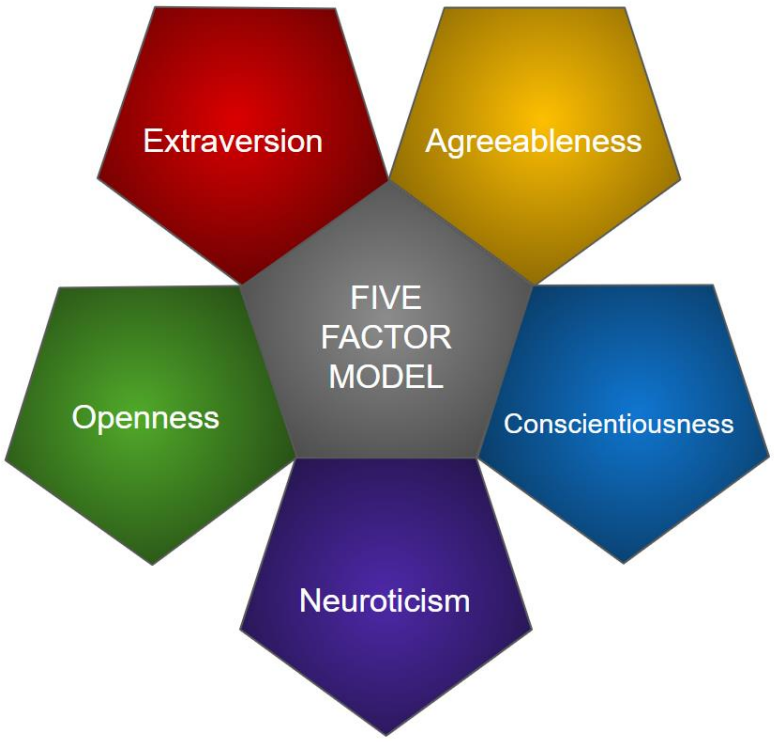

Figure 8. The Five-Factor Model of Personality (the author based on the work of McCrae and Costa, 2010).

Five-Factor Model in Adolescents

When constructing evaluation instruments for the FFM in child-adolescent populations, different approaches have been followed: 1) creating new questionnaires to evaluate the five factors in children (bottom-up approach); 2) administering to non adult samples questionnaires designed to evaluate the five factors in adults by adapting the content of some items to younger groups (top-down approach).

Studies that follow bottom-up construction, such as the Hierarchical Personality Inventory for Children (HiPIC; Mervielde & De Fruyt, 2002), show a factorial solution that includes the dimensions of conscientiousness, benevolence, extraversion, imagination and emotional stability in children aged from 3 to 13 years. These five traits can be equated to conscientiousness, agreeableness, extraversion, openness and emotional stability, respectively. However, the authors emphasize that despite finding a similar factorial solution to that found in adults, the content of dimensions varies somewhat, especially in younger children. For instance, benevolence includes content related to the irritability and low egocentricity facets of neuroticism and the low assertiveness characteristic of extraversion in adults, along with other more typical contents of agreeableness, such as altruism, compassion and cooperation (De Pauw, 2017; Herzhoff, et al., 2017a). In adolescents, the content of agreeableness is more similar to that found in adults (Herzhoff, et al., 2017a). Regarding openness, some authors argue that it does not appear until preadolescence and is imbued with conscientiousness at an early age (De Pauw, 2017). Regarding its content, at such an earlier age, this trait would include more content associated with intellect (i.e., intellectual interests) and imagination, while at later ages it would be more closely related to openness (i.e., aesthetics, feelings) (Herzhoff et al., 2017a). For extraversion, the adult facet activity seems to emerge as a whole dimension between mid-

childhood and mid-adolescence (i.e., "Little Six model": extraversion, agreeableness, conscientiousness, neuroticism, openness, activity). Furthermore, while childhood activity would include more physical aspects, such as energy or motor activity, in later stages it would include aspects related to motivation and action. This may reflect a developmental process during which activity would gradually be integrated with aspects of sociability and lead to a broader extraversion component, while achievement motivation aspects would be integrated into conscientiousness (De Pauw, 2017; Herzhoff et al., 2017a). Neuroticism would cover contents associated with anxious discomfort or feelings of low self-esteem in childhood, while it would cover a wider range of traits in adults (i.e., self-confidence, social anxiety, vulnerability to stress, depressive feelings, sadness, dependence, loneliness, impulsivity and hostility) (De Pauw, 2017). Finally, conscientiousness in childhood is a robust personality factor that covers tendencies of impulse and attentional control and persistence, as well as individual differences related to order, confidence and achievement motivation. In adolescence, it also includes facets related to social aspects of conscientiousness (i.e., sense of duty and responsibility) (De Pauw, 2017).

Although the HiPIC is an instrument that is internationally acknowledged, as far as we know it is not available in Spanish. However, other instruments like the JS NEO (Ortet et al., 2012), whose construction procedure goes from top to bottom, is adapted to Spanish. The JS NEO-A60 (Ortet-Walker et al., 2020) constitutes an abridged version of the previous JS NEO-S (Ortet, et al., 2010), a short version of the JS NEO (Ortet et al., 2012) based on the original instrument for adults (NEO-PI-R; McCrae and Costa, 2010). These instruments assess the five broad domains of the FFM.

Although the FFM is one of the most useful models for describing personality, there is evidence for higher-order factors (e.g., Alpha and Beta, Digman, 1997) or a General Factor of Personality (GFP; Musek, 2007; Rushton et al., 2008; Rushton & Irwing, 2008), in which the five personality dimensions are grouped similarly to the structure of psychopathology (i.e.,

hierarchical or bifactor models of psychopathology). Given its relevance to understand the structure of psychopathology, the following section presents empirical evidence for the GFP.

General Factor of Personality (GFP)

In recent decades, and based on the fact that FFM traits are not completely independent in empirical terms, and exhibit correlations of varying magnitudes (Arias et al., 2018), a GFP has also been proposed (see Figure 9). This factor is interpreted as a general dimension that reflects adaptive strategies in different life domains, with a combination of high levels of emotional stability, conscientiousness, agreeableness, extraversion and intellect/openness (Musek, 2007). Some studies have provided evidence in favor of a hierarchical model of personality, including a GFP defined by Alpha and Beta high-order factors. These factors display loadings above .60 of conscientiousness, emotional stability and agreeableness for Alpha/Stability, and above .55 for Beta/Plasticity, as defined by extraversion and openness (Rushton et al., 2008; Rushton & Irwing, 2008). The GFP generally integrates non cognitive dimensions of personality and has been related to social desirability, emotionality, motivation, general well-being, satisfaction with life and self-esteem (Musek, 2007).

Nonetheless, the GFP notion has also received some criticism. Authors like Arias et al. (2018) emphasize that the GFP does not show sufficient reliability to suggest a meaningful psychometric interpretation as the selected items are better indicators of the five classic personality traits rather than of a wider domain. Ferguson et al. (2011) pointed out that the low correlations between personality traits and the strength with which indicators saturate on the general factor are insufficient to establish its existence. Therefore, and similarly to the structure of psychopathology, although fit indices suggest that certain structural models (bifactor model or Exploratory Structural Equation Model, ESEM), in which a GFP is specified, better fit data than those in which a GFP is not specified is not enough evidence to take its existence for granted. Hence the need to explore the meaning of the GFP by relating it to other variables of interest or criterion variables with which it should hypothetically be associated.

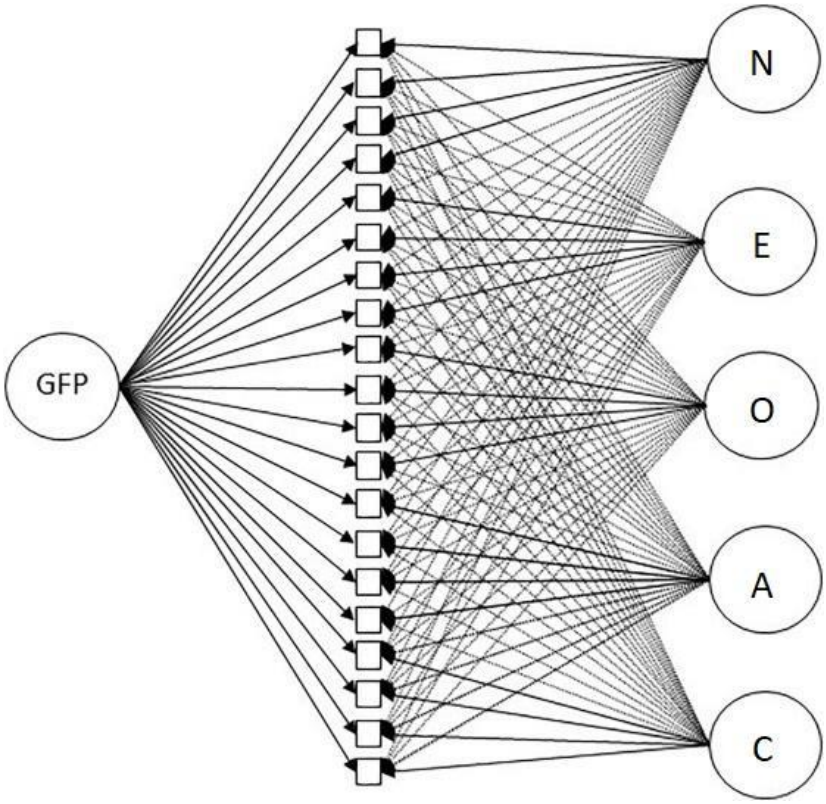

Figure 9. ESEM orthogonal bifactor model: FFM and GFP structures of the Mini-IPIP (adapted from Arias et al., 2018). GFP = General Factor of Personality; N = Neuroticism/Emotional Stability; E = Extraversion; O = Openness; A = Agreeableness; C = Conscientiousness.

Along these lines, the meta-analysis of van der Linden et al. (2017) found a substantial overlap between the GFP and emotional intelligence (r = .85, p <.001), which suggests that the GFP can be interpreted as a tendency toward better emotional adjustment and increased social effectiveness. The found associations are similar regardless of the extraction method employed to obtain the GFP (van der Linden et al, 2017). Other studies have indicated strong correlations between the GFP and the p factor (r = 0.72, p <.001; Oltmanns et al. (2018), and between the General Factor of Personality Disorders (GFPD) and the p factor (r = 92, p < .001, Oltmanns et al. 2018), which indicate that p, GFPD and GFP probably form part of a common continuum (Oltmanns et al., 2018). Similarly, Rosenström et al. (2019) found a common general factor for normal personality traits and its maladaptive variants based on personality disorders. This study reported a correlation of .49 with the p factor, which is slightly lower than those reported by

Oltmanns et al. (2018). Another recent study also suggested that not only the GFP, GFPD and p exhibited a substantial overlap, but also proposed a *Big Everything* factor that would account for considerable variance in indicators of psychopathology, personality, pathological personality and cognitive functioning (Littlefiel et al., 2020). In any case as previous studies are scarce, delving into the meaning of the GFP remains a pending issue, especially in the adolescent population.

Finally, it is important to point out that when considering personality in adolescence, it is necessary to approach its study from a developmental perspective (Durbin, 2019) because despite personality being relatively stable (Hampson & Goldberg, 2006), it also shows some change throughout life, especially during this period (Denissen et al., 2013; Klimstra et al., 2009; Soto & Tackett, 2015). For this reason, the following section reviews the personality stability and change concepts.

Personality Development in Youths

As previously mentioned, studies of personality stability and change conducted in past decades have revealed a certain degree of stability and also change in personality (Damian et al., 2019; Denissen et al., 2013; Ferguson, 2010; Harris et al., 2016; Klimstra et al., 2009; Roberts, et al., 2006; Soto & Tackett, 2015; Van Dijk et al., 2020). Personality stability and change with time can be studied with different designs and statistical approaches, and there are several ways that stability can be conceptualized (De Fruyt et al., 2006), of which the most broadly examined are rank order and mean level stability/change.

Rank order stability reflects the degree to which individuals' ordering remains over time (Bleidorn & Hopwood, 2019) from the highest to the lowest score for a certain personality trait (normally with test-retest correlations). Meta-analysis results have shown that rank order stability increases from childhood to early adulthood (Ferguson, 2010; Roberts & Del Vecchio, 2000), and more recent studies have obtained similar results to those found in previous meta-analyses (Borghuis et al., 2017; Ibáñez et al., 2016; Klimstra et al., 2009). These increases in

stability have been interpreted according to the cumulative-continuity principle (Anusic & Schimmack, 2016; Bleidorn & Hopwood, 2019; Soto & Tackett, 2015), which states that developing a stabler identity would provide young adults with a scheme with which the experiences that accumulate throughout life would be organized and lead to more consistent behavior patterns (Bleidorn & Hopwood, 2019).

The mean-level change reflects the degree to which traits increase or decrease on average among people, and is normally estimated by the standardized mean difference in traits across assessments (Bleidorn & Hopwood, 2018). By studying these changes in personality over time, the shape of its growth can be determined. Accordingly, a well-known meta-analysis revealed that agreeableness, conscientiousness and emotional stability tend to slightly increase at the end of adolescence, which all reflect greater adjustment (Roberts et al., 2006). The increments observed in the mean levels of these traits late in adolescence and at the beginning of adulthood have been interpreted form the maturity principle, which considers that traits tend to slightly increase at the end of adolescence, which reflects greater adjustment (Roberts et al., 2006). Regarding personality, maturity has been associated with the development of traits that tend to be socially valued (Hogan & Roberts, 2004). For instance, conscientiousness has been related to academic effort and achievement motivation (Corker et al., 2012). On emotional stability, research points out a general trend from adolescence to adulthood toward greater adjustment (Soto et al., 2011). In line with this principle, twin studies have also provided evidence for a general tendency to maturation (for reviews, see Briley & Tucker-Drob, 2014; Kandler, 2012; Kandler & Papendick, 2017).

However, not all studies have found such mean-level changes from childhood to late adolescence (or at adulthood onset) because it would seem that youth personality development does not always match the maturity principle (Borghuis et al., 2017; Ibáñez et al., 2016; Göllner et al., 2017; Van den Akker et al., 2014) and adolescence is often associated with instability tendencies (Hill & Edmonds, 2017). Meta-analyses on mean-level change from childhood to

adulthood onset have indicated a decrease and later increase in both conscientiousness and openness from early to late adolescence, which display a U-shaped developmental pattern (Denissen et al., 2013). A later study conducted with over 1 million participants aged 3-20 years, in addition to conscientiousness and openness, also found U-shaped age trends for agreeableness in adolescents aged 10-20 years (Soto et al., 2011). The reductions that display a curvilinear trajectory have been interpreted according to the disruption hypothesis, which posits that adolescents showing a tendency to experience temporal dips in personality traits are socially relevant (Soto & Tackett, 2015; Denissen et al., 2013). This is consistent with this period, which is characterized by biological, psychological and social transitions (Soto & Tackett, 2015), and might be accompanied by a display of more deviant behavior (Allen et al., 2006) and diverse psychopathological outcomes (Bleidorn & Hopwood, 2019). Discrepancies between reference values and actual behavior might lie at the heart of diminished perceived maturity (Denissen et al., 2013). This means that while young children tend to accept values and norms, conversely adolescents usually seek autonomy by repelling and challenging these adult norms (Eisenberg & Morris, 2004).

Such discrepancies found in FFM trait trajectories in previous meta-analyses (Denissen et al., 2013; Roberts et al., 2006; Soto et al., 2011) have also emerged in more recent studies. For instance, findings in early adolescence reveal some increases for neuroticism (Ibáñez et al., 2016; Van den Akker, et al., 2014), while others show a decreasing mean-level of neuroticism at the end of adolescence (Elkins et al., 2017; Gollner et al., 2017). For openness, some studies have reported increases (Borghuis et al., 2017), decreases (Gollner et al., 2017) and no mean-level changes (Elkins et al., 2017) for this trait. See Table 1 for a list of studies on stability and change in FFM traits from infancy to late adolescence.

Table 1.
Studies on personality mean-level trajectories in adolescence.

Reference	N	Age span	N	E	O	A	C

McCrae et al. (2002)	230	12-18	Girls: ↑N Boys: -	-	↑O	-	-
Pullmann et al. (2006)	876	12-18	↓N	↑E	↑O	↓A	↓C
De Fruyt et al., (2006).	498	7-18	10-18: ↓N	-	12-13: ↓O	-	12-13: ↓C
Branje et al., (2007).	285	11-18	-	Girls: ↷E Boys: ↓E	Girls: ↑O Boys: ↓O	Girls: ↑A -	Girls: ↑C -
Klimstra et al., (2009).	1313	12-20	↓N	12-15: ↑E 16-20: ↓E	Girls: - Boys: ↑O	↑A	Girls: - Boys: ↷C
Van den Akker et al., (2010)	290	8-9	-	↓E	↓O	-	↓C
Lüdtke et al., (2011).	1908	13-18	↓N	-	-	↑A	↑C
Soto et al., (2011).	1267218	10-65	Girls: ↑N Boys: ↓N	↓E	↺O	↺A	↺C
*Denissen et al., (2013).	14	10-20	-	-	↓O	-	↓C
Van den Akker et al., (2014).	596	6-20	↷N	↓E	↓O	↺A	↺C
Ibañez et al., (2016).	234	12-15	-	-	-	↓A	↓C
Elkins et al., (2017).	1161	15-24	↓N	↓E	-	↑A	↑C
Borghuis et al., (2017).	2230	12-22	Girls: ↺N Boys:	Girls: ↺E Boys:	Girls: ↓O Boys:	Girls: ↑A Boys: ↑A	Girls: ↑C Boys: ↺C

			-	-	↑O		
Göllner et al., (2017).	2761	10-14	↓N	Parents' reports: ↓E Self-reports: ↑E	↓O	A↓	-
Brandes et al., (2020).	440	9-13	-	↓E	-	↑A	Girls: ↑C
Mann et al., (2020)	674	12-17	↓N	-	↑O	↑A	↓C

Note: ↑= increasing trend; ↓= decreasing trend; ↺= decreasing followed by increasing trend; ↷= increasing followed by decreasing trend; -= no significant mean-level change in this trait. *=Meta-analytic review.

The discrepancies between the studies that found increases in these dimensions and those that encountered trajectories displaying a U-shaped pattern or a decrease could be partly due to the exact period of childhood and adolescence (early-, mid- or late-) when data were collected. Furthermore, in some studies all the children in the same wave are of the same age, which is not the case for other studies. For instance, there are studies in which all the children are 13 years old in wave 1, but in others the mean age in wave 1 might be 13, but children aged between 10 and 17 years are also included. Another factor that can explain discrepancies between studies is the fact that certain trajectories (i.e., U trajectory) can only be studied by including four data waves or more in analyses. Finally, the fact that specific facets within FFM traits show different trajectories can also influence discrepancies in the trajectories of the dimensions between studies as the instruments employed to evaluate personality traits are not homogeneous among research works. Indeed recently, Brandes et al. (2020) found increases in agreeableness facets, with a heterogeneous facet change for neuroticism and openness (similarly for both genders). Significant decreases in extraversion facets were found, but the direction and magnitude of trajectories differed according to gender and each facet, with increases in conscientiousness for every facet, but only for girls and no significant changes for

boys (Brandes et al., 2020). Taken together, additional research into mean-level changes of the FFM and its facets should be performed in adolescence.

Knowing the existing evidence for the development of personality and the nature of the stability/change of personality in the first life stages is essential to understand how personality is related to other variables of interest, such as psychopathology, in these life stages.

Personality and Psychopathology Associations

In past decades, many studies have presented evidence for the close association between personality and psychopathological symptomatology in children (Hengartner, 2018; Muris & Ollendick, 2005), adolescents (De Bolle, et al., 2012; Klimstra et al., 2011; Mann et al., 2020; for a review see Tackett, 2006) and adults (Andersen & Bienvenu, 2011; Bienvenu, 2007; Freire et al., 2007; Krueger, 2005; South et al., 2010; Widiger, 2003). There is empirical evidence for the notion that they are interwoven constructs, whose nature and evolution are similar over time (De Bolle, et al., 2016), and even psychopathology and positive mental health are related, but distinct ends of a continuum (Lamers et al., 2012). Nevertheless, most of this literature is based on cross-sectional studies that have been carried out with adult samples (for reviews, see Andersen & Bienvenu, 2011; Kotov et al., 2010; Krueger, 2005; South et al., 2010; Widiger, 2003), and focuses mainly on single personality traits and their associations with one psychological disorder or two (Watts et al., 2019).

When specifically considering cross-sectional evidence for the association of traits with specific disorders in adults, neuroticism appears to be closely associated with anxiety and depression (Freire et al., 2007), especially when combined with low extraversion and low conscientiousness (for meta-analytic reviews, see Kotov et al., 2010; Malouff et al., 2005). Moreover, low agreeableness (or antagonism) and low conscientiousness (or disinhibition) show robust correlates with antisocial behavior (for a meta-analytic review, see Ruiz et al., 2008), aggression (for a meta-analytic review, see Jones et al., 2011) and substance use (Carou et al., 2017; Terracciano et al., 2008). Thus findings reveal that similar personality

patterns characterize subjects with high scores on scales of mental disorders (Trull & Sher, 1994) and also personality disorders (Costa & McCrae, 1990). Similarly, when looking at facets instead of the broad traits of personality, a more recent study indicated that substance use can be predicted by high excitement-seeking from extraversion and low self-discipline from conscientiousness, while internalizing symptoms can be expectably associated mainly with high anxiety and depression from neuroticism, and low gregariousness from extraversion (Walton et al., 2018).

These trait-symptom associations have also been documented in youth (for a review, see Tackett, 2006), and indicate that traits like emotional stability, extraversion, conscientiousness and agreeableness are negatively associated with psychopathological distress and diverse symptoms (i.e., conduct problems, emotional symptoms, hyperactivity-attention and peer problems), but are positively linked with prosocial behavior (Kokkinos et al., 2016; Ozer & Benet-Martinez, 2006). Consequently, neuroticism is reported to be associated with anxiety and depression in youths (Andrés et al., 2016; Muris et al., 2018) and appears to be a shared component of different anxiety disorders and phobias across ages, especially when combined with low extraversion (for a review, see Pagura et al., 2009). Low extraversion also presents associations with anxiety on its own (Andrés et al., 2016). Agreeableness and conscientiousness consistently show robust negative associations with oppositional defiant disorder and conduct disorder in children (Herzhoff et al., 2017b) and in some studies with hyperactivity-attention problems (Nigg et al., 2002). A disinhibited early personality profile (low conscientiousness) seems to be closely related to substance use, conduct disorder and antisocial behavior (Krueger, et al., 2009). Cross-cultural studies indicate that most of these associations, mainly emotional stability with depression, are consistent across countries (Klimstra et al., 2011).

Along the same lines, longitudinal studies with adults have corroborated links between these constructs over people's lifespan (for a review, see Bagby et al., 2008). The evidence of these prospective designs suggest that neuroticism significantly predicts adult psychopathology

(Hengartner, et al 2016), mainly mood disorders like depression and anxiety (Gershuny & Sher, 1998; Hengartner, et al 2016; Kendler et al., 2006; Mineka et al., 2020), specifically through self-criticism and dependency components (Kopala-Sibley et al., 2017). Neuroticism also seems to be prospectively linked with less common disorders; e.g., post-traumatic stress disorder (Breslau & Schultz, 2013). Meta-analytic reviews that include longitudinal studies have reinforced cross-sectional research findings. In one meta-analysis, Ruiz et al. (2008) have reported how personality features characterize antisocial personality disorder and substance use, with low agreeableness and low conscientiousness being the most predictive traits. At the facet level, these disorders are characterized by high impulsivity, excitement-seeking, deliberation and self-discipline (Ruiz et al., 2008). Similarly in a meta-analytic review with adult and non-adult samples, the agreeableness and conscientiousness dimensions appear to bear moderate relations to antisocial behavior (Miller & Lynam, 2006). The more recent meta-analysis by Gomez and Corr (2014) has indicated that inattention and hyperactivity are closely associated not only with low conscientiousness and low agreeableness, but also with high neuroticism, which suggests personality confers these symptoms vulnerability. According to longitudinal studies, changes in personality traits and their association with mental health have not been exhaustively studied, but the developmental course of FFM traits has been suggested to be linked with changes in adjustment and personality disorders (Wright et al., 2015).

Only a few prospective studies have focused on adolescents' FFM trait associations with different clinical symptoms. In one study, Klimstra et al. (2010) examined associations between personality traits and problem behavior (i.e., depression and aggression), and used five annual data waves to perform cross-lagged panel models. The results suggested bidirectional effects between every trait, except for openness with depression, and also between the five traits with aggression. However, a certain grade of specificity came over as stronger associations appeared found between depression with emotional stability and introversion, and also among low agreeableness, low conscientiousness and low emotional stability and aggression. Later studies

in youths on other symptom types have shown that impulsivity (low conscientiousness) and sensation-seeking are prospectively related to substance use (Mackie, et al., 2011; Quinn & Harden, 2013) and antisocial behavior (Mann et al., 2018), and neuroticism can predict eating disorders (Brown et al., 2020). Very few studies have addressed the development of FFM traits over time in association with specific mental health problems. Aldinger et al. (2014) revealed that adolescents characterized by increased neuroticism were at higher risk of suffering depressive and anxiety disorders in young adulthood.

Even though the associations of the FFM with single disorders and groups of symptoms have been explored, less attention has been paid to associations between personality traits and the correlated model of psychopathology (i.e., in which internalizing and externalizing factors correlate with one another). In the few cross-sectional studies that have been performed with both adults and youths, and consequently studies addressing symptoms, neuroticism has been linked with internalizing problems (Slobodskaya & Akhmetova, 2010) or a distress factor (Watts et al., 2019), while low agreeableness and low conscientiousness have presented marked associations with externalizing symptoms (DeYoung et al., 2008; Prinzie et al., 2004; Slobodskaya & Akhmetova, 2010; Watts et al., 2019). It is noteworthy that extraversion can be associated with both internalizing problems for its communal aspect (e.g., enjoying the time spent with people, being cheerful, liking crowded and exciting places) and externalizing problems for its agentic aspect (e.g., speaking one's mind, taking charge of a group of people, liking the sensation of going really fast) in adults (Watson et al., 2019). Finally, openness appears less related to psychopathology (Levin-Aspenson et al., 2019). In general, these associations remaid significant when tackled in prospective studies with children (Favini et al., 2018; Hengartner, 2018; Laceulle et al., 2014; van den Akker, 2010), adolescents (De Bolle et al., 2012; Van Heel et al., 2019) and adults (Mezquita et al., 2015).

Studies exploring the FFM traits and the bifactor model of psychopathology are even scarcer. Caspi et al. (2014) found that the p factor in adults was related mainly to neuroticism,

followed by low conscientiousness and low agreeableness, while the externalizing factor was associated with low conscientiousness, low agreeableness and, to a lesser extent, extraversion. The internalizing factor showed weak associations with neuroticism, introversion, agreeableness and conscientiousness. Consistently in a study exploring the genetic nature of the associations between the GFP in children and adolescents, Tackett et al., (2013) evidenced overlapping variance in negative emotionality and the p factor at both phenotypic and etiologic levels. This overlap between p and neuroticism has been evidenced in later studies in adolescents (Brandes et al., 2019). As far as we know, only one previous study has addressed the association of the FFM with the bifactor model of psychopathology in adolescents (Castellanos-Ryan et al, 2016). This study reveals the same associations of the FFM traits with p that were found in the study by Caspi et al. (2014). However, a different pattern of associations emerged with internalizing and externalizing factors. Specifically, neuroticism presented close associations with the internalizing factor, and extraversion displayed a weak, but significant, association with the externalizing factor (Castellanos-Ryan et al., 2016). These differences could suggest subtle, yet distinct, developmental trends in personality-psychopathology associations, as well as differences in factors content. More recently, a longitudinal study (Mann et al., 2020) examined associations between changes over time in FFM traits and changes with time in broad factors taken from a hierarchical model of psychopathology, including a p factor. Although its results suggested very slight mean-level change for FFM traits in a Mexican-origin youth sample, this change in personality was related to change in psychopathology. Specifically, initial levels of conscientiousness, agreeableness and emotional stability appeared to be positively associated with lower initial levels of p, and increases in extraversion and decreases in neuroticism were related to lowering p. The authors stated that future studies should test similar prospective models in culturally different groups. Thus the longitudinal associations between the p factor and FFM traits deserves more research attention because these constructs are not static (Durbin, 2019), and personality provides a foundational basis for dimensional

models of psychopathology (Widiger et al., 2018). To clarify, a summary of the findings on the FFM personality traits and psychopathology associations in youths is displayed in Table 2 according to publication dates.

Overall these findings encourage us to consider personality traits as important predictors of specific clinical disorders and symptoms, as well as higher-order comorbidity factors, and even p. To explain such association mechanisms, different conceptual models have been proposed. In the next section, we present the different theoretical models that attempt to explain the close links between personality and psychopathology, along with empirical evidence that favors each one.

Table 2.
The main results of the studies on associations between the Big-Five personality traits, or temperament traits, and psychopathological outcomes in youths.

Reference	Sample	Main variables	Main Results
Huey & Weisz, 1997.	N=116 children.	Ego control, ego resilience, Big-Five traits, and behavioral and emotional problems.	Ego under control predicted EXT, and both Ego brittleness and Ego under in control predicted INT problems. E and A were independent predictors of EXT, whereas N predicted INT.
Nigg et al., 2002.	N=1620 adults and parents of children.	ADHD and Big-Five traits.	Inattention-disorganization were related to low C and to N. The cluster of hyperactivity-impulsivity and oppositional behaviors was associated with low A.
Prinzie et al., 2004.	N=599 children	Big-Five traits, parenting and EXT	Low A and low C presented negative associations with EXT. E and Imagination were positively related to children's EXT. High parents' N and A were related to EXT.
Van Hoecke et al., 2006.	N=296 children.	Big-Five traits and facets, INT and EXT with enuresis.	Substantial levels of problem behavior found in children with enuresis, who also obtained high N and low C scores.
Muris et al., 2007.	N=208 children	Reactive and regulative temperament with INT, EXT and personality (N, E and O).	Negative affectivity was positively associated with INT and EXT. Effortful control was negatively related to symptoms. Negative affectivity and low effortful control were linked with symptoms. Fear and (low) attention control were associated with INT. Anger/frustration and (low) activation and inhibitory control were linked with

			EXT.
DeYoung et al., 2008.	N=140 male adolescents	EXT and Big-Five.	The authors applied a hierarchical model based on the Big-Five and two higher-order factors: stability (N reversed, A, and C) and plasticity (E and O). A latent EXT variable was characterized by low stability, high plasticity and low cognitive ability.
Krueger, et al., 2009.	N=1048 adolescents	Substance dependence, antisocial behavior, and disinhibited personality.	A disinhibited personality profile was related to substance use, conduct disorder and antisocial behavior. The results support a hierarchical model of the externalizing spectrum.
Klimstra et al., 2010.	N=1313 adolescents	Big-Five traits with problem behavior (i.e., depression and aggression).	The effects between personality and problem behavior were bidirectional (vulnerability and scar hypothesis). N, E and C predicted INT. A, C and O predicted EXT. N, E, A and C were predicted by INT. EXT predicted N and A.
Slobodskaya & Akhmetova, 2010.	N=1640 children and adolescents	Big-Five Personality development and problem behavior.	Personality explained about 30% variance in children's INT, and 50% in EXT. INT were linked with higher N and lower E; EXT were linked with higher E, lower C and A.
van der Akker et al., 2010.	N=290 children	Big-Five, parenting and adjustment problems.	Changes in childhood personality and over-reactive parenting were associated with adjustment problems. Increases in over-reactive parenting predicted externalizing. Decreases in E and increases in N predicted INT problems. Decreases in A and C predicted EXT.
Kushner et al, 2011	N=346 children	Big-Five and INT.	INT was predicted by high N and A.
Klimstra et al., 2011.	N=1521 Dutch and N=1975 Italian adolescents	Cross-cultural differences in Big-Five, Depression and generalized anxiety symptoms	All traits save O were negatively associated with depressive symptoms in both samples. The link between N and depression was consistent across countries, with stronger associations for Italians.
Mackie, et al., 2011.	N=409 adolescents	Psychotic-like experiences, impulsivity, alcohol use, depression, anxiety, substance use and victimization.	Adolescents' profiles characterized by impulsivity, thrill-seeking and substance use followed an increasing trajectory of psychotic-like experiences.
De Bolle et al., 2012.	N=717 children and adolescents	INT and EXT with personality (N, E, A and C).	Support for the continuity model on the association between INT with N and E, as well as between EXT with A and C. Particular trait-symptom combinations provided evidence for pathoplasty and complication models.

Vasey et al., 2013.	N=1897 children, adolescents and young adults	Negative and positive emotionality, self-regulatory capacity and depression.	Negative and positive emotionality and effortful control are linked with depression and may moderate one another's association with depressive symptoms.
Tackett e.t al., 2013.	N=1569 twin pairs of children and adolescents	p factor and negative emotionality.	General psychopathology substantially overlaps at the phenotypic and genetic levels with negative emotionality. A spectrum hypothesis was supported.
Quinn & Harden, 2013.	N=5632 adolescents and young adults	Impulsivity, sensation-seeking with alcohol, marijuana and cigarette use.	Impulsivity and sensation-seeking were prospectively related to substance use. Adolescents who declined slowly in impulsivity rapidly increased in substance use. The substance use risk may be the highest among the individuals who decline more gradually in impulsivity.
Laceulle, et al., 2014.	N=1195 adolescents	Temperament, INT and EXT.	Temperament and its change predicted future mental disorders by supporting the vulnerability model. Change in frustration predicted INT and EXT, and changes in fear predicted INT.
Aldinger et al., 2014.	N=266 adolescents	Neuroticism, depression and anxiety disorders, emotional experience and affective instability	Adolescents characterized by positive neuroticism development are at higher risk of suffering from depressive and anxiety disorders in young adulthood.
Andrés, et al., 2016.	N=230 children	E, N, cognitive reappraisal and suppression of emotional expression with anxiety and depression.	Cognitive reappraisal presented a total mediating effect on the relation of E with anxiety, which was not observed for depression. The suppression of emotional expression showed a partial mediating effect on the relation of N with anxiety and depression.
Castellanos-Ryan et al., 2016.	N=2144 adolescents	P factor, INT EXT with personality (N, E, A and C).	Psychopathology fitted a bifactor model, with p factor, EXT (mainly substance misuse and low ADHD) and INT, and also a bifactor model with p factor and EXT (mainly ADHD and ODD), substance use and INT. The p factor was related to low C, low A, high N and hopelessness, high delay-discounting, poor response inhibition and low IQ. INT was related to high N, hopelessness and anxiety-sensitivity, low novelty-seeking and E.
Kokkinos, et al., 2016.	N=323 children	Big Five traits, attachment and psychosocial functioning.	E, O, A and C were negatively associated with psychopathology, and positively with prosocial behavior. The opposite pattern was observed for N. E moderated attachment and conduct problems links.

Herzhoff et al., 2017b.	N=346 children	Personality traits and variance in ODD comorbidity.	ODD-externalizing comorbidity was accounted for by disinhibitory traits (low A and C). ODD-CD comorbidity was accounted for by low C and A, and ODD-ADHD comorbidity was explained by low C. ODD was positively associated with N.
Hengartner, 2018.	N=1200 children	Big-Five traits and their associations with EXT.	Mean-level N stability was low. A minority of children showed marked changes in trait scores over time. Personality change in A and C predicted EXT. Evidence supported continuity, pathoplasty and scar models.
Mann et al., 2018.	N=7000 children and adolescents	Disinhibited personality, conduct problems, and lack of guilt and antisocial behavior.	High levels of childhood conduct problems were associated with higher levels of impulsivity, sensation-seeking and antisocial behavior in early adolescence. Lack of guilt was associated with lower sensation-seeking levels.
Muris, et al., 2018.	N=118 adolescents.	Self-conscious emotions, personality traits and anxiety symptoms.	Shame was associated with anxiety symptoms. It correlated positively with N and negatively with E.
Levin-Aspenson et al., 2019.	N = 806 adolescents and 3352 adults	INT and EXT with N, E and O.	A three-level structure of psychopathology was consistent across age groups. N showed stronger associations with INT vs. EXT and with broader dimensions. E showed weaker associations. O was not related to psychopathology.
Van Heel, et al., 2019.	N=1116 adolescents.	EXT, parenting and personality.	C showed negative reciprocal associations with EXT and punitive control.
Watts et al., 2019.	N=942 children and adolescents	Big-Five traits and psychopathology (factors and symptoms).	Distress was positively associated with N. EXT was negatively associated with A and C. Developmental structural continuity of both personality and psychopathology was supported.
Brandes et al., 2019.	N=695 children	P Factor and N.	The p factor overlaps substantially with N. Psychopathology and neuroticism can be characterized by bifactor models.
Mann et al., 2020.	N=674 adolescents	Big-Five traits and the hierarchical structure of psychopathology.	The initial levels of C, A, and N were positively associated with lower initial p levels. Increases in E and decreases in N were associated with decreases in p.
Brown et al., 2020.	N=5812 adolescents	Temperament, borderline personality features, sensation-seeking, Big-Five factors, and depressive symptoms.	Neuroticism, borderline personality and depressive symptoms predicted eating disorders, while sensation-seeking and conscientiousness were also significant predictors for females.

Note: N = Neuroticism, E = Extraversion, O = Openness, A = Agreeableness, C = Conscientiousness, INT = Internalizing problems, EXT = Externalizing problems, HAP = Hyperactivity and Attention problems, ADHD = Attention deficit and hyperactivity disorder, ODD = Oppositional defiant disorder; p = General Factor of Psychopathology.

Trait-Symptom Association Models

Different conceptual models aim to explain how personality and psychopathology constructs co-occur and mutually affect one another (for reviews, see De Fruyt et al., 2017b; Krueger & Tackett 2003; and South, et al, 2010). Of these, four major models have emerged in recent decades and attempt to explain such associations (South et al., 2010; De Fruyt et al., 2017a). First the vulnerability model proposes that pre-existing personality traits predispose people to develop certain mental illnesses (De Fruyt et al., 2017a; De Fruyt et al., 2017b). For instance, high neuroticism may lead to depressive disorders developing in adults (Hengartner et al., 2016; for a review, see Clark et al., 1994) and youths (Tackett, 2006; Nigg, 2006). The complication model, also known as the scar model, suggests experiencing a certain form of psychopathology that causes a "scar" in personality that changes it (De Fruyt et al., 2017a; De Fruyt et al., 2017b). For instance, experiencing a panic attack that is contributed to higher anxiety sensitivity levels in adults (Schmidt et al., 2000) or childhood antisocial behavioral problems predicting increased neuroticism in adulthood (Shiner et al., 2002). Third, for pathoplasty, also known as the exacerbation model, premorbid personality is considered to have an effect on the disorder's expression, its course, severity and treatment response. In the pathoplasty model, it is also assumed that personality and psychopathology have independent etiological causes (De Fruyt et al., 2017a; De Fruyt et al., 2017b). For example, a longitudinal study has indicated that changes in childhood personality and over-reactive parenting are associated with internalizing and externalizing adjustment problems in adolescence (van der Akker et al., 2010). Finally, the continuity model suggests that traits and psychopathology both form part of one continuous latent dimension (De Fruyt et al., 2017a; De Fruyt et al., 2017b). This model seeks to eliminate conceptual distinctions between traits and disorders as they are considered alternative terms that can describe the same phenomena (Durbin & Hicks, 2014). In

close relation to the continuity model we find the spectrum model, which assumes common etiological mechanisms between personality and psychopathology (De Fruyt et al., 2017a; De Fruyt, et al., 2017b; Tackett et al., 2013). This has been reflected by the results of twin studies, which have indicated the existence of a behavioral disinhibition factor composed of symptoms of conduct disorders, substance use, ADHD and novelty-seeking. This factor can be explained by shared genetic factors (Young et al. 2000). These four models are graphically depicted in Figure 10.

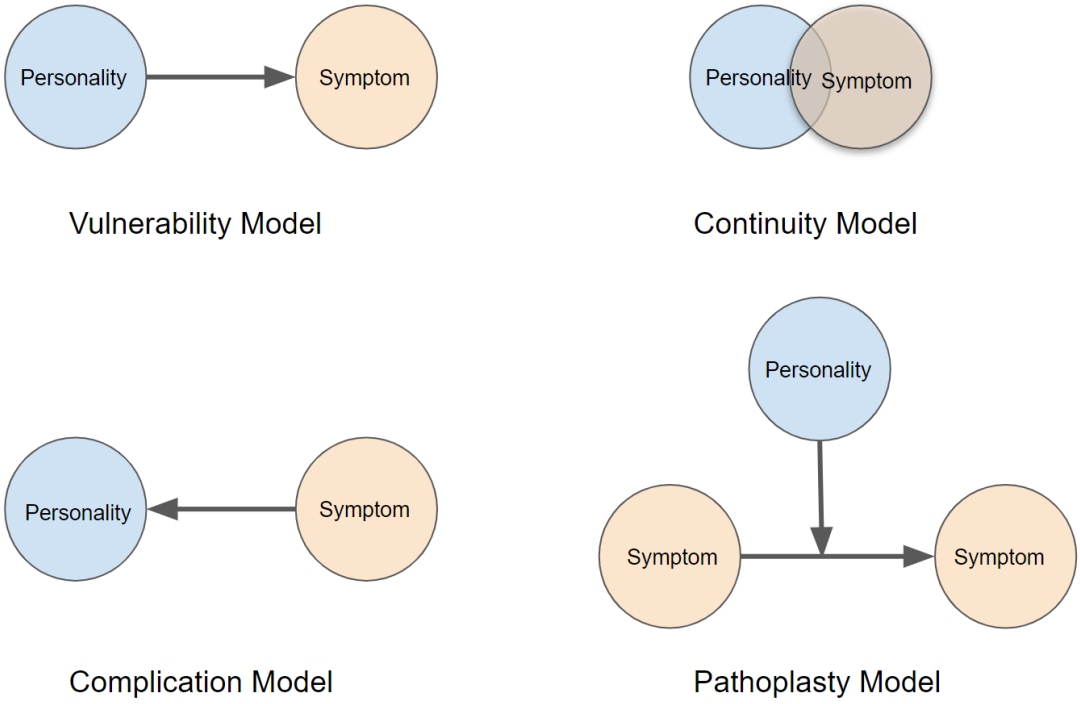

Figure 10. Personality-Psychopathology Association Models.

So although some previous empirical studies have investigated all these theoretical models, as far as we know only one work has simultaneously explored them (i.e., De Bolle et al., 2012), which hinders firm conclusions being drawn about the plausibility of all the models (De Fruyt et al., 2017a). In a study carried out with children and adolescents, De Bolle et al. (2012) found that continuity effects are predominant, with some evidence for pathoplasty and complication effects when explaining the relation between normal personality and psychopathology. The same research group's subsequent study obtained similar results when

studying the relation of psychopathology with maladaptive personality traits (De Bolle et al., 2016). These authors concluded that the results show the dimensional nature of personality traits and psychopathology, which suggest that they should be understood primarily as continuous and related constructs (De Fruyt et al., 2017a).

Later works have criticized the fact that studies into the simple covariation between constructs conclude that personality and psychopathology form part of the same continuum as such studies do not inform about how such associations are established. In fact the participants in most research works fill out self-reports of personality and psychopathology at the same time that have a similar format, and this tends to oversize the overlap between domains. Furthermore, when evidence is found for one of the classic models of the relation between personality and psychopathology (i.e., complication, vulnerability, pathoplasty or continuity), whether these relations can be better explained by another model, or which model is more plausible than others to explain associations, is rarely ruled out. This scenario stagnates this research field (Durbin, 2019; Durbin & Hicks, 2014). Moreover, one of the main problems of classic models is that they do not consider normative personality trait changes throughout life. Therefore, if a trait is a precursor to a symptom, but the mean levels of that trait normally increase in a population during certain development periods, the question remains as to whether greater vulnerability during that period in the entire population should be expected, or if the risk would be limited to people with high levels of this trait earlier on in life (Durbin, 2019; Durbin & Hicks, 2014).

As previously indicated, in the last 20 years considerable evidence has accumulated for changes in average personality levels lifelong, and epidemiological studies have reported the prevalence of most mental disorders practically throughout the whole life cycle. For this reason, Durbin (2019) and Durbin and Hicks (2014) have suggested having to study associations between personality and psychopathology from a developmental perspective. However, virtually no studies on this matter exist. For children, one study has indicated changes in personality (along with over-reactive parenting), mainly increased neuroticism and decreased

agreeableness and conscientiousness, which might lead to adjustment problems (van den Akker et al., 2010). Only one previous study has addressed how personality stability-change throughout adolescence is related to the broad factors of psychopathology, including p (Mann et al., 2020; see Table 2). It was performed specifically with Mexican-origin youths and considered factors from a hierarchical model of psychopathology. Therefore, questions remain unanswered and research about the associations between the FFM and the structure of adolescent psychopathology, and about the mechanisms underlying these associations over time that constitute a vibrant and active area of inquiry, is required (Krueger et al., 2020).

CHAPTER 2

AIMS AND HYPOTHESES

Research Aims

As we stated in the introduction to this thesis, there are relevant studies that defend a bifactorial model of adolescent psychopathology (Castellanos-Ryan et al., 2016; Gomez et al., 2019; Haltigan et al.., 2018; Laceulle, et al., 2015; Murray, et al., 2016; Niarchou et al., 2017; Patalay et al., 2015). Yet despite the fact that the bifactorial model generally fits data better than other models (e.g., correlated factors) (Markon, 2019), it is still necessary to explore the meaning of the factors composing the model, especially p (Bornovalova et al., 2020; Watts et al., 2019). Therefore, tackling associations among internalizing, externalizing and p factors with other variables like personality is essential to examine the construct and criterion validity of the resulting psychopathological factors. It is also necessary to delimit which groups of symptoms are better located in each bifactor model factor. This is relevant because, although the location of certain symptoms in the structure of psychopathology is quite clear (e.g., depression in the internalizing factor) (Achenbach, 2020; Carragher et al., 2016; Caspi et al., 2014; Castellanos-Ryan et al. , 2016; Laceulle, et al., 2015; Lahey et al., 2012), the location of other symptoms, such as attention problems and hyperactivity, varies across studies (Castellanos-Ryan et al., 2016; Laceulle, et al., 2015; Mann et al., 2020; Murray, et al., 2016; Niarchou et al., 2017) and needs further clarification. In addition, as we previously indicated, although many studies have explored the relation between personality and specific disorders or symptoms, very few previous studies have examined the associations of the FFM with psychopathological factors, regardless of them being obtained from correlated or bifactor models.

Consequently, the objectives of Study 1 were to explore: 1) the structure of psychopathology in adolescents (correlated vs. bifactor models), assessed using symptom scales of the most prevalent mental disorders; 2) the location of hyperactivity and attention problems in correlated and bifactor models (i.e., externalizing or specific factor); 3) the associations of the FFM with the resulting factors of psychopathology; 4) the convergence between p and the GFP in a sample of adolescents.

Second, most empirical studies on the association of personality traits and psychopathology are cross-sectional, were carried out with adults, and focused on specific mental disorders or symptoms (Durbin, 2019; Kotov et al., 2010). Therefore, gaps in the study of the prospective associations between the FFM and the bifactor model of psychopathology in adolescents remain. In addition, the functional associations (i.e., continuum, complication or pathoplasty models) between the FFM and different broad factors of psychopathology have only been explored simultaneously in one previous study (De Bolle et al., 2012), and none has considered a bifactor model of psychopathology. For these reasons, the aim of Study 2 was to explore the associations between the FFM and broad factors of psychopathology (i.e., internalizing, externalizing, hyperactivity-attention problems and p) with a 3-year longitudinal design with adolescents by testing different trait-symptom association hypotheses.

Finally, one of the main problems of classic models (i.e., continuum, complication or pathoplasty) lies in the fact that they ignore normative changes of personality traits throughout life. For example, if a trait is a precursor of depression, but the mean levels of that trait increase in the population during certain development periods, the question as to whether we should expect greater vulnerability during that period in the entire population, or if the risk would be limited to people who display high levels of this trait earlier in life, is posed. For this reason, several authors argue that it is essential to address associations between personality and psychopathology from a developmental perspective (Durbin, 2019; Durbin & Hicks, 2014). Hence the importance of modeling the developmental course of these constructs by addressing these dynamic processes at the individual level and considering individual differences at both the starting point and during development over time (De Clercq et al., 2017). Only one previous study has explored the links between change in personality and change in broad factors of psychopathology from a hierarchical model of mental disorders in adolescents (Mann et al., 2020). Thus the aim of Study 3 was to examine the individual differences in onset and growth over time (three assessment waves every 12 months) of the FFM (i.e., personality

developmental trajectories across a three-wave assessment), and their association with the different levels of a bifactor structure of psychopathology (i.e., internalizing, externalizing, hyperactivity-attention problems and p factors) and single scales of symptoms (i.e., depression, anxiety, social anxiety, eating problems, post-traumatic symptomatology, somatic complaints, hyperactivity/impulsivity, attention problems, anger control problems, aggression, antisocial behavior and defiant behavior) as measured in the last assessment wave.

Hypothesis

Based on the literature review, the following findings were expected:

Study 1. Five-Factor model of personality and structure of psychopathological symptoms in adolescents.

- We expected to find a good fit for a bifactor model of psychopathological symptoms in adolescents, with structural differentiation between the hyperactivity and attention problems factor and externalizing symptoms.
- We predicted that p would be associated mainly with neuroticism, (low) agreeableness and (low) conscientiousness. The internalizing factor would be closely related to neuroticism, whereas externalizing problems would be principally associated with (low) agreeableness and (low) conscientiousness. The hyperactivity and attention problems factor would be related to (low) conscientiousness
- Extraversion was predicted to be weakly and negatively associated with the internalizing factor, but would also present a slight positive relation to the externalizing factor.
- Openness was not expected to be related to psychopathological factors.
- A strong convergence between p and the GFP was predicted.

Study 2. Longitudinal associations between the Five-Factor Model of personality and the bifactor model of psychopathology: continuity, pathoplasty and complication effects in adolescents.

- The hypothesized positive associations would lie between neuroticism and the internalizing symptoms and p, whereas agreeableness and conscientiousness would be negatively associated with externalizing problems and p both within and across measurement waves.
- We also expected to find a negative association between conscientiousness and hyperactivity and attention problems.
- We predicted to find a low negative association with the internalizing symptomatology and a weak positive relation to externalizing problems for extraversion.
- For trait-symptom association models, we expected to find general evidence for continuity and, to a lesser extent, for complication and pathoplasty effects between the FFM and the different factors of psychopathology.
- We expected to find general evidence for continuity and, to a lesser extent, for complication and pathoplasty effects between the GFP and p.

Study 3. Personality development and its associations with the bifactor model of psychopathology in adolescence.

- We expected to find significant individual differences in personality traits over time regarding the parameters of onset and patterns of change.
- We predicted that both parameters would not be significantly associated.
- For growth trajectories, we hypothesized minor, but significant changes, in most personality traits.

- We expected to find specific associations of both onset and growth parameters with later psychopathological outcomes: a) neuroticism would be positively associated with internalizing symptoms and p; b) agreeableness and conscientiousness would be negatively associated with externalizing problems and p; c) conscientiousness would be negatively related to hyperactivity and attention problems; d) extraversion would have a negative association with internalizing symptomatology and a positive relation to externalizing problems; e) openness would not be significantly related to psychopathological outcomes.

Summary of the Main Variables

Below a table summarizes the main variables used in all three empirical studies carried out.

Table 3.
Summary of the main variables of each empirical study

VARIABLES	STUDY 1	STUDY 2	STUDY 3
Neuroticism T1	X	X	X
Extraversion T1	X	X	X
Openness T1	X		X
Agreeableness T1	X	X	X
Conscientiousness T1	X	X	X
General Factor of Personality (GFP) T1	X	X	
Internalizing Symptoms T1	X	X	
Externalizing Symptoms T1	X	X	
Hyperactivity-inattention Symptoms T1	X	X	
General Factor of Psychopathology (p) T1	X	X	
Neuroticism T2		X	X
Extraversion T2		X	X
Openness T2			X
Agreeableness T2		X	X
Conscientiousness T2		X	X
General Factor of Personality (GFP) T2		X	

Internalizing Symptoms T2		X	
Externalizing Symptoms T2		X	
Hyperactivity-inattention Symptoms T2		X	
General Factor of Psychopathology (p) T2		X	
Neuroticism T3		X	X
Extraversion T3		X	X
Openness T3			X
Agreeableness T3		X	X
Conscientiousness T3		X	X
Internalizing Symptoms T3		X	X
Externalizing Symptoms T3		X	X
Hyperactivity-inattention Symptoms T3		X	X
General Factor of Psychopathology (p) T3		X	X

CHAPTER 3

STUDY 1

FIVE-FACTOR MODEL OF PERSONALITY AND STRUCTURE OF PSYCHOPATHOLOGICAL SYMPTOMS IN ADOLESCENTS

Published article:

Etkin, P., Mezquita, L., López-Fernández, F. J., Ortet, G., & Ibáñez, M. I. (2020). Five Factor model of personality and structure of psychopathological symptoms in adolescents. *Personality and Individual Differences, 163*. https://doi.org/10.1016/j.paid.2020.110063

Abstract

This study aims to explore the factorial structure of the most prevalent psychopathological symptoms in adolescence, and to explore the associations between the resulting psychopathological factors with both the Five-Factor Model of personality and the General Factor of Personality (GFP). A sample of 835 adolescents (M = 14.35, SD = 1.58; 49% girls) completed personality and psychopathology self-reports. The confirmatory factor analyses showed that a bifactor model of psychopathology, which included a general psychopathological factor (p factor) and specific factors (i.e., internalizing, externalizing, and hyperactivity and attention problems), better fitted the data than other competing models. The main associations found in the regression analyses were: neuroticism and introversion with the internalizing factor; low agreeableness with the externalizing factor; low conscientiousness with the hyperactivity and attention problems score; high neuroticism, low conscientiousness and low agreeableness with the p factor. Last, the GFP and p factor were substantially related, with coefficients between .42 and .49 ($p<.001$). This study suggests that a bifactor model adequately depicts the psychopathology structure in adolescence. This structure was supported by differential associations of personality traits with each resulting factor.

Keywords: personality, psychopathology, adolescents, internalizing, externalizing; big five; general factor.

Introduction

Mental disorders are one of the major causes of disability in youths aged 10-19 years (WHO, 2012) with a strong impact on society due to high socio-economic and health costs (Trautmann et al., 2016). For these reasons, a better understanding of the etiology of the most prevalent mental disorders during this life period could have important implications for developing prevention/intervention programs.

Psychopathology structure

Clinical disorders co-occur more often than expected by chance (Krueger & Markon, 2006). This comorbidity could be due to common underlying spectra (South et al., 2010). Accordingly, studies about the structure of common mental disorders have found two correlated high-order latent factors of psychopathology: internalizing, characterized by anxiety and mood symptoms; externalizing, characterized by antisocial behavior and conduct problems in both children and adults (Cosgrove et al., 2011; Krueger 1999). This structure remains stable over the time, and between age and gender groups, when employing clinical vs. community samples, and when using symptom scales, symptom counts of psychiatric diagnostic categories or categorical diagnoses (Mezquita et al., 2015). In addition, a growing body of contemporary research suggests that the psychopathology structure could be better accounted for by a bifactor model, in which a common general factor, called the p factor, emerges with externalizing and internalizing factors (Caspi et al., 2014; Carragher et al., 2015; Lahey et al., 2012; Murray et al., 2016; Tackett et al., 2013).

Although the overall psychopathology structure is well-established when conduct-related disorders, anxiety and depression are included, the location of the Attention Deficit and Hyperactivity Disorder (ADHD) in the structure is less clear. Studies tend to consider ADHD or inattention and hyperactivity-impulsivity symptoms in the externalizing factor (Carragher et al., 2014; Cosgrove et al., 2011; Laceulle et al., 2015; Tackett et al., 2013). However, ADHD

symptoms usually present the lowest factor loadings in most studies (Lahey et al., 2017; Snyder et al., 2017), or even negative factor loadings in the externalizing factor when testing bifactor models (Castellanos-Ryan et al., 2016). ADHD have also been associated with internalizing problems (Greenbaum & Dedrick, 1998; Sellbom et al., 2020), with some studies proposing them to be a separate factor from internalizing and externalizing (Achenbach et al., 2001; Sánchez-Sánchez et al, 2016). These data generally suggest that the location of ADHD symptoms within the psychopathology structure needs further examination.

Psychopathology and personality

In past decades, evidence has highlighted the close association between personality and psychopathology. Studies on specific disorders show that neuroticism is the most related trait to psychopathology (Tackett & Lahey, 2017; Widiger et al., 2019), mainly to anxiety and depression disorders (Kotov et al., 2010). Low agreeableness/antagonism and low conscientiousness/disinhibition have shown robust associations with oppositional defiant and conduct disorders in children (Herzhoff et al., 2017b), and with antisocial behavior, aggression (Jones et al., 2011) and substance use (Kotov et al., 2010) in adults.

Although personality has been postulated as a vulnerability factor that can account for comorbidity between the most prevalent mental disorders (Krueger & Tackett, 2003), research into the association between the Five-Factor Model (FFM) and the supra factors of psychopathology is limited. When a correlated psychopathology model (i.e., two correlated high-order latent factors of internalizing and externalizing without the p factor) has been specified in youths (De Bolle et al., 2012) and adults (Mezquita et al., 2015), neuroticism has shown strong associations with the internalizing factor, and low agreeableness and low conscientiousness with the externalizing factor. Exploring the FFM broad traits and the bifactor model of psychopathology is even scarcer. Caspi et al. (2014) found that the p factor in adults was related mainly to neuroticism, followed by low conscientiousness and low agreeableness, while the externalizing factor was related to low conscientiousness, low agreeableness and, to

a lesser extent, to extraversion. Last, the internalizing factor showed weak associations with neuroticism, introversion, agreeableness and conscientiousness.

As far as we know, there is only one previous study that has addressed the association of the FFM with the bifactor model of psychopathology in adolescents (Castellanos-Ryan et al, 2016). This study showed the same associations of the FFM traits with the p factor found in the study by Caspi et al. (2014). However, a different pattern of associations emerged with internalizing and externalizing factors. Specifically, neuroticism presented strong associations with the internalizing factor, and extraversion displayed a weak, but significant, association with the externalizing factor (Castellanos-Ryan et al., 2016). These differences could suggest subtle, yet distinct, developmental trends in personality-psychopathology associations, as well as differences in factors content. Overall, the association between the p factor and FFM traits deserves much more research attention.

Last, and in parallel to the general psychopathology factor, a general factor of personality (GFP) has also been proposed in the personality literature. The GFP has been interpreted as a tendency toward better emotional adjustment and increased social effectiveness (van der Linden et al, 2017). Studying the overlap between the p factor and the GFP may help to elucidate the nature of these constructs (Oltmanns et al., 2018). In line with this, Oltmanns et al. (2018) found a correlation between the GFP and the p factor of 0.72 and 0.90 with the general factor of personality disorders (GFPD), while the correlation between the p factor and the GFPD was .92. These data indicate that three general factors share a considerable amount of variance, and may reflect the extent of impairment or dysfunction within the respective persons' lives, irrespectively of whether that impairment is attributed to psychopathological symptoms, personality disorders or a certain personality configuration. Similarly, Rosenstrom et al. (2019) found a common general factor for normal personality traits and its maladaptive variants based on personality disorders. This factor showed a correlation of .49 with the p factor, which is slightly lower than those found by Oltmanns et al. (2018). As far as we know, the

association between the p factor and the GFP remains to be explored in adolescents.

The present study

There is evidence for the replicability of the bifactor structure of common mental disorders and psychopathological symptoms in both youths and adults. However, certain issues require further examination. Specifically, the present research aims to explore: a) the psychopathology structure in adolescents, assessed with symptoms scales related to the most prevalent mental disorders (correlated vs. bifactor models; see Figure 11: Models 2 and 3 vs. 4 and 5); b) the location of hyperactivity and attention problems in correlated and bifactor models (i.e., externalizing or specific factor; see Figure 11 Models 2 and 4 vs. 3 and 5); c) the associations of the FFM personality broad traits with the resulting factors of psychopathology; d) the convergence between the p factor and the GFP in a sample of adolescents.

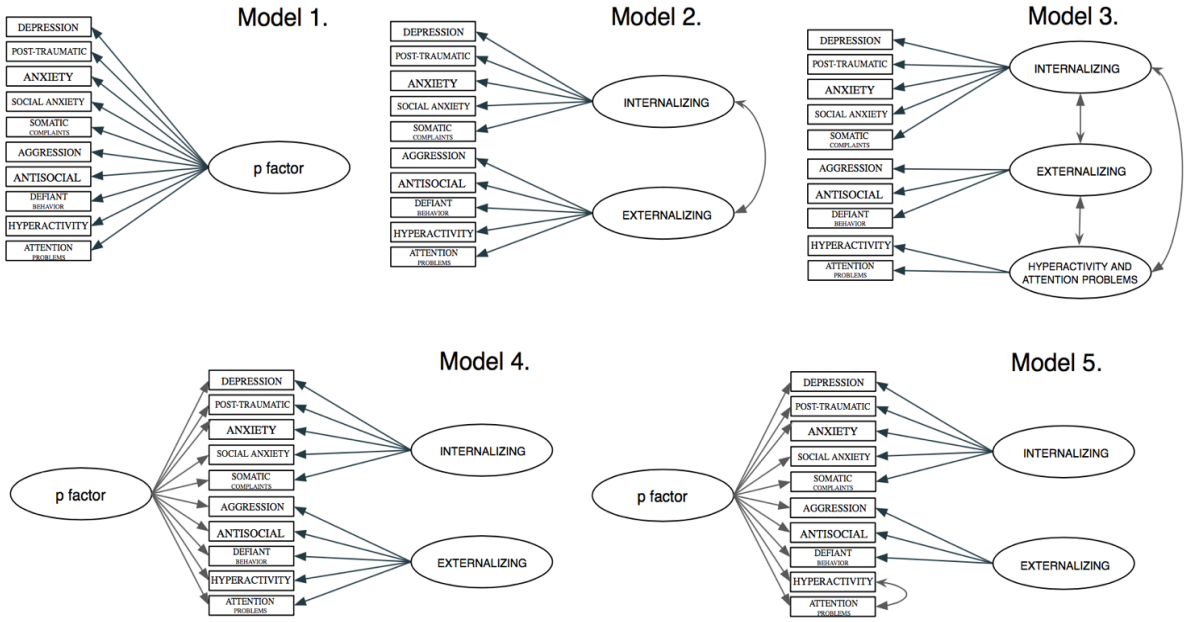

Figure 11. Hypothesized models.

Method

Sample

A sample of 835 adolescents, aged between 12 and 18 years (mean age = 14.35, *SD* = 1.58; 49% girls), participated in this study. All the participants were high school students. Their

age distribution was: 12 to 13 years (34.87%); 14 to 16 years (55.42%); 17 to 18 years (9.71%). Most (83.21%) were Spanish, and the rest were from: 7.82% Romania; 3.81% Latin America; 2.04% Morocco; 1.42% Asia; 0.60% the Middle East; 1.13% other European countries.

Procedure

In the first place, two secondary institutes (IES) in the city of Castellón were contacted, and the relevant authorization was obtained from the corresponding autonomous bodies and educational centers to collect the data. To obtain the data, the parents or legal guardians of the study participants agreed to participate in the study, signing an informed consent detailing the instruments to be used, the objectives of the study, the possible benefits and harms, the confidentiality measures and data protection used and the possibility to stop participating at any time. The administration of the questionnaires was carried out by PhD students from the IDAP research team during tutoring hours, members of the research team were available for questions during each measurement occasion. The participation of the students was voluntary, anonymous and the project was approved by the Deontological Committee of the Universitat Jaume I (Resolution: 27-07-2015). The participants were evaluated in class during tutoring hours, the questionnaires were filled out on paper and safeguarding their data confidentiality was ensured. As a reward, participants received a small present and took part in a ruffle for backpacks.

Measures

Psychopathological symptoms. The SENA (Fernández-Pinto et al., 2015), as described before, is a wide assessment tool containing different specific instruments for the evaluation of children and adolescents; although, for the purpose of this study only the self-report for high school adolescents (aged 12-18 years) was used. Attending to the aims of this study, the scales most related to the internalizing and externalizing factors were selected and assessed: depression, anxiety, social anxiety, post-traumatic symptomatology, somatic complaints, hyperactivity/impulsivity, attention problems, aggression, antisocial behavior and defiant behavior. The participants answered a 5-point Likert-type scale that went from 0 (never/almost

never) to 4 (always/almost always). The scores of the SENA scales were obtained by summing the items of each symptom scale. There were no inverse items.

Personality traits. The short form (JS NEO-S; Ortet et al., 2010) of the Junior version of the Spanish NEO-PI-R (Ortet et al., 2012) is a 150-item inventory based on Costa and McCrae's model, that assesses: neuroticism, extraversion, openness to experience, agreeableness and conscientiousness. The participants answered on a 5-point Likert-type scale that ranged from 0 (strongly disagree) to 4 (strongly agree). Evaluate these 5 dimensions and 30 facets (6 for each trait). It consists of 150 items that evaluate the following traits and their facets: Neuroticism (N1. Anxiety, N2. Hostility, N3. Depression, N4. Social anxiety, N5. Impulsivity, N6. Vulnerability), Extraversion (E1. Cordiality, E2. Gregariousness, E3. Assertiveness, E4. Activity, E5. Search for emotions, E6. Positive emotions), Openness (openness to experience: O1. Fantasy, O2. Aesthetics, O3. Feelings, O4. Actions, O5. Ideas, O6. Values), Agreeableness (A1. Confidence, A2. Openness, A3. Altruism, A4. Conciliatory attitude, A5. Modesty, A6. Soft character), Conscientiousness (C1. Competence, C2. Order, C3. Sense of duty, C4. Search of success, C5. Self-discipline, C6. Deliberation). The inverse items were turned into direct and the trait scores were obtained by summing the facet scores. The Cronbach's alphas of all the herein employed scales are presented in Table 4.

Analysis

Confirmatory factor analyses (CFA) were performed to test the fit of the different hypothesized models (see Figure 11) using Mplus 7.4. Fit was assessed using the Tucker-Lewis Index (TLI) > 0.95, the Comparative Fit Index (CFI) > 0.95, Standardized Root Mean Square Residual (SRMR) < .06, Root Mean Square Error of Approximation (RMSEA) < .08 (Hu & Bentler, 1999) and AIC (Akaike, 1987; Gignac, 2016), for which the lower the value, the better the fit. CFI and RMSEA differences were used to compare the model fit of the competing models. The ΔCFI should be ≤.010 and the ΔRMSEA ought to be ≤ .015 to consider two models to be equivalents (Chen, 2007). The effects of age and gender were controlled for by covarying

both with the other variables in the model.

Three methods were followed to extract the GFP. First, the first unrotated factor scores were saved when an EFA was applied to the 30 facets using SPSS 24; second, a one-factor CFA was performed with the five broad traits using Mplus 7.4. (see van der Linden et al., 2017); third, a bifactor Exploratory Structural Equation Model was performed with the 30 facets (Arias et al., 2018). The results of the GFP extractions can be consulted in SM2.

SPSS 24 was also used to conduct descriptive analyses, Cronbach's alpha, and to explore the associations of the FFM and the GFP with the psychopathological factors (i.e., regression analysis). Cohen's d was performed to compare the mean scores of the personality traits and psychopathological scales across sex groups using the online calculator at http://www.polyu.edu.hk/mm/effectsizefaqs/calculator/calculator.html.

Results

Descriptive data

The descriptive results for all the studied variables are presented in Table 4.

Table 4.
Descriptive Results

		Total sample		Boys		Girls		Boys - Girls	
	α	M	SD	M	SD	M	SD	*d*	*t*
Neuroticism	.83	56.22	14.89	53.09	13.62	59.41	15.38	.43	-6.10***
Extraversion	.83	74.70	15.09	74.28	13.97	75.09	16.05	.05	- .75
Openness	.75	71.69	12.77	67.99	11.46	75.14	12.83	.59	-8.24***
Agreeableness	.82	74.65	13.73	72.13	14.12	77.42	13.01	.39	-5.46***
Conscientiousness	.89	70.92	17.07	69.08	16.04	72.92	17.94	.22	-3.16**
Depression	.90	10.82	9.66	8.75	7.80	12.96	10.93	.44	-6.37***
Anxiety	.89	14.26	9.03	11.34	7.85	17.35	9.19	.70	10.12***
Social anxiety	.83	9.97	6.54	8.78	6.09	11.20	6.79	.37	-5.40***
Post-traumatic	.79	9.81	6.94	8.30	6.36	11.40	7.15	.46	-6.58***
Somatic complaints	.79	10.15	6.14	8.60	5.57	11.76	6.31	.53	-7.63***

Hyperactivity	.85	11.66	8.05	11.35	8.31	11.96	7.78	.07	-1.08
Attention problems	.89	14.01	8.58	13.70	8.55	14.31	8.65	.07	-1.03
Aggression	.76	3.03	3.87	3.59	4.40	2.41	3.09	.31	4.50***
Antisocial	.78	2.60	4.12	3.21	4.94	1.92	2.88	.32	4.64***
Defiant behavior	.63	1.72	2.04	1.70	2.09	1.73	2.01	.01	-.23

Note. Cohen's d values of .20, .50 and .80 correspond to small, medium and large effect sizes, respectively (Cohen, 1992). *$p < .05$. **$p < .01$. ***$p < .001$. Cronbach's alpha of .60 or higher is adequate for short scales (Loewenthal, & Lewis, 2018). The Defiant behavior scale comprises only three items.

Confirmatory Factor Analyses

First, a one-factor model of general psychopathology (Model 1, Figure 11) was specified, with poor fit indices (see Table 5). The two-factor correlated model of the internalizing and externalizing problems (Model 2, Figure 11) showed better fit indices (see Table 5), but they were still under the recommended cut-offs. Of the correlated models, the three-factor solution (Model 3, Figure 11), in which the externalizing and hyperactivity and attention problems were differentiated, showed the best fit indices. Next, bifactor models based on Model 2 (named Model 4 in Figure 11) and Model 3 (named Model 5 in Figure 11) were specified. Both models had fit indices above the recommended cut-offs. However, the factor loadings of the hyperactivity and attention problems on the externalizing factor in Model 4 were -.07 ($p > .05$) and -.22 ($p > .01$), respectively, which suggests that they were not well conceptualized in the externalizing factor. For this reason, Model 5 was chosen as the final model (see Figure 12). This model includes a general factor of psychopathology (*p* factor), an internalizing factor composed of depression, posttraumatic, anxiety and social anxiety symptoms, and somatic complaints, and an externalizing factor composed of aggression and antisocial and defiant behaviors. Although we could not specify a second-order factor of hyperactivity and attention problems in Model 5 because we needed more than the observed variables to do so, we included a correlation between both variables, which resulted in an equivalent model in fit index terms. This model showed that attention problems and hyperactivity shared variance to one another ($r = .29$, $p < .001$) that was not shared with the

other observed variables once the p factor was controlled for.

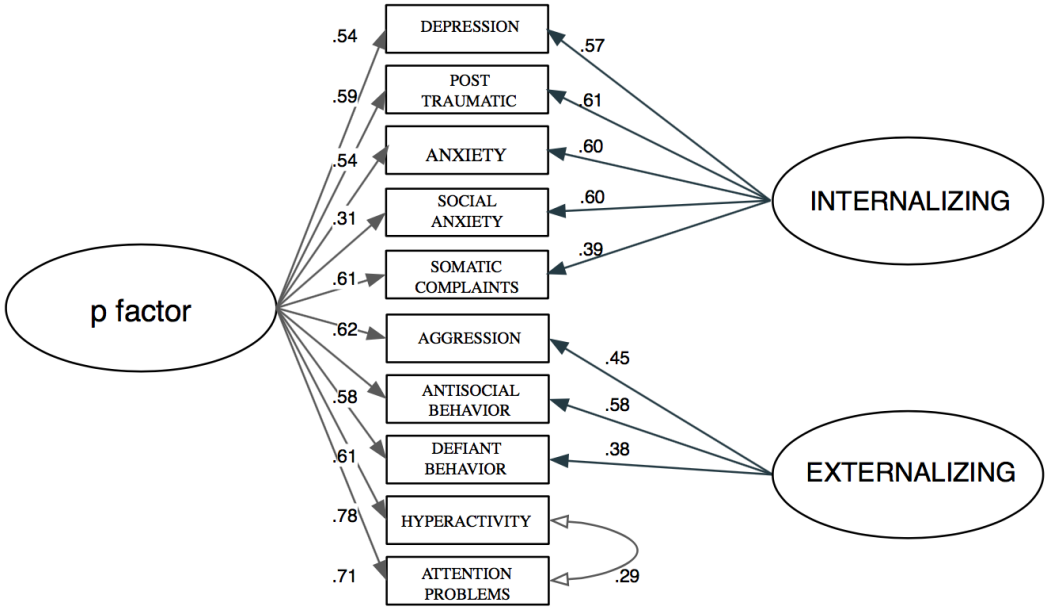

Figure 12. Standardized results for Model 5.
Note. All the factor loadings and correlations were significant at p <.001.

Table 5.

Factor Models.

Model	χ^2	*d.f.*	*p*	CFI	TLI	RMSEA	SRMR	AIC	Compared model	*d.f.* difference	*p*	Δ CFI	Δ RMSEA
1	904.776	35	<.001	.770	.573	.173	.092	49470.139	-	-	-	-	-
2	425.840	34	<.001	.896	.802	.118	.053	48747.792	1	1	<.001	.126	.055
3	233.851	32	<.001	.947	.892	.087	.039	48499.809	2	2	<.001	.051	.031
4	178.561	25	<.001	.959	.894	.086	.026	48437.961	2	9	<.001	.063	.032
5	184.292	26	<.001	.958	.895	.086	.027	48440.753	3	6	<.001	.011	.001

Table 6.

Regression Analyses

	Model 3						**Model 4**						**Model 5**					
	INT		EXT		HAP		INT		EXT		P Factor		INT		EXT		HAP*		P Factor	
	ΔR²	**β**	ΔR²	**β**	ΔR²	**β**	ΔR²	**β**	ΔR²	**β**	ΔR²	**β**	ΔR²	**β**	ΔR²	**β**	ΔR²	**β**	ΔR²	**β**
Regression #1	.39		.42		.34		.42		.07		.34		.42		.09		.34		.33	
Neuroticism		.53***		.21***		.33***		.48***		-.10*		.31***		.47***		-.13**		.33***		.35***
Extraversion		-.12***		.19***		.22***		-.37***		.05		.21***		-.38***		.09*		.21***		.19***
Openness		.10***		-.00		.02		.13***		-.00		.01		.13***		-.02		.02		.03
Agreeableness		-.07*		-.24***		-.11***		.02		-.25***		-.13***		.03		-.24***		-.11***		-.14***
Conscientiousness		-.06		-.29***		-.39***		.28***		.06		-.40***		.27***		-.07		-.40***		-.35***
Regression #2	.20		.13		.17		.07		.00		.18		.07		.00		.18		.18	
GFP_UF		.44***		.36***		.41***		.26***		.00		.42***		.27***		.06		.43***		.42***
Regression #3	.25		.13		.22		.09		.00		.22		.09		.00		.20		.22	
GFP_CFA		.50***		.36***		.47***		.29***		.07		.47***		.31***		.01		.45***		.47***
Regression #4	.10		.15		.16		.00		.01		.17		.00		.01		.15		.17	
GFP_ESEM		.31***		.39***		.40***		.06		.07		.42***		.06		.12**		.38***		.42***

Note. INT=Internalizing factor; EXT= Externalizing factor; HAP= Hyperactivity and Attention factor (*or score); GFP_UF= GFP obtained when running an Unrotated Factor Model (Main Components); GFP_CFA= GFP obtained when performing one-factor CFA; GFP_ESEM=GFP obtained when performing bifactor ESEM
*p<.05; **p<.01; ***p<.001.

Regression analyses

In the regression analyses, the factor scores of the CFAs that showed acceptable or good fit indices (Models 3 to 5) were introduced as dependent variables. The personality traits or the GFPs were included as independent variables. As a factorial score of hyperactivity and attention problems could not be extracted in Model 5, we introduced the sum of the symptoms of hyperactivity and attention problems as a dependent variable after regressing out the age and gender effects. Before performing each regression analysis, the assumptions of linearity, homoscedasticity and absence of multicollinearity were confirmed.

The results revealed that the p factor was associated mainly with high neuroticism and low conscientiousness, followed by high extraversion and low agreeableness (Models 4 and 5, Table 6). The internalizing factor was related mainly to neuroticism in the three models. However, when the p factor was specified, the internalizing factor also showed close associations with introversion. The externalizing factor was related mainly to low conscientiousness and low agreeableness (Model 3). Nevertheless, when the p factor was specified, the association with low conscientiousness was no longer significant (Model 4 and 5). The hyperactivity and attention factor (Model 3) / score (Model 5) showed the closest associations with low conscientiousness.

The GFPs were strongly associated with the p factor, but also showed similar associations with the HAP score (Model 5) and the internalizing factor (Model 3). Associations were similar regardless of the extraction method employed to obtain the GFP score.

Discussion

The aims of the present research were to test the factorial structure of the most prevalent psychopathological symptoms in adolescents and to explore the associations of the factors obtained with the Big Five and the GFP.

When the psychopathology structure was explored, the bifactor models of psychopathology (Model 4 and 5) better fitted the data than the correlated models, which falls

in line with the most recent studies on the psychopathology structure (Gomez et al., 2019; Murray et al., 2016). The final model (Model 5) also showed that the hyperactivity and attention deficit scales had correlated variance, which was not shared with the externalizing factor. This result was similar to a previous study in which the SENA was employed (Sánchez-Sánchez et al., 2016). It also coincided with those studies that have employed other assessment tools, such as CBCL/6-18 and YSR (Achenbach et al., 2001), in which attention deficit and hyperactivity symptoms are narrow-band syndromes that do not load on the broad-band syndrome of internalizing and externalizing symptomatology.

The regression analyses findings also supported this structural differentiation between ADHD symptoms and other externalizing symptoms as each psychopathology trait was related to specific personality traits: the p factor with high neuroticism, low agreeableness, low conscientiousness, and extraversion; the internalizing factor chiefly with neuroticism and introversion; the externalizing factor with low agreeableness and low neuroticism; hyperactivity and attention problems mainly with low conscientiousness (Model 5, Table 6).

When comparing our findings to previous studies on the association of the FFM with the bifactor psychopathology structure (Castellanos-Ryan et al., 2016; Caspi et al., 2014), we found similarities, but also discrepancies. The association of the p factor with high neuroticism, low agreeableness and low conscientiousness is robust across studies, independently of them being conducted in adolescents, like we did (Castellanos-Ryan et al., 2016), or in adults (Caspi et al., 2014). Neuroticism was the personality trait that was most closely associated with the internalizing factor in the three studies, although associations were usually more marked in youths than in adult populations. The associations of the FFM with the externalizing factor revealed some discrepancies among studies, which can be partly explained by the different symptom scales included in structural models. Hence in the present study, in which the externalizing factor comprised behavioral problems, low agreeableness and low neuroticism were the personality traits to show the closest association with this factor, similarly to the study

of Caspi et al. (2014) conducted in adults. However, the externalizing factor in the work by Castellanos-Ryan et al. (2016) comprised mainly substance use disorder symptoms, which could explain why they found that externalizing was related only to extraversion.

Last, and in relation to the general factors, a substantial relation between the GFP and the p factor appeared in our study. Like previous studies, the found associations were similar regardless of the extraction method employed to obtain the GFP (van der Linden et al, 2017). The beta indices ranked from .42 to .47 ($p<.001$), were similar in magnitude to those reported by the study of Rosenstrom et al. (2019), and were somewhat lower than the .72 correlation reported by Oltmanns et al. (2018). Thus, our findings partially support the notion that general factors of personality and psychopathology may represent the extent of impairment or dysfunction associated with a certain personality configuration and the presence of psychopathological symptoms (Oltmanns et al., 2018), but also suggest certain specificity for each general factor, at least in adolescents. In any case, and as far as we know, this is the first study conducted in youngsters that examines the association between the p factor and the GFP. So replication studies are clearly needed.

The present study has several limitations. First, it used only self-report scores. Future studies should consider obtaining reports from other informants like parents or teachers (Achenbach & Ndetei, 2012). Second, its design is cross-sectional. Longitudinal designs would allow the study of prospective and functional associations between personality and psychopathology (De Bolle et al., 2012). Third, including additional measures could help to depict a more complete psychopathology structure, and to refine the associations of the FFM with the resulting psychopathology factors. Last, it was not possible to make a categorical diagnosis. Additional studies with clinical adolescent populations could be useful to better understand the associations of personality with the psychopathology structure.

In conclusion, this research supported a bifactor structure of psychopathology symptoms in adolescence. The differential associations of FFM traits with each subfactor

conferred bifactor structure support. Our findings have implications for clinical practice as they might suggest that different interventions may be relevant at various levels of this hierarchy. Thus, intervention protocols, such as the unified protocol proposed by Barlow et al. (2017), could be useful for preventing/treating internalizing transdiagnostic spectra. Moreover, the existence of a p factor highlights an opportunity to implement transdiagnostic prevention/intervention programs at early ages, even when children manifest a tangle of undifferentiated symptoms (Forbes et al., 2019). Finally, FFM traits appear to have strong associations with this psychopathological structure and can be considered early indicators of riskier personality profiles.

Declaration of Conflicting Interests

The authors declare no potential conflicts of interest in relation to the authorship, research or the publication of this study.

Funding Sources

The first author received a Predoctoral Scholarship (GRISOLIA/2017/129), from the Valencian Community Government, Spain. This research was funded by grants RTI2018-099800-B-I00 from the Spanish Ministry of Science, Innovation and Universities (MICIU/FEDER), GV/2016/158 and AICO/2019/197 from the Generalitat Valenciana; UJI-B2017-74 and UJI-A2019-08 from the Universitat Jaume I.

Supplementary Material

First Unrotated Factor Model

Table 7.
Unrotated Factor Solution using Principal Axes Factoring

	1	2	3	4	5
C1	.626	.128	.008	-.289	-.122
C4	.621	.077	.258	-.358	.040
C5	.615	.272	-.047	-.272	-.103
E1	.591	-.279	.173	.192	.220
A1	.566	.082	.087	.082	.237
C2	.564	.102	-.123	-.265	.069
N6	-.560	.320	.278	-.099	.065
E6	.546	-.345	.156	.120	.002
C3	.507	.223	.345	-.278	.049
E3	.467	-.277	-.073	.109	-.148
E4	.444	-.427	.054	.092	.059
C6	.415	.413	-.252	-.153	.035
E2	.356	-.462	-.024	.068	.190
A4	.338	.459	-.071	.208	.028
A5	-.111	.435	.133	.275	.152
E5	.084	-.429	.265	-.085	-.119
A2	.399	.422	.013	.310	.220
O5	.163	.382	.169	.032	-.347
N2	-.351	-.355	.280	-.084	.072
N5	-.226	-.314	.304	.092	.012
N4	-.281	.239	.559	-.182	.167
N3	-.503	.232	.533	-.220	.149
A6	.313	.075	.490	.201	.087
O3	.226	-.162	.465	.009	-.154
N1	-.201	.043	.459	.038	.170
O4	.346	-.294	.426	.001	-.147
A3	.389	.301	.126	.427	.077
O6	-.026	.141	.092	.257	-.169
O2	.147	.233	.304	.092	-.444
O1	-.131	.037	.223	.267	-.327

Confirmatory Factor Analysis

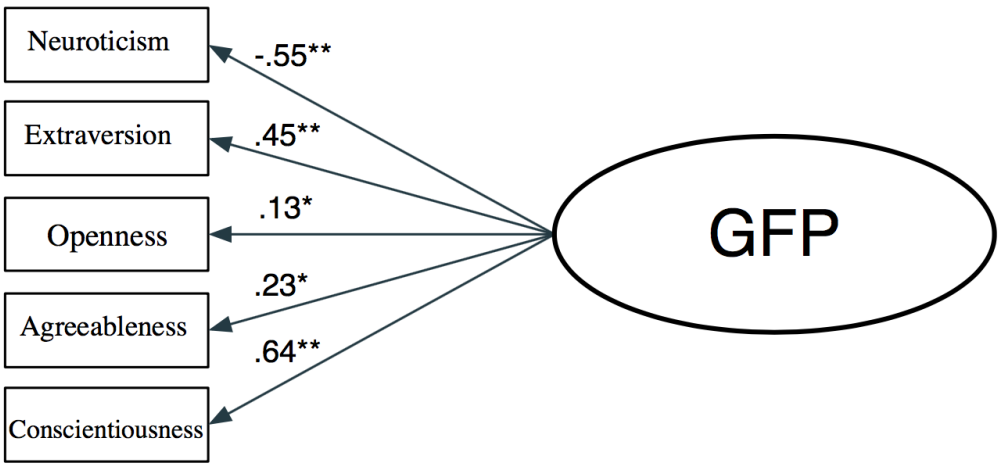

Figure 13. Confirmatory Factor Analysis of the General Factor of Personality.
Note: GFP= General Factor of Personality;
* $p<.05$, ** $p<.001$

Table 8.
Fit indices of the Confirmatory Factor Analysis.

χ^2	*p*	*d.f.*	AIC	CFI	RMSEA	SRMR
35.186	.000	5	31984.752	.872	.088	.032

Bifactor Exploratory Structural Equation Model (ESEM).

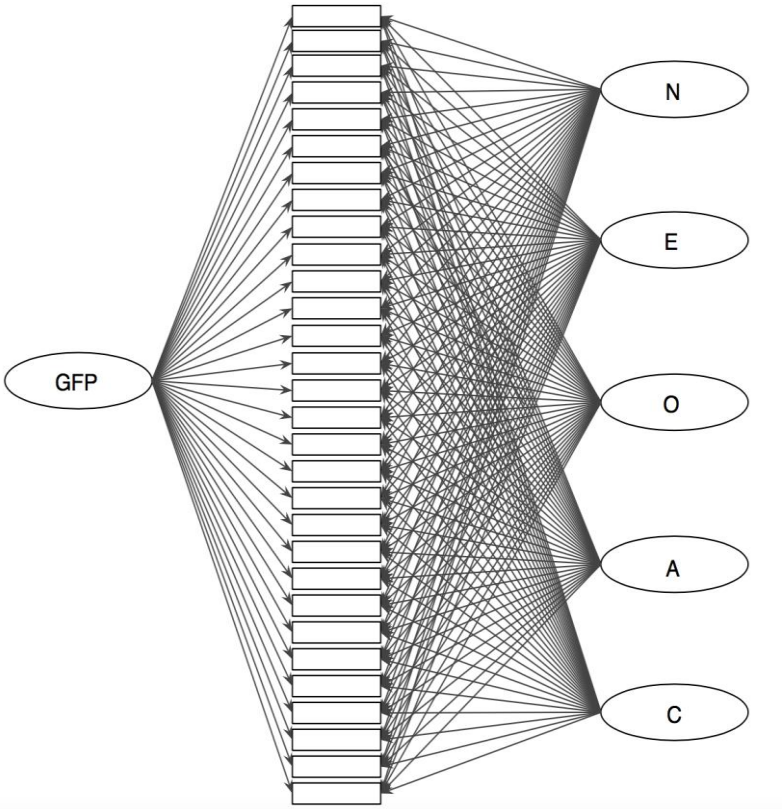

Figure 14. Bifactor ESEM.
Note: GFP= General Factor of Personality. N=Neuroticism; E=Extraversion; O=Openness; A=Agreeableness; C=Conscientiousness.

Table 9.
Fit indices of the Bifactor ESEM.

χ^2	*p*	d.f.	AIC	CFI	RMSEA	SRMR
742.771	.000	270	120015.819	.921	.047	.027

Table 10.
Standardized factor loadings of each trait in the broad traits of the FFM and the GFP (Bifactor ESEM model)

Facet	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness	GFP
N1	.48***	.07.	.10	.15**	-.02	-.15
N2	.32*	.36***	.06	-.06	.18*	-.55***
N3	.73***	-.26***	.05	-.02	-.05	-.26**
N4	.69***	-.20*	.05	-.01	-.07	-.02
N5	.23*	.32***	.17*	.00	-.03	-.33*
N6	.48***	-.41***	.03	.04	-.11*	-.32***
E1	.00	.55***	-.05	.13***	-.04	.48***
E2	-.12**	.56***	-.15***	-.04	.02	.16*
E3	-.30***	.40***	.15**	.02	.14**	.23***

E4	-.13*	.58***	.02	-.01	.10	.21*
E5	.13*	.37***	.17*	-.31***	-.06	.05
E6	-.07	.49***	.09	-.08*	-.11	.49***
O1	.03	-.04	.44***	.06	-.20***	-.08
O2	.06	-.11*	.58***	.12**	.16***	.12*
O3	.26***	.27**	.34***	-.08	-.03	.24
O4	.19***	.41***	.31**	-.13*	.00	.30*
O5	.04	-.30***	.39***	.08	.06	.26***
O6	-.05	-.05	.28***	-.23***	-.03	-.06
A1	.01	.19**	-.11*	.22***	.05	.56***
A2	-.06	-.05	-.03	.64***	.13**	.33***
A3	-.05	.05	.15***	.57***	-.02	.34***
A4	-.13	-.26***	.02	.35***	-.04	.44***
A5	.16***	-.23***	.04	.53***	.00	-.08
A6	.33***	.20*	.22**	.23***	-.10	.38***
C1	-.11**	.04	.08*	-.07	.45***	.54***
C2	-.16***	.10*	-.13**	.07*	.57***	.37***
C3	.29***	.02	.08	.03	.34***	.55***
C4	.17***	.15*	.04	-.07	.45***	.58***
C5	-.14***	-.06*	.06	.06	.56***	.50***
C6	-.19*	-.29***	-.16*	.11	.24*	45***

Note: In order to help the model properly converge, the facet of gregariousness in extraversion was set at 1 (∼1). GFP= General Factor of Personality (ESEM).
* p<.05, ** p<.01, *** p<.001

Correlations.

Table 11.
Correlations between General Factors of Personality

	1 GFP_ ESEM	2 GFP_ CFA	3 GFP_ UF
1	-	.82*	.87*
2		-	.95*
3			-

GFP_UF= GFP obtained when running an Unrotated Factor Model (Main Components); GFP_CFA= GFP obtained when performing a one-factor CFA; GFP_ESEM=GFP obtained when performing a bifactor ESEM;
* p<.001

CHAPTER 4

STUDY 2

LONGITUDINAL ASSOCIATIONS BETWEEN THE FIVE-FACTOR MODEL OF PERSONALITY AND THE BIFACTOR MODEL OF PSYCHOPATHOLOGY: CONTINUITY, PATHOPLASTY AND COMPLICATION EFFECTS IN ADOLESCENTS

Abstract

The study of the bifactor structure of psychopathology, which includes a general factor of psychopathology (or p factor) in addition to the internalizing or the externalizing factors, has gained attention. However, its associations with the Five-Factor Model (FFM) of personality has been addressed in few studies, and none has examined different plausible etiological models (i.e., continuity, pathoplasty, complication) to explain its relationship, which is the aim of the present research. Additionally, the longitudinal association of the General Factor of Personality (GFP) and the p factor will be also explored. Personality and psychopathological symptoms of high school students were assessed at three time points (once a year) (n = 655; *M* = 13.79, *SD* = 1.24; 49.8% girls). Confirmatory Factor Analysis (and measurement invariance across waves) were tested for the traits, the GFP and the bifactor model of psychopathology. While the bifactor model and the one-factor solution for each personality trait displayed good fit to the data and remained invariant over time, the structure of the GFP was adequate and invariant in two of the three waves. The resulting factors were included in cross-lagged panel models and showed that the FFM traits and the psychopathology factors influenced each other reciprocally. Most associations fell in line with the continuity model, but minor pathoplastic and complication effects were also reported. Similar associations were found between the GFP and the p factor. These results suggest that interventions in riskier personality profiles might prevent the development of general and more specific psychopathology spectra.

Keywords: *psychopathology; personality; continuity; pathoplasty; complication; p factor.*

Introduction

Mental disorders have a marked negative impact on our society due to both substantial health and socio-economic costs (Trautmann et al., 2016). A better understanding of the determinants of the most prevalent mental disorders in adolescence, such as personality, could have important implications for developing prevention and treatment intervention programs. Various personality trait structure models exist, but the Five-Factor Model (FFM) of personality (McCrae & Costa, 2010) offers a useful descriptive taxonomy according to many personality psychologists (John et al., 2008). When exploring the associations between the FFM and single mental disorders or scales of symptoms, various meta-analyses reveal that neuroticism is the most closely related trait to anxiety and mood disorders (Jeronimus et al., 2016; Kotov, et al., 2010), while low agreeableness and low conscientiousness are associated mainly with drug use, behavioral and oppositional defiant disorders (Herzhoff, et al., 2017b; Kotov et al., 2010; Malouff et al., 2007; Ruiz et al., 2008).

There are also a few studies that explore the associations between personality traits and a correlated model of psychopathology in which an internalizing factor, composed mainly of anxiety and depression symptoms; and an externalizing factor, composed mainly of substance use and antisocial behavior, are specified and correlated with each other. These studies showed that neuroticism is mainly related to the internalizing factor, while low agreeableness and low conscientiousness are related to the externalizing factor (Carragher et al., 2015; Cosgrove et al., 2011; Krueger & Markon, 2006; Hengartner, 2018; Mezquita et al., 2015; Watts, et al., 2019). Recently, a bifactor model of psychopathology has also been tested, in which in addition to the internalizing and externalizing factors or even a psychotic factor, a general factor of psychopathology (or p factor) arose (Caspi et al., 2014, Lahey et al., 2012; Laceulle et al., 2015; Gomez et al., 2019; Murray, et al, 2016). While the correlated model of psychopathology explains the high comorbidity among the commonest mental disorders within each spectrum, the bifactor model emphasizes the general predisposition to psychopathology. Studies that

relate the p factor with personality showed that the p factor linked mostly with high neuroticism, followed by low conscientiousness and low agreeableness in adolescents (Castellanos-Ryan et al., 2016; Etkin et al., 2020) and adults (Caspi et al., 2014).

Considering the close association between personality and psychopathology, and in order to better understand the meaning of the p factor, previous studies have also explored whether there is overlap between the p factor and the General Factor of Personality (GFP) (Etkin et al., 2020; Oltmanns et al., 2018; van der Linden et al., 2017). Some authors have suggested that the overlap between both factors may represent the extent of impairment or dysfunction associated with a certain personality configuration and the presence of psychopathological symptoms (Oltmanns et al., 2018). In the adult population, a correlation of .72 (Oltmanns et al., 2018) among both factors has been found, while in adolescents previous studies found beta indices from 0.42 to 0.47 ($p < .001$) (Etkin et al., 2020).

Although all of these studies evidence that personality and psychopathology are associated with each other, they do not clarify the mechanisms by which they are related. To explain the functional relationship between both variables, four major models have been proposed (for reviews, see De Fruyt et al., 2017a; De Fruyt et al., 2017b; South, et al, 2010). The first model, predisposition/vulnerability, proposes that pre-existing personality traits predispose people to develop certain mental illnesses; for instance, high neuroticism may lead to the development of depressive disorders in children (Tackett, 2006; Nigg, 2006) and adults (Hengartner et al., 2016). The second model, complication/scar, suggests that experiencing a certain form of psychopathology causes some changes in personality. For instance, childhood antisocial behavior problems predict increased neuroticism in adulthood (Shiner et al., 2002). The third model, pathoplasty/exacerbation, indicates that premorbid personality is considered to have an effect on the expression, course, and severity of disorders, and also on treatment response, but they might have independent causes. For example, one study indicated that the changes in childhood personality and over-reactive parenting were associated with adjustment problems

later on in adolescence (van den Akker et al., 2010). Finally, the fourth model, continuity/spectrum, suggests that personality traits and psychopathology are both part of one continuous latent dimension (Durbin, 2019). For instance, personality disorders are understood as extreme versions of general personality traits (Samuel et al., 2010). Regarding this fourth model, it is possible to theoretically differentiate between a general continuity model that claims a trait and disorder exist on a continuum from normal traits to psychopathology, and a spectrum model that also assumes common causes and a variability mechanism on such a continuum (De Fruyt et al., 2017b).

Different studies have investigated all four models, but very few have explored them simultaneously (De Bolle et al., 2012; Hengartner, 2018; Klimstra, et al., 2010), which hinders broader conclusions (De Fruyt et al., 2017a). This is partly due to the difficulty to perform these kinds of studies, which required multiple assessments across time and to assess both variables, personality and psychopathology, in each wave of assessment. In one of these previous studies, Klimstra et al. (2010) addressed the longitudinal relations between the FFM and two problem behaviors, depression and aggression, performing cross-lagged panel models. They found that effects between personality and problem behavior were bidirectional. These effects were interpreted as vulnerability and complication effects. Specifically, neuroticism, extraversion and conscientiousness predicted depression, while agreeableness, conscientiousness and openness predicted aggression. Conversely, neuroticism, extraversion, agreeableness and conscientiousness were predicted by depression, while aggression predicted neuroticism and agreeableness. They studied cross-sectional correlations only at T1, and observed significant associations between low emotional stability, low extraversion and low agreeableness with problem behavior. These results have been interpreted in subsequent studies as evidence of the continuity model (De Bolle et al., 2012; De Bolle et al., 2016).

As far as we know, only De Bolle et al. (2012) and De Bolle et al. (2016) have simultaneously studied the above-mentioned etiological models on the associations between

personality and the correlated model of psychopathology (i.e., in which two factors of internalizing and externalizing symptoms without a p factor are specified) with a longitudinal-prospective design in children. The authors found evidence for the continuity model to explain the relations between psychopathology and personality when considering both the Five-Factor Model traits (De Bolle et al., 2012) and maladaptive traits (De Bolle et al., 2016). These associations were more robust for conceptually closer personality traits and psychopathology symptoms, such as the neuroticism/introversion–internalizing problems relation and the low agreeableness–externalizing problems association. Specific complication/scar effects were found from internalizing to neuroticism and conscientiousness, and from externalizing to extraversion and agreeableness traits. Pathoplasty effects were observed for agreeableness on internalizing and externalizing, and for extraversion on externalizing (De Bolle et al., 2012).

Despite these advances, longitudinal studies about the etiological models of personality-psychopathology associations are scarce, especially in adolescents (Durbin, 2019). Moreover, no previous studies with adolescents have longitudinally explored these associations between personality and the bifactor model of psychopathology, nor between the GFP and the p factor.

The present study

The current work aims to empirically study the associations between the FFM of personality and the bifactor model of psychopathology, in which an internalizing, externalizing, hyperactivity and attention problems, and the general (p) factor are specified (see Etkin et al., 2020 Model 5 for a similar specification of the structural model) in a 3-year longitudinal design with Spanish adolescents. In order to achieve this aim, cross-lagged panel models would be performed. Additionally, the association between the p factor and the GFP would be longitudinally explored using the same methodology. The hypothesized associations were between neuroticism and all the symptoms, mainly the internalizing factor (De Bolle et al., 2012; 2016; Etkin et al., 2020) and the p factor (Brandes et al., 2019), whereas agreeableness and conscientiousness would be negatively associated with externalizing symptoms (De Bolle

et al., 2012; 2016; Etkin et al., 2020; Klimstra et al., 2010) both within and across waves of measurement. We also expected to find a negative association between conscientiousness and hyperactivity-attention problems (Etkin et al, 2020), and we predicted to find negative associations with internalizing problems for extraversion (Caspi et al., 2014; Etkin et al., 2020). The trait openness would not be included in the analyses as most previous research suggests no significant associations with psychopathology (Kotov et al., 2010). For the trait-symptom association models, we expected to find general evidence for continuity, and to a lesser extent of complication and pathoplasty effects between the FFM and the different factors of psychopathology and between the GFP and the p factor (De Bolle et al., 2012; 2016). The links between previously assessed personality traits and subsequent symptoms have been considered suggestive of the vulnerability hypothesis in previous studies (Klimstra et al., 2010). However, as the effects in the present work are not restricted to participants without a history of mental disorders as in other studies (Laceulle et al., 2014), such a model cannot stringently be confirmed and it is, therefore, safer to attribute these effects to the pathoplasty model (Hengartner, 2018). Hence, vulnerability was not included in our hypotheses. This study is the first to explore the association hypotheses between the FFM and a bifactor model of psychopathology, and between the GFP and the p factor in adolescents.

Method

Sample

High school students were assessed at three time points once a year. For the first wave (T1), the sample consisted of 831 Spanish adolescents, all aged between 12-18 years (M = 14.35, SD = 1.58; 50.6% girls); n = 619 for the second wave 1 year later (T2, 50.8% girls, mean age of 14.74 years; SD = 1.22); finally, n = 465 for the third wave 1 year later (T3, 49.9% girls, mean age 15.22; SD = 1.00). Of this total sample, analyses were performed on those participants that completed at least two of the three assessment time points for personality or psychopathological symptoms: n = 655; (M = 13.79, SD = 1.24; 49.8% girls). The age

distribution in the final group was as follows: 43.3% between 12-13 years old, 55% between 14-16 years old and 1.7% between 17-18 years old. Although the sample was heterogeneous in nationality terms, most participants were born in Spain (82.3%).

Procedure

Participation was voluntary, during class hours, and after receiving informed consent from the school and parents or guardians. This study was previously approved by the Deontological Committee of the authors' university. Questionnaires were filled in on paper and safeguarding of personal data confidentiality was ensured. For the follow-up after the initial assessment, we continued assessing all the students available in their classroom on personality traits and psychopathological symptoms 1 year later, and 1 year after that. A numerical code was assigned to each participant and the correspondence to their identity was only accessible to the researcher in charge.

Measures

Psychopathological symptoms. The Assessment System for Children and Adolescents (SENA; Fernández-Pinto et al., 2015). The scales included for this study were depression, anxiety, social anxiety, posttraumatic symptoms and somatic complaints (comprising an internalizing factor), aggression, antisocial behavior and defiant behavior (the externalizing factor) and hyperactivity and attention problems (comprising the hyperactivity-attention problems factor). Participants answered a 5-point Likert-type scale and the score of each scale was obtained by summing all the corresponding items.

Personality traits. The JS-NEO-A60 (Ortet-Walker et al., 2020) was used to assess neuroticism, extraversion, agreeableness and conscientiousness. The trait openness was not included in the analyses given evidence indicating its lack of association with psychopathology (Kotov et al., 2010; Levin-Aspenson et al., 2019). The inventory comprises 60 items that are answered on a 5-point Likert-type scale. The score of each scale was obtained by summing all the corresponding items.

Analyses

Using SPSS 24, descriptive analyses were conducted with the final group of participants who completed at least two of the three measure time points. Cronbach's alphas were performed to evaluate the internal consistency of the scales and Cohen's *d* was used to compare the mean scores of personality traits and psychopathological domains among boys and girls, using the following online calculator: www.polyu.edu.hk.

Confirmatory Factor Analyses (CFA) were carried out for each wave of the four personality traits, loading the corresponding 12 items scores on each personality factor. Also, CFA were carried out for each wave of the GFP and the bifactor model of psychopathology. In the case of the GFP, a one-factor model where the total score of each of the five traits of the FFM loaded onto a single factor, was specified for each wave of assessment. In the case of the bifactor model, the assessed symptoms scales loaded both on the corresponding factors of internalizing, externalizing, hyperactivity-attention problems and a general p factor (consult Etkin et al., 2020, Model 5 for a similar specification of the bifactor model). Next, longitudinal measurement invariance was tested for all these models by applying sequential restrictions (configural, metric and scalar invariance) to observe if the factor configuration held across waves. In case of invariance or reasonable partial invariance, the factor scores of the CFAs were saved to be later included in the cross-lagged models.

In order to study the different associations between the FFM traits and the psychopathology factors measured through the three waves and between the GFP and the p factor, three cross-lagged panel models were performed. The cross-lagged panel models allow us to simultaneously examine different association hypotheses, which are more accurate in predicting reciprocal associations than ordinary regression analyses (Klimstra et al., 2010). In the first one, the FFM personality traits (except Openness to the experience), and the internalizing factor, the externalizing factor and the hyperactivity-attention problems score assessed at the three time points were included. In the second one, we included the four traits

assessed in the three waves of assessment and the p factor. In the third one, the GFP and the p factor were included. A simplified version of the models is presented in Figure 15. The correlations between personality traits and psychopathology symptoms during the same measurement wave were interpreted as continuity effects or trait-disorder co-development (De Bolle et al., 2012; Hengartner, 2018). The pathways between the symptoms assessed in a previous wave with later personality traits were considered from a complication hypothesis (De Bolle et al., 2012; 2016; Hengartner, 2018; Klimstra et al., 2010). Finally, the associations of antecedent personality traits and subsequent wave symptoms were attributed to pathoplasty (De Bolle et al., 2012; Hengartner, 2018). All the structural equation models (i.e., CFA and cross-lagged panel models) were performed using the Mplus 7.4 software.

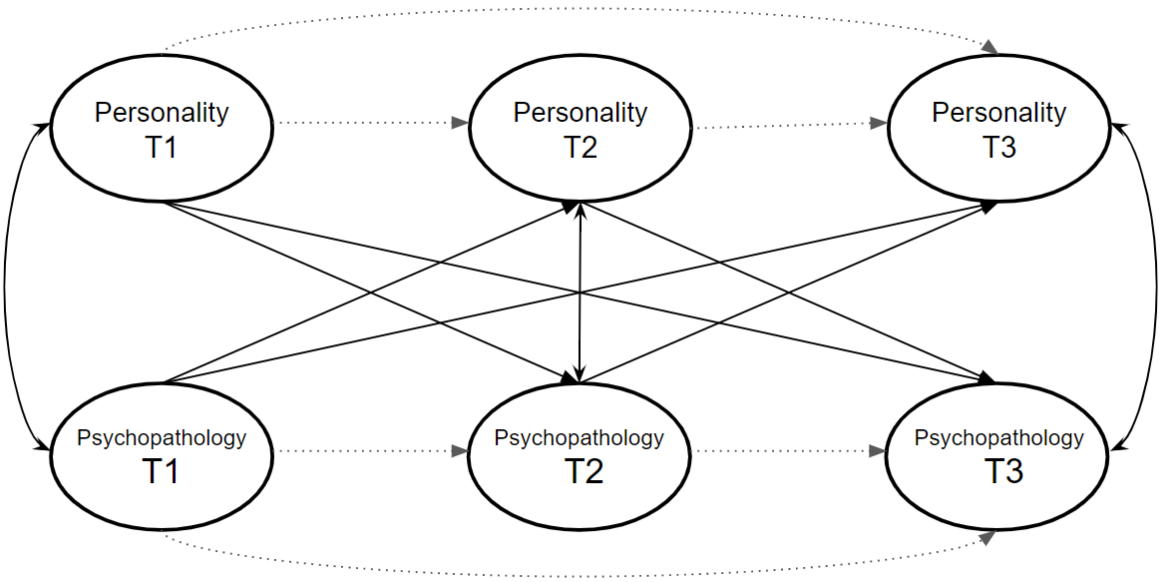

Figure 15. Simplified representation of the Cross-Lagged Panel Model.

The models' fit was assessed using the Comparative Fit Index (CFI) > .90 (acceptable), > .95 (optimal), the Root Mean Square Error of Approximation (RMSEA) < .06 and the Standardized Root Mean Square Residual (SRMR) < .08 (Hu & Bentler, 1999; Marsh et al., 2004). For both instruments, any questionnaires with more than 5% missing values were not included in the analyses. The remaining missing data were randomly distributed (less than 2% missing values per variable).

Results

Descriptive data.

The results of the descriptive analyses are displayed in Table 12. Girls scored significantly higher for neuroticism, agreeableness and conscientiousness than boys, albeit with small effect sizes. Regarding the symptom factors, girls also obtained high scores for internalizing problems such as anxiety, depression, somatic complaints and post-traumatic symptoms with a medium effect size, and boys for externalizing problems such as antisocial behavior and aggression, with a small effect size. Cronbach's alphas are also shown in Table 12 and were all above the good cut-off point according to the criteria of George and Mallery (2003), with the exception of the defiant behavior scale, which is only composed of 3 items.

Table 12.
Descriptive Results

	α	Total sample		Boys		Girls		*d*	t
		M	SD	M	SD	M	SD		
Neuroticism T1	.83	22.899	8.683	21.536	7.859	24.184	9.267	.31	-3.664***
Extraversion T1	.82	31.996	7.588	31.633	6.971	32.369	8.160	.08	-1.153
Agreeableness T1	.81	33.748	6.960	31.462	7.799	36.659	7.149	.43	-6.074***
Conscientiousness T1	.84	28.931	6.966	29.080	8.036	31.192	8.263	.26	-3.371**
Aggression T1	.78	2.702	3.718	3.309	4.450	2.120	2.720	.32	3.845***
Anxiety T1	.88	14.006	8.878	11.221	7.648	16.695	9.163	.65	-7.753***
Antisocial behavior T1	.80	2.182	3.800	2.669	4.565	1.713	2.806	.25	3.000**
Social anxiety T1	.84	10.114	6.579	9.056	6.133	11.136	6.839	.32	-3.825***
Attention problems T1	.89	13.555	8.549	13.166	8.475	13.930	8.522	.09	-1.067
Depression T1	.90	10.607	9.461	8.304	7.255	12.831	10.739	.50	-5.915***
Defiant behavior T1	.67	1.599	1.966	1.480	1.881	1.713	2.041	.12	-1.418
Hyperactivity T1	.83	11.404	8.000	10.933	7.970	11.859	8.017	.12	-1.383
Posttraumatic symptoms T1	.80	9.759	6.880	8.217	6.225	11.249	7.160	.45	-5.402***
Somatic Complaints T1	.79	10.237	6.162	8.658	5.498	11.762	6.390	.52	-6.225***
Neuroticism T2	.85	20.983	8.864	19.263	8.097	22.625	9.258	.39	-4.741***

Extraversion T2	.83	32.184	7.547	31.142	7.177	33.178	7.767	.11	-3.309**
Agreeableness T2	.81	34.927	6.568	33.027	6.957	36.732	5.617	.59	-7.151***
Conscientiousness T2	.86	28.111	7.298	27.007	6.954	29.165	7.471	.30	-3.671***
Aggression T2	.75	2.218	3.163	2.613	3.559	1.831	2.631	.25	3.084**
Anxiety T2	.88	13.602	9.928	10.146	7.584	16.981	10.764	.73	-9.148***
Antisocial behavior T2	.82	1.932	3.137	2.303	3.689	1.569	2.433	.23	2.915**
Social anxiety T2	.87	9.454	6.809	8.018	5.985	10.853	7.263	.43	-5.310***
Attention problems T2	.88	13.041	8.206	12.315	7.700	13.755	8.625	.18	-2.201*
Depression T2	.91	10.091	9.175	8.082	7.473	12.056	10.213	.44	-5.535***
Defiant behavior T2	.63	1.462	1.781	1.313	1.729	1.608	1.822	.17	-2.065*
Hyperactivity T2	.85	10.419	7.561	9.728	7.660	11.096	7.414	.18	-2.257*
Posttraumatic symptoms T2	.85	8.696	6.806	6.880	5.835	10.467	7.218	.55	-6.806***
Somatic Complaints T2	.79	9.734	6.259	7.778	5.1457	11.646	6.654	.11	-8.101***
Neuroticism T3	.85	21.271	8.824	19.862	8.542	22.600	8.898	.31	-3.315**
Extraversion T3	.85	32.343	7.686	31.413	7.421	33.221	7.842	.24	-2.506*
Agreeableness T3	.84	34.744	7.041	32.855	7.172	36.543	6.430	.54	-5.768***
Conscientiousness T3	.87	28.384	7.214	26.723	6.796	29.965	7.258	.46	-4.892***
Aggression T3	.76	2.032	3.248	2.658	3.657	1.445	2.690	.38	3.926***
Anxiety T3	.85	12.990	8.895	10.166	7.688	15.639	9.148	.65	-6.776***
Antisocial behavior T3	.81	2.058	3.696	2.532	4.073	1.614	3.251	.25	2.591**
Social anxiety T3	.86	8.595	6.576	7.727	6.047	9.409	6.951	.26	-2.689**
Attention problems T3	.84	12.278	8.856	12.454	8.977	12.113	8.757	.04	.401
Depression T3	.89	10.224	9.952	8.999	9.038	11.372	10.631	.24	-2.516*
Defiant behavior T3	.50	1.424	2.460	1.365	1.950	1.480	2.861	.05	-.487
Hyperactivity T3	.87	9.862	7.519	9.734	7.873	9.982	7.186	.03	-.344
Posttraumatic symptoms T3	.73	8.075	6.711	6.760	6.328	9.308	6.839	.39	-4.031***
Somatic Complaints T3	.88	9.392	5.993	7.903	5.673	10.788	5.961	.50	-5.169***

*p < .05. ** p< .01. ***p < .001 N = Neuroticism, E = Extraversion, A = Agreeableness, C = Conscientiousness. Small, medium and large effect sizes correspond to Cohen's d values of .20, .50 and .80, respectively (Cohen, 1992). Cronbach's alphas are considered as: > .9 (Excellent), > .8 (Good), > .7 (Acceptable), > .6 (Questionable), > .5(Poor), and < .5 (Unacceptable) according to George and Mallery (2003).

Confirmatory Factor Analyses

CFAs were conducted separately for each personality trait, the bifactor model of psychopathology (i.e., Bi-MP) and the GFP in waves one, two and three (see Table 13). For each personality trait model, the results showed that a one-factor model composed of the 12 items of its scale fitted the data well after adding minor changes based on the modification indices. All the correlations were between items within the same facet. The Bi-MP also showed acceptable fit indices across assessment waves, while the GFP showed acceptable fit indices in wave 1 and 2 after including a correlation between neuroticism and openness, suggested by the modification indices. The factor loadings of each item/scale on their factor are presented in the Supplementary Material.

Table 13.

CFA Models for Personality Traits and Symptom Factors at Waves 1, 2 and 3

Model	χ^2	*p*	*df*	CFI	RMSEA	SRMR
N wave 1	178.954	<.001	54	.906	.068	.046
N wave 2	156.111	<.001	54	.943	.059	.038
N wave 3	129.274	<.001	54	.950	.059	.038
E wave 1	164.546	<.001	50	.922	.068	.046
E wave 2	209.561	<.001	50	.918	.077	.049
E wave 3	172.590	<.001	50	.914	.078	.051
A wave 1	139.206	<.001	53	.938	.057	.044
A wave 2	150.530	<.001	53	.940	.058	.044
A wave 3	157.737	<.001	53	.931	.070	.043
C wave 1	171.346	<.001	52	.916	.065	.047
C wave 2	204.943	<.001	52	.928	.072	.046
C wave 3	137.098	<.001	52	.945	.062	.039
Bi-MP wave 1	171.273	<.001	26	.931	.080	.041
Bi-MP wave 2	114.418	<.001	26	.932	.074	.054
Bi-MP wave 3	140.069	<.001	26	.900	.090	.037
GFP wave 1	11.270	.023	4	.950	.057	.028
GFP wave 2	11.556	.021	4	.935	.055	.031
GFP wave 3	18.624	.001	4	.881	.089	.041

Note: N = Neuroticism, E = Extraversion, A = Agreeableness, C = Conscientiousness, Bi-MP = Bifactor Model of Psychopathology (see Etkin et al., 2020, Model 5); GFP = General Factor of Personality.

Measurement invariance across waves

We tested the longitudinal measurement invariance of the personality traits and the Bi-MP across waves one, two and three (Table 14). In the case of the GFP, as the model fit was

under the recommended cut-offs at Time 3, we only tested the measurement invariance across waves 1 and 2. All the measurement invariance levels were obtained (configural, metric, scalar) based on the fact that the fit of the more restrained models did not significantly worsen, as indicated by the ΔRMSEA values < .015 and ΔCFI values < .010. In the case of the personality traits, mostly partial (instead of full) measurement invariance was obtained based on the added modifications needed to obtain a good model fit. In step 1, for neuroticism, a good model fit was obtained for the configural model, which indicates that the same factor configuration holds across waves (i.e., configural invariance). Then in step 2 (additionally constraining the factor loadings to be equal across waves), we obtained partial metric invariance as it was necessary to release the invariance constraint in one of the factor's loadings. Then, we also constrained the item intercepts across the three waves (i.e., step 3, scalar invariance) and obtained partial scalar invariance after releasing the invariance constraint in one of the intercepts. Concerning extraversion, two correlations were added to improve the fit indices for the configural model: one between two different items assessing positive emotions from different waves, and another between two different items assessing gregariousness in the same wave. We obtained partial metric invariance in step 2, as it was necessary to release the invariance constraint in one of the factor's loadings. Then we obtained partial scalar invariance after releasing the invariance constraint in one of the intercepts. Regarding agreeableness, there was no need for extra correlations for the configural model. No modifications were needed to reach the cut-off point and full metric invariance was found. For step 3, we obtained partial scalar invariance after releasing the invariance constraint in one of the intercepts. Finally, for conscientiousness, no modifications were needed for the configural model, partial metric invariance was found after releasing the invariance constraint in one factor loading and partial scalar invariance was observed after releasing the invariance constraint of one intercept. Overall, for metric invariance, less than 20% of parameters were freed, which is considered acceptable according to Dimitrov (2010). The bifactor model of psychopathology and the GFP showed full metric

and full scalar invariance across the three and two waves of assessment, respectively (see Table 14).

Table 14.
Measurement Invariance across Waves 1, 2 and 3

		χ^2	*p*	*df*	CFI	RMSEA	SRMR	Δ CFI	Δ RMSEA
N	Configural	860.600	<.001	555	.940	.031	.046	-	-
	Metric	888.766	<.001	577	.939	.031	.049	.001	.00
	Scalar	937.927	<.001	601	.934	.031	.050	.005	.00
E	Configural	1060.907	<.001	540	.898	.041	.061	-	-
	Metric	1124.253	<.001	562	.890	.042	.065	.008	.001
	Scalar	1181.694	<.001	582	.883	.042	.066	.007	.00
A	Configural	905.711	<.001	552	.925	.033	.056	-	-
	Metric	950.531	<.001	574	.920	.034	.062	.005	.001
	Scalar	1012.953	<.001	594	.911	.035	.064	.009	.001
C	Configural	991.912	<.001	549	.917	.037	.050	-	-
	Metric	1041.180	<.001	571	.912	.038	.056	.005	.001
	Scalar	1102.869	<.001	589	.904	.039	.060	.008	.001
Bi-MP	Configural	779.282	<.001	336	.944	.045	.057	-	-
	Metric	818.156	<.001	366	.943	.043	.059	.001	.002
	Scalar	912.339	<.001	389	.934	.045	.061	.009	.002
GFP	Configural	176.722	<.001	72	.960	.047	.064	-	-
	Metric	185.926	<.001	80	.960	.045	.067	.003	.003
	Scalar	240.732	<.001	105	.942	.051	.070	.006	.003

Note: N = Neuroticism, E = Extraversion, A = Agreeableness, C = Conscientiousness, Bi-MP = Bifactor Model of Psychopathology

Cross-Lagged Models

The first cross-lagged panel model, which included the four traits and the internalizing factor, the externalizing factor and the hyperactivity-attention problems score showed good fit indices, and all above the cut-off point (χ^2 = 140.495; *p < .001; d.f. = 58;* CFI = .977; RMSEA = .047; SRMS= .032). Similarly, the second model, which included the p factor in addition to

the four traits also showed good fit indices (χ^2 =55.954; $p < .05$; *d.f. = 37;* CFI = 993; RMSEA = .028; SRMS = .035). The associations between the personality and psychopathology factors of both models are presented in Table 15. The associations were significant between traits and psychopathological factors, mainly for the variables pertaining to the same assessment occasion.

The third model in which only the GFP and the p factor at time 1 and 2 were included also showed adequate fit indices (χ^2 = 2.011; $p < .150$; *d.f. = 1;* CFI = .998; RMSEA = .039; SRMS= .012). The correlations between the GFP and the p factor were .52 (p <.001) and .27 (p <.001) at time 1 and time 2, respectively. The path between the GFP at time 1 and the same factor at time 2, showed a standardized beta coefficient of .62 (p <.001), while the path from the p factor at time 1 to the same factor at time 2 was .55 (p <.001). Additionally, the p factor at time 1 was related to the GFP at time 1 (β = .10, $p < .01$), while the association between the GFP at time 1 with the p factor at time 2 was not significant (β = .02, $p > .05$).

Table 15.
Standardized Estimates for the Cross-Lagged Panel Model, including Psychopathology Factors

P	PP	Pathoplasty			Continuity			Complication		
		P1→PF2	P2→PF3	P1→PF3	P1-PF1	P2-PF2	P3-PF3	PF1→P2	PF2→P3	PF1→P3
N										
	INT	**.08***	.06	.09	**.56*****	**.19*****	**.26*****	**.24*****	.04	.08
	EXT	-.09	-.08	-.03	-.10	.01	-.10	.00	.05	.03
	HAP	**.08***	.08	.05	**.35*****	**.25*****	**.23*****	**.16*****	.01	.06
	p	**.28*****	.09	.04	**.45*****	**.38*****	**21*****	**.12****	.05	.06
E										
	INT	**-.17*****	**-.11***	.04	**-.29*****	**-.14****	**-.21****	-.06	-.00	-.06
	EXT	**.14****	.03	-.02	.04	-.03	.14	-.03	.06	-.06
	HAP	**.10****	**.14****	-.01	.04	.07	.03	-.02	.07	-.02
	p	-.01	**.11***	.04	-.03	.00	.00	-.02	.04	-.02
A										

	INT	**.11***	.04	.01	.04	.03	.10	.02	-.06	-.03
	EXT	**-.31*****	-.06	-.08	**-.36*****	**-.22*****	**-.18***	-.07	**-.21****	-.02
	HAP	.04	-.04	-.03	**-.32*****	**-.23*****	**-.19****	-.04	-.08	-.07
	p	.07	-.10	-.11	**-.37*****	**-.14****	**-.31*****	-.04	.01	-.07
C										
	INT	.06	**.14****	**.**00	.02	**.13****	**.14***	.06	.01	.11
	EXT	-.09	.10	-.11	**-.11****	-.07	.04	**-.09***	.00	.05
	HAP	-.02	-.08	.07	**-.47*****	**-.16*****	-.09	-.06	.06	-.02
	p	.08	**-.10***	.05	**-.46*****	-.04	.04	-.04	.10	-.01

Note: *p < .05. **p < .01. ***p < .001 P = Personality Trait; PF = Psychopathology Factor; N = Neuroticism; E = Extraversion; A = Agreeableness; C = Conscientiousness; INT = Internalizing; EXT = Externalizing; HAP = Hyperactivity and Attention Problems, p = general factor of psychopathology.

Discussion

The current study used a cross-lagged panel analysis to tackle 3-year longitudinal associations between personality traits (neuroticism, extraversion, agreeableness and conscientiousness) and the bifactor model of psychopathology in Spanish adolescents. Only a few previous studies have simultaneously explored different personality and psychopathology association models in adolescence. Klimstra et al. (2010) used cross-lagged panel models to study the bidirectional relation between the FFM and problem behavior, while De Bolle et al. (2012) explored association models between the FFM and the correlated model of psychopathology in which an internalizing and an externalizing factor were specified. Nonetheless, this is the first study to include three broad factors of psychopathology (i.e., internalizing, externalizing and hyperactivity-attention problems) and also the p factor in a cross-lagged model to study personality trait-psychopathology symptom associations prospectively in adolescents. In addition, this is also the first study that explores the functional associations between the GFP and the p factor.

In order to explore the reciprocal associations between personality and the different factors of psychopathology, previous CFA analyses were performed to test the structure and longitudinal invariance of each personality trait, the bifactor model of psychopathology, and

the GFP. Similar to those found in previous studies, all the models for the four personality traits showed partial invariance (Hengartner; 2018; Marsh et al., 2010). However, less than 20% of parameters were freed to reach the partial invariance, which is considered acceptable (Dimitrov, 2010), and allowed us to perform the cross-lagged panel models including the personality trait factors. In addition, the bifactor model for psychopathological symptoms showed a good data fit, and these structures appeared to be invariant over time (Gluschkoff et al., 2019; Hengartner, 2018; McElroy et al., 2018). In the case of the GFP, the structure was acceptable for times 1 and 2 but not for time 3, the reason for which GFP invariance was tested only in the first two points of assessment, and the associations of the GFP and the p factor were explored only in the first two waves of assessment as well. The lower sample size of wave 3 compared with wave 1 and 2, and the higher mean sample age in the third point of assessment, which reflected a different period of development, could be responsible for the differences in the model fit across time.

After that, a series of cross-lagged panel models were performed. Results showed that continuity (Oltmans et al., 2018) and to a lesser extent, complication effects were observed between the general factor of personality and the p factor. Then, for the specific traits, neuroticism presented the most robust continuity effects with internalizing symptoms, the hyperactivity-attention problems (De Bolle et al., 2012; 2016; Du Rietz, et al., 2018; Etkin et al., 2020) and the p factor (Brandes et al., 2019; Etkin et al., 2020). The strongest effects were observed for the associations pertaining to the first measurement occasion. Although with smaller effects and only from the first to the second wave, support was found for the pathoplasty model, with neuroticism prospectively predicting increases in the p factor, and to a lesser extent in the internalizing factor (Castellanos-Ryan et al., 2016; Klimstra et al., 2010; Kushner et al., 2011; Mann et al., 2020; van den Akker et al., 2010), and in the hyperactivity-attention problems (Mann et al., 2020; Gomez & Corr, 2014). In accordance with the complication model, neuroticism was, in turn, predicted by internalizing problems (De Bolle et al., 2012;

2016; Klimstra et al., 2010), the hyperactivity-attention problems and the p factor, but only for the associations between the first and second waves. Nonetheless, the complication effects of externalizing problems predicting neuroticism reported by Klimstra and colleagues (2010) were not found in the present study.

Extraversion presented (negative) continuity effects with internalizing symptoms across all the waves of assessment, but not externalizing behavior (De Bolle et al., 2012; Etkin et al., 2020). In line with the pathoplasty model, extraversion predicted hyperactivity-attention problems, externalizing symptoms (De Bolle et al., 2012) and the p factor, but effects were rather small. Extraversion also showed (negative) pathoplastic effects with internalizing symptoms, where lower levels of extraversion predicted higher internalizing factor scores (Klimstra et al., 2010; van den Akker et al., 2010). Moreover, we found no complication effects for extraversion with either the internalizing or externalizing factors (Watts et al., 2019), although some previous findings indicated that depression levels predict changes in extraversion (Klimstra et al., 2010). The association between extraversion and internalizing has not been replicated consistently in the field (Kotov et al., 2010), although specific symptoms within this psychopathological factor, specifically depression and social anxiety, appear to have relatively robust negative links with extraversion in adults (Kotov et al., 2010).

Agreeableness showed negative continuity associations with externalizing symptoms (De Bolle et al., 2012; 2016), the hyperactivity-attention problems (Etkin et al., 2020), and with the p factor (Etkin et al., 2020) for each wave, albeit with smaller effects for each successive wave. This trait also displayed significant bidirectional (both pathoplastic and complication) effects with externalizing problems. So, externalizing problems were found to negatively predict agreeableness (Klimstra et al., 2010), while low agreeableness predicted changes in externalizing symptoms (De Bolle et al., 2012; 2016; Mann et al., 2020; Hengartner, 2018), which consequently may lead to later adult antisocial behavior (Moffitt et al., 2011). These results fall in line with previous findings which suggest that externalizing pathology is predicted

by declines in agreeableness (Hengartner, 2018; Mervielde & De Fruyt, 2002) and by increases in frustration, as well as by diminished effortful control (Laceulle et al. 2014) when considered from a temperament perspective. Thus, by considering the bidirectional effects (complication and pathoplastic effects), less agreeable individuals appear more likely to develop externalizing problems and, as they become less agreeable over time, they subsequently present more symptoms. To a lesser extent and unexpectedly, agreeableness was also positively linked with later internalizing problems (Mann et al., 2020), showing small pathoplastic effects. Future replication studies should clarify if this is a spurious or a robust effect.

Finally, low conscientiousness presented continuity effects with all the factors, but mostly with hyperactivity-attention problems (Gomez & Corr, 2014; Etkin et al., 2020; Nigg et al., 2002), and the p factor (Etkin et al., 2020), followed by externalizing problems (De Bolle et al., 2012; 2016; Etkin et al., 2020; Slobodskaya & Akhmetova, 2010). Moreover, complication effects were found with externalizing in line with other studies (De Bolle et al., 2012). In line with the pathoplasty hypothesis, lower levels of conscientiousness predicted increments of the p factor from wave 2 to wave 3 (Castellanos-Ryan et al., 2016; Mann et al., 2020). No pathoplasty effects emerged with the externalizing factor (Hengartner, 2018; Mervielde & De Fruyt, 2002) or hyperactivity-attention problems (Gomez & Corr, 2014) as in previous studies. Contrary to our expectations based on other studies (Klimstra et al., 2010), we also found a positive association between conscientiousness and the internalizing factor, cross-sectionally (i.e., continuity model) and prospectively (pathoplasty model). This might be due to the p factor capturing the nonspecific variance of the reported symptoms. However, as no previous studies have addressed the association between the FFM and the bifactor model of psychopathology, additional replication studies are necessary to confirm if conscientiousness has a strong association with the resulting internalizing factor.

Overall, results of the performed cross-lagged models for personality trait-psychopathology symptom associations showed strong continuity effects as in previous studies

(De Bolle et al., 2012, 2016). In addition, these cross-sectional correlations showed a high degree of specificity as in previous studies on the FFM and the bifactor model of psychopathology (Caspi et al., 2014, Etkin et al., 2020; Castellanos-Ryan et al., 2016). Specifically, the stronger cross-sectional correlations were found between the internalizing factor and neuroticism and introversion (Castellanos-Ryan et al., 2016; Etkin et al., 2020); the externalizing factor with low agreeableness and low conscientiousness (Caspi et al., 2014; Etkin et al., 2020); the hyperactivity and attention problems score with low conscientiousness and neuroticism (Etkin et al., 2020); and the p factor with neuroticism, low conscientiousness and low agreeableness (Caspi et al., 2014, Etkin et al., 2020; Castellanos-Ryan et al., 2016).

Moreover, we found some specific pathoplasty (mainly neuroticism and introversion predicting higher internalizing symptoms, neuroticism predicting higher p factor scores and lower agreeableness predicting higher externalizing symptoms) and complication effects (mostly internalizing predicting increments of neuroticism and externalizing predicting decrements in agreeableness), which agrees with De Bolle et al. (2012; 2016), and in a similar way to the bidirectional effects between personality and problem behavior reported by Klimstra et al., (2010). As in the cross-sectional associations, the prospective associations showed that the pathoplasty and the complication hypotheses are especially tenable for those personality-psychopathology combinations that are conceptually closer. These results confer evidence for both the relevance of personality characteristics in predicting symptomatology, and symptomatology possibly 'scarring' later personality in adolescents (Krueger & Tackett, 2003).

The findings of this study involve some clinical implications, on the one hand, that focusing treatment and prevention interventions on riskier personality profiles might prevent some symptoms from developing later (Jeronimus et al., 2014); on the other hand, treating psychopathological symptoms at early ages might change the course of some personality aspects and prevent dysfunctional personality development (Hengartner, 2018). Traditionally in clinical contexts, the utility of youth personality assessments for decision making has been

largely ignored, although traits and symptoms appear closely interwoven and should, therefore, be considered in conjunction (De Bolle et al., 2012, 2016). In this line, our results support the notion of a continuity between personality and psychopathology, which is reflected in the similarities between the structures of both constructs (Krueger et al., 2018). Also, as suggested by previous research (Krueger & Markon, 2011), empirical evidence might help to develop an overarching model by grouping symptoms/disorders based on their empirical affinities along their shared trait vulnerability to hence promote the classification of personality and psychopathology within a unified framework. Therefore, at the different levels of this structure, diverse interventions could be relevant and unified intervention protocols could be useful for transdiagnostic spectra, such as internalizing problems (Barlow et al., 2017).

The present study also has some limitations. On the one hand, our findings on personality and psychopathological symptoms were based only on participants' self-reports, which could result in biased answers. Accordingly, data collection from multiple informants might improve our understanding of processes. On the other hand, our sample consisted solely of nonclinical participants, which makes it difficult to draw conclusions about the predictability of specifically diagnosed mental disorders. Therefore, more longitudinal studies are still needed as research should aim to elucidate developmental processes regarding personality and psychopathology (Durbin, 2019) and how they function in their full complexity. Despite these limitations, this research work contributes to the scarce longitudinal studies on the associations between personality traits and psychopathology in youths, as it is the first to study the etiological association models between the FFM and the bifactor structure of psychopathology, including not only the classic internalizing and externalizing spectra, but a separate hyperactivity-attention problems factor along with a general (p) factor.

Supplementary Material

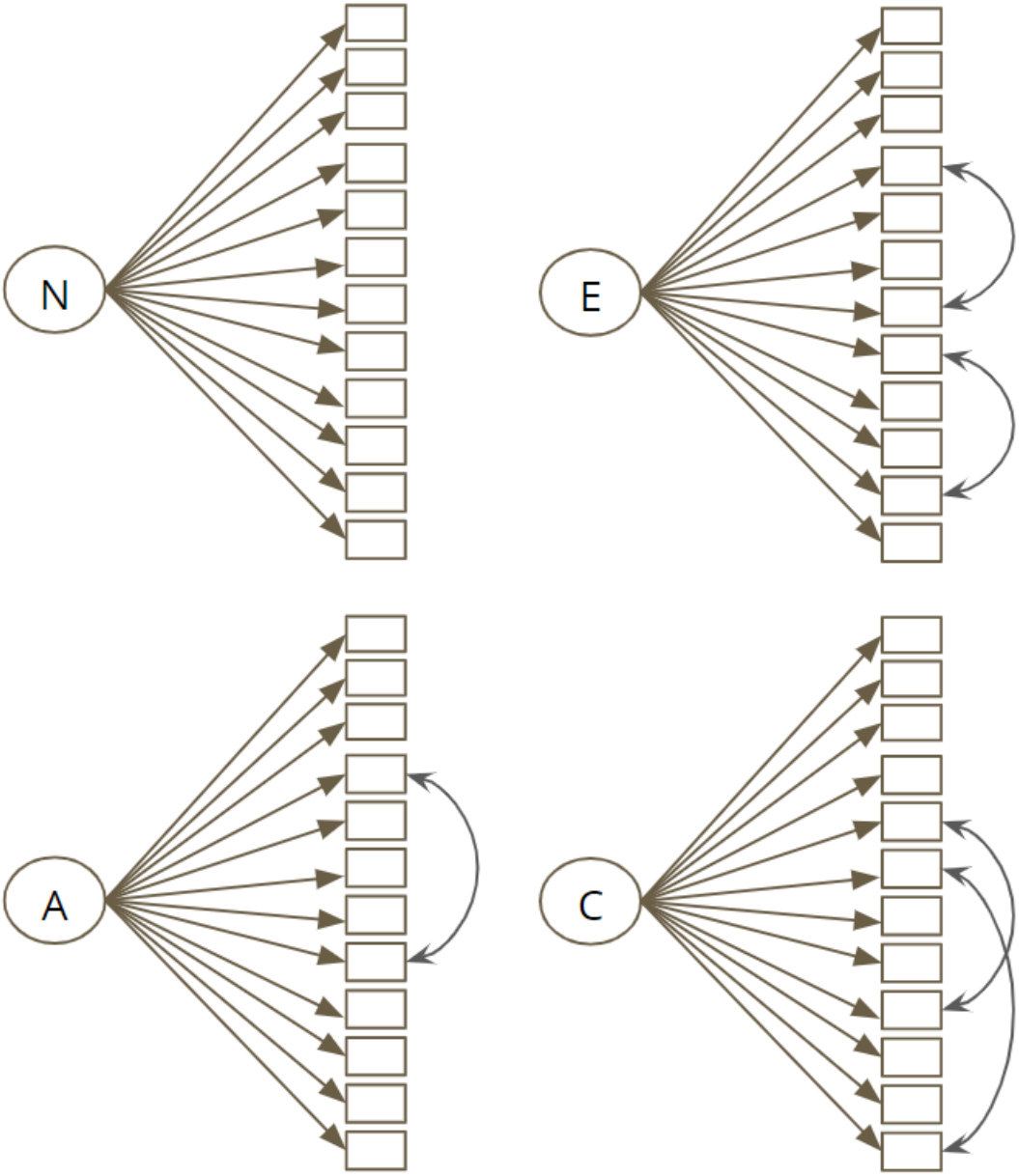

Figure 16. Confirmatory Factor Analysis for personality traits, performed for waves 1, 2 and 3.
N = Neuroticism; E = Extraversion; A = Agreeableness; C = Conscientiousness.

Table 16.

Standardized model results for personality traits' Confirmatory Factor Analyses

Item Nº	N T1	N T2	N T3	E T1	E T2	E T3	A T1	A T2	A T3	C T1	C T2	C T3
1	.46***	.54***	.57***	.65***	.65***	.67***	.38***	.36***	.38***	.59***	.52***	.52***
2	.49***	.47***	.47***	.41***	.51***	.52***	.70***	.63***	.66***	.56***	.56***	.61***
3	.58***	.63***	.69***	.37***	.45***	.42***	.52***	.51***	.58***	.49***	.51***	.61***
4	.44***	.58***	.59***	.55***	.55***	.53***	.45***	.41***	.54***	.61***	.65***	.62***
5	.40***	.35***	.35***	.29***	.34***	.34***	.35***	.48***	.60***	.57***	.66***	.64***
6	.60***	.55***	.62***	.55***	.52***	.56***	.35***	.47***	.42***	.42***	.49***	.59***
7	.49***	.62***	.70***	.48***	.52***	.53***	.73***	.73***	.75***	.45***	.54***	.58***
8	.65***	.47***	.42***	.56***	.58***	.35***	.62***	.60***	.69***	.54***	.54***	.60***
9	.57***	.66***	.74***	.77***	.61***	.57***	.31***	.51***	.57***	.63***	.77***	.56***
10	.56***	.68***	.63***	.69***	.70***	.79***	.37***	.47***	.49***	.60***	.72***	.70***
11	.65***	.71***	.66***	.62***	.76***	.64***	.70***	.65***	.72***	.59***	.73***	.73***
12	.63***	.65***	.70***	.53***	.50***	.50***	.58***	.55***	.59***	.44***	.36***	.66***

Note: ***$p < .001$ N = Neuroticism; E = Extraversion; A = Agreeableness; C = Conscientiousness.

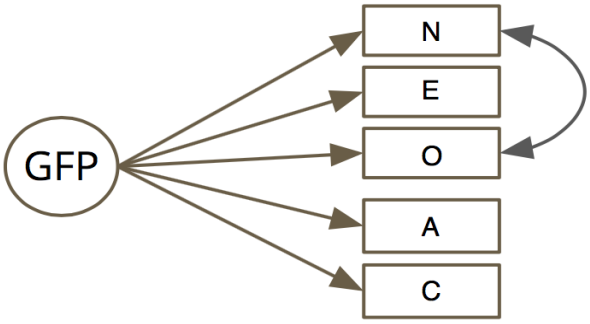

Figure 17. Confirmatory Factor Analysis for the General Factor of Personality.
N = Neuroticism; E = Extraversion; A = Agreeableness; C = Conscientiousness; GFP = general factor of personality.

Table 17.
Standardized model results for personality GFP's Confirmatory Factor Analyses

	T1	T2	T3
Neuroticism	-.40***	-.42***	-.41***
Exraversion	.31***	.33***	.33***
Openness	.33***	.26***	.21***
Agreeableness	.45***	.37***	.41***
Conscientiousness	.65***	.55***	.57***

Note: ***$p < .001$

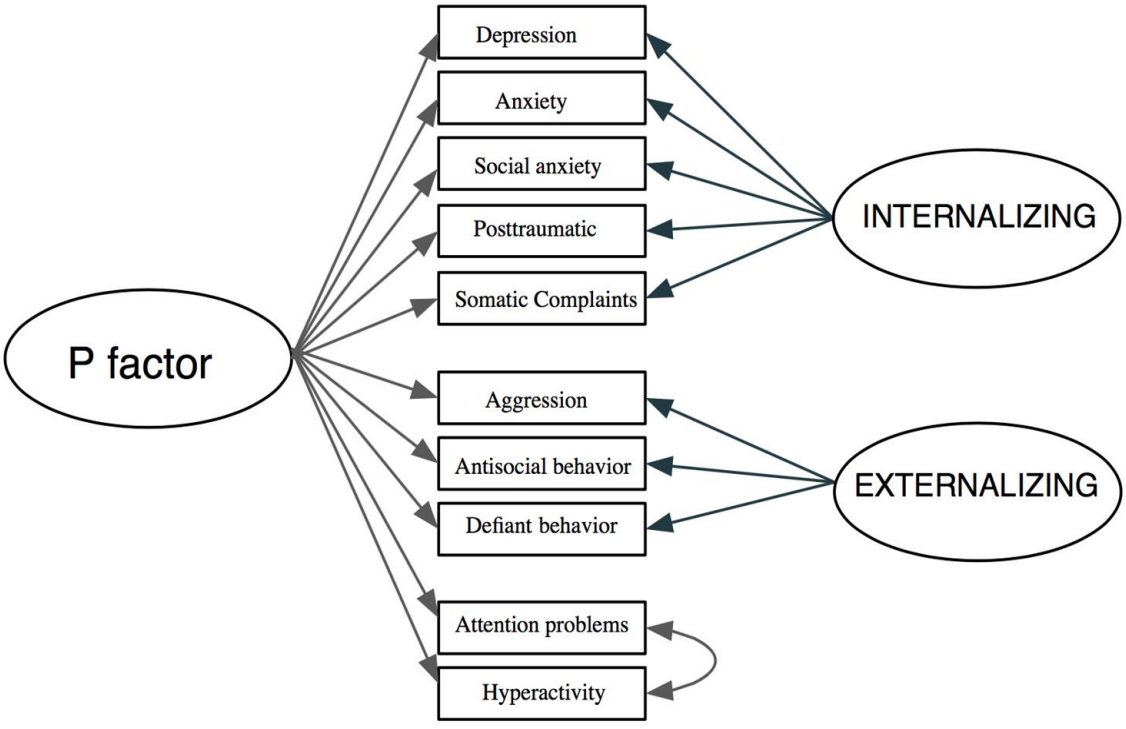

Figure 18. Bifactor Model of Psychopathology

Table 18.

Standardized model results for the Bifactor Model of Psychopathology

Symptom Scales	P T1	INT T1	EXT T1	P T2	INT T2	EXT T2	P T3	INT T3	EXT T3
Depression	.58***	.57***	-	.81***	.29*	-	.64***	.56***	-
Anxiety	.62***	.63***	-	.72***	.35**	-	.56***	.65***	-
Social Anxiety	.40***	.57***	-	.45***	.62***	-	.43***	.54***	-
Posttraumatic symptoms	.61***	.61***	-	.73***	.48***	-	.63***	.60***	-
Somatic complaints	.64***	.41***	-	.79***	.04	-	.62***	.45***	-
Aggression	.56***	-	.53***	.36***	-	.63***	.57***	-	.54***
Antisocial behavior	.51***	-	.68***	.38***	-	.79***	.48***	-	.69***
Defiant behavior	.58***	-	.44***	.52***	-	.44***	.57***	-	.69
Attention problems	.78***	-	-	.61***	-	-	.77***	-	-
Hyperactivity	.82***	-	-	.54***	-	-	.68***	-	-

Note: *$p < .05$. **$p < .01$. ***$p < .001$

INT = Internalizing; EXT = Externalizing; P = General Factor of Psychopathology.

CHAPTER 5

STUDY 3

PERSONALITY DEVELOPMENT AND ITS ASSOCIATIONS WITH THE BIFACTOR MODEL OF PSYCHOPATHOLOGY IN ADOLESCENCE

Abstract

Growing evidence supports a bifactor model of psychopathology, where in addition to the classical factors of internalizing, externalizing and hyperactivity/attention problems, a general factor of psychopathology (or p factor) arises. Although personality traits are closely related to each of these psychopathology factors, only a few studies have explored the associations between the Five-Factor personality and the bifactor psychopathology model – and none of them from a personality development perspective. Consequently, this study aims to explore the onset and growth of personality traits across three waves and their associations with psychopathology factors in 551 adolescents (51.5% girls; M_{age} = 13.77, *SD* = 1.29 at T1). Confirmatory factor analysis supported the bifactor structure of psychopathology. Latent growth curve modeling showed a slightly declining trend in neuroticism and conscientiousness, and a small increase in agreeableness. Personality's onset and growth parameters were not correlated for any trait, but emerged as independent predictors for psychopathology factors and symptoms three years later In conclusion, the present study evidences that both individual differences in starting point and change over time in personality traits can predict later psychopathology, highlighting the importance of considering these parameters as risk or protective factors when developing prevention programs for mental health problems.

Keywords: personality, Five-Factor Model, psychopathology, p factor; adolescents, development; latent growth curve modeling.

Although personality traits have traditionally been considered to be relatively stable (Hampson & Goldberg, 2006), studies conducted over the past decades have shown that there is also change in personality traits (Denissen et al., 2013; Graham et al., 2020; Roberts et al., 2006; Van Dijk et al., 2020). Personality stability and change across time can be studied via different conceptualizations, designs and statistical approaches (De Fruyt et al., 2006), with rank order and mean-level stability/change being the most often used.

Rank order stability reflects the degree of individuals' ordering maintained over time, from highest to lowest score on a certain trait (using test-retest correlations). Meta-analyses have shown that rank order stability increases from childhood to early adulthood (Ferguson, 2010; Roberts & DelVecchio, 2000) and more recent studies show similar results (Borghuis et al., 2017; Ibáñez et al., 2016; Van Dijk et al., 2020). These increases in stability have been interpreted according to the cumulative-continuity principle (Anusic & Schimmack, 2016; Bleidorn & Hopwood, 2019; Soto & Tackett, 2015), that states that the development of a more stable identity would provide young adults with a scheme through which the experiences accumulated throughout life would be organized, leading to more consistent patterns of behavior (Bleidorn & Hopwood, 2019).

Mean-level change reflects the degree to which traits increase or decrease on average among people and is generally estimated by standardized mean differences in traits across two assessments (Bleidorn & Hopwood, 2019). By studying these changes in personality over time, the shape of such growth trajectories can be determined, for instance, linear growth, no growth, non-linear free growth (when three or more waves of data are available) and more complex curvilinear patterns (when four or more waves of data are analyzed). Meta-analyses on mean-level change from childhood to the beginning of adulthood showed a decrease and later increase in conscientiousness and openness from early to late adolescence, displaying a U-shaped developmental pattern (Denissen et al., 2013). Similarly, a study with over a million participants from 3 to 20 years of age also found U-shaped age trends for conscientiousness, agreeableness

and openness in adolescents from 10 to 20 (Soto, 2011). These decrements in this curvilinear trajectory have been interpreted according to the disruption hypothesis, positing that adolescents show a tendency to experience temporal dips in personality traits that are socially relevant during this period of biological, psychological and social transitions (Soto & Tackett, 2015), which might be accompanied by an increase in deviant behavior (Allen et al., 2006) and diverse psychopathological outcomes (Bleidorn & Hopwood, 2019). The posterior increments in the mean levels of the traits during late adolescence and the beginning of adulthood have been interpreted form the maturity principle, indicating that traits tend to slightly increase at the end of adolescence, reflecting greater adjustment (Roberts, et al., 2006).

However, not all studies found this curvilinear pattern of development. Regarding extraversion, while some studies suggest a mean-level decrease during adolescence, as most youth seem to become less sociable in this period (Elkins et al., 2017; Soto et al., 2011), other studies found some facets of extraversion (i.e., social vitality) tend to slightly decrease with age, but other facets (i.e., social dominance) increase with time (Roberts et al., 2006). For neuroticism, some evidence points to a decrease in teenage years (Elkins et al., 2017; Roberts et al., 2006), while other studies show a temporary mean-level increase for girls followed by a decrease for both genders (Borghuis et al., 2017; Soto et al., 2011); and these trends were not found to be significant in other studies (Denissen et al., 2013; Ibáñez et al., 2016). Other studies also found mean-level increases of agreeableness and consciousness from early and middle adolescence to late adolescence (Borghuis et al., 2017; Elkins et al., 2017).

Overall, research reveals small but significant changes in the development of traits from early to late adolescence (Denissen et al., 2013; Borghuis et al., 2017; Ibáñez et al., 2016; Soto et al., 2011; Van den Akker et al., 2014). As indicated by different authors, further research on the intersection of personality development and psychopathology in youth is required in order to get us closer to a better understanding of their interrelatedness (e.g., Soto & Tackett, 2015).

Structure of Psychopathology

The first studies about the structure of psychopathology were performed by Achenbach (1966), who ran exploratory factor analyses in a sample of 300 children aged 4-15 and found that a correlated model, composed by internalizing and externalizing factors that are correlated to each other, accounted for the structure of psychopathology. While the internalizing factor comprised symptoms related to phobias, anxiety, depression and somatic complaints, the externalizing factor comprised symptoms related to aggression and delinquent behavior. This correlated "bottom up" model of psychopathology (or similar models with some variations), has been replicated in later studies with samples of youths (Achenbach, 2011; Cosgrove et al., 2011) and adults (Krueger, 1999), and appears to emerge independently of using symptom scales, count of symptoms, or categorical diagnoses (Achenbach 2020; Mezquita et al., 2015).

Various studies on the structure of psychopathology have also demonstrated that a bifactor model, in which a general factor of psychopathology (or p factor) is specified overarching the internalizing and externalizing factors, it shows better fit to the data than other competing models (Carragher et al., 2015; Caspi et al., 2014; Etkin et al., 2020; Lahey et al., 2012). This p factor appears to capture the individual's liability to mental disorders (Caspi et al., 2014) accounting for the comorbidity among multiple disorders, their persistence over time, symptom severity (Caspi & Moffit, 2018), duration and intensity of treatment (Smith et al., 2020). This psychopathology structure has shown to be consistent across adolescence and adulthood (Levin-Aspenson et al., 2019) and the p factor appears to be highly heritable (Allegrini, et al., 2020) and stable over time (Murray et al., 2016). Although the first studies suggesting a bifactor structure of psychopathology are relatively recent (Caspi et al., 2014; Lahey et al, 2012), more recent studies both with adults (Lahey et al., 2018) and youths (Castellanos-Ryan, 2016; Etkin et al., 2020) support such structure.

These studies have influenced the rise of the Hierarchical Taxonomy of Psychopathology (HiTOP; Kotov et al., 2017). The HiTOP consortium aims to help move forward the classical

categorical conceptualization of psychopathology towards a perspective that reflects the dimensional and hierarchical structure of psychopathology (Kotov et al., 2018). It proposes a structure of psychopathology based on empirical research, integrating symptoms and overarching factors of psychopathology, and advocating for a continuous rather than discrete nature of psychopathological variation (Kotov et al., 2017; Krueger et al., 2018). When focusing on the elements of the HiTOP that tend to emerge in statistical models of the structure of common mental disorders across development, a p factor can be differentiated at the top. Further, internalizing and externalizing transdiagnostic spectra can be situated at the second level of the structure (top-down), fear and distress sub-spectra below the internalizing factor, and substance use and antisocial behavior below the externalizing factor (Forbes et al., 2019).

The resemblance between the HiTOP and well-established models of human personality variation, particularly the prominent Five-Factor Model (FFM; McCrae & Costa, 2010), can be clearly observed. This similarity is not accidental, but rather reflects the ways in which personality forms the empirical psychological infrastructure for the development of specific varieties of psychopathological symptoms (Krueger et al., 2018; Widiger et al., 2018).

Personality and Psychopathology

Numerous studies in the last decades have addressed the close relationships between personality traits of the FFM (McCrae & Costa, 2010) and mental disorders, mostly with adult samples (for reviews and meta-analyses see Andersen & Bienvenu, 2011; Kotov et al., 2010; Krueger, 2005; Malouff et al., 2005; South et al., 2010; Widiger, 2003). These associations have been also documented in youth (for a review see Tackett, 2006), indicating that traits such as emotional stability, extraversion, conscientiousness and agreeableness were negatively associated with diverse psychopathology (conduct problems, emotional symptoms, hyperactivity, inattention and peer problems) and positively with prosocial behavior (Kokkinos et al., 2016).

Specifically, neuroticism has repeatedly been associated to anxiety and depression in youths in both cross-sectional (Andrés et al., 2016; Muris, et al., 2018) and longitudinal studies (Klimstra et al., 2010). It appears to be a shared component of different anxiety disorders and phobias across ages, especially when combined with low extraversion (Andrés et al., 2016; for a review see Pagura et al., 2009). Furthermore, in both cross-sectional and longitudinal designs with children, agreeableness and conscientiousness consistently show robust negative associations with oppositional defiant disorder, conduct disorder and aggression (Herzhoff, et al., 2017b; Klimstra et al., 2010) and in some studies with hyperactivity/attention problems (Nigg et al., 2002). These patterns have been observed in adults as well (for a meta-analytic review see Kotov et al., 2010) and receive support at a neurobiological level (Hyatt et al., 2019).

Regarding the associations of the FFM with broad psychopathological factors in youths, literature is limited to a few studies. Cross-sectional studies show that when a correlated model is specified (i.e., when internalizing and externalizing factors are correlated to each other), neuroticism presents strong associations with the internalizing factor (Levin-Aspenson et al., 2019), whereas low agreeableness and low conscientiousness are related to the externalizing factor (DeYoung et al., 2008; Prinzie et al., 2004), in a similar way as found in adults (Mezquita et al., 2015; for a review see Malouff et al., 2005). Meanwhile, openness appears to be less related to psychopathology (Kotov et al., 2010; Levin-Aspenson et al., 2019).

As far as we know, in the only prospective study that explored the associations across time of the FFM with the correlated model of internalizing and externalizing factors in adolescence, De Bolle et al. (2012) found that latent change in emotional stability and agreeableness is negatively linked to change in internalizing and externalizing problems, respectively. Latent change in extraversion is negatively linked to change in internalizing symptoms, and change in openness and conscientiousness is related to change in externalizing behaviors. The authors concluded that a continuity hypothesis (i.e., personality traits and psychopathology symptoms distributed along the same continuum) for the trait-symptom

associations was the most empirically supported, followed by some specific complication/scar associations (i.e., psychopathology influences personality change) and pathoplasty associations (i.e., personality moderates the course of psychopathology). Similar association patterns are found in children (van den Akker et al., 2010), when the externalizing spectrum is studied independently of the internalizing factor (Hengartner, 2018) and when temperament dimensions instead of the FFM are employed (Laceulle, et al., 2014). Overall, these findings indicate a dimensional nature of personality traits and psychopathology, suggesting they can be understood from a continuous perspective as interwoven constructs, displaying dynamic change patterns, with a similar nature and evolution over time (De Bolle et al., 2012).

The exploration of the FFM and their association with bifactor or hierarchical models of psychopathology is even scarcer. To our knowledge, there is only one study in adults (Caspi et al., 2014) and a couple in adolescents (Castellanos-Ryan et al, 2016, Etkin et al., 2020; Mann et al., 2020). In these studies, the p factor was mainly related to high neuroticism, low agreeableness and low conscientiousness (Caspi et al., 2014; Castellanos-Ryan et al, 2016, Etkin et al., 2020; Mann et al., 2020). However, the associations between the FFM and the internalizing and externalizing factors differ across studies. While neuroticism was the best predictor of the internalizing factor in the studies by Castellanos-Ryan et al. (2016) and Etkin et al. (2020), in the study by Caspi et al. (2014) neuroticism and the other FFM personality traits (except for openness) were weakly related to the internalizing factor. In addition, low agreeableness and low conscientiousness were the best predictors of the externalizing factor in the adult sample (Caspi et al., 2014) and low agreeableness in one of the adolescents' samples (Etkin et al., 2020), while extraversion showed the only significant but weak association with the externalizing factor in the Castellanos-Ryan et al. (2016) study. Discrepancies between studies could be due to the sample characteristics (adults vs adolescents), the composition of the psychopathology factors (i.e., inclusion of different groups of symptoms) and the design of

the research (i.e., cross-sectional in Caspi et al., 2014 and Etkin et al., 2020, vs longitudinal in Castellanos-Ryan et al., 2016).

Among these works, only one (Mann et al., 2020) has studied the associations between changes over time in FFM traits and changes in broad factors from a hierarchical model of psychopathology, including a p factor. Although their results suggested only very little mean-level change for FFM traits in a Mexican-origin youth sample, this change in personality was related to change in psychopathology. Specifically, initial levels of conscientiousness, agreeableness, and emotional stability appeared to be associated with lower initial levels of the p factor, and increases in extraversion and decreases in neuroticism were related to decreases in p (Mann et al., 2020). The authors stated that future studies should test similar prospective models in culturally different groups. In any case, more longitudinal studies are needed in order to disentangle the nature of these complex associations across time, and to place this interrelationship within the framework of development, because processes within these constructs are not static (Durbin & Hicks, 2014).

Overall, even though empirical research has addressed the associations between personality and psychopathological symptoms/disorders in youths, most studies are cross-sectional and rely on traditional analytic strategies (Andrés et al., 2016; Herzhoff et al., 2017b; Klimstra et al., 2010; Muris et al., 2018). For this reason, despite general advances in the field, some authors have criticized the lack of longitudinal studies about the nature of the trait-symptom relationships, especially in younger age groups, pointing out that the efforts mostly show that traits and disorders are correlated with each other, without broaching their processes and mechanisms (Durbin, 2019; Wilson & Olino, *in press*). Conversely, taking a developmental perspective would allow us to focus on processes that may explain better correlational data (Durbin & Hicks, 2014; Wilson & Olino, *in press*). Hereby, it is important to model the developmental course of these constructs, addressing these dynamic processes at the individual level and considering individual differences in both starting point and development over time

(De Clercq et al., 2017). Moreover, even when researchers encouraged new studies to examine the potential for differential associations between traits and the supra-factors of psychopathology (Watts et al., 2019), the number of studies that focused on the associations between the FFM and the bifactor (Caspi et al., 2014; Castellanos-Ryan et al, 2016, Etkin et al., 2020) or hierarchical (Mann et al., 2020) models of psychopathology remained scarce.

The Present Study

The present study aims to provide evidence to reach a better understanding of the longitudinal relationships between personality and the bifactor structure of psychopathology in adolescents, from a developmental perspective, using latent growth curve modeling. This technique integrates individual-level and mean-level changes in one analysis and it is particularly suited to explore the individual differences in the course from personality at a starting point, to personality development during subsequent points, and in turn to different psychopathological outcomes (i.e., individual growth trajectories). The relevance of this methodology comes from its usefulness for examining individual differences that develop over time (i.e., growth), identifying different trajectories that might lead to psychopathological symptoms (De Clercq et al., 2017). Thus, we included specific psychopathology symptom scales and a bifactor structure of psychopathology, consisting of broad factors of internalizing, externalizing, hyperactivity/attention problems and a general p factor.

Regarding the parameters, we expected to find significant individual differences regarding onset and patterns of change over time of the personality traits. In addition, we predicted that both parameters would not be significantly associated. Concerning the growth trajectories, we hypothesized small but significant changes in most personality traits. Moreover, we expected to find specific associations of both onset and growth parameters with later psychopathological outcomes: neuroticism would be positively associated with internalizing symptoms (i.e., depression, anxiety) and the p factor, whereas agreeableness and conscientiousness would be negatively associated with externalizing symptoms (i.e., antisocial

behavior, aggression) and the p factor. In addition, we hypothesized to find a negative association between conscientiousness and hyperactivity/attention problems. For extraversion, we expected to find negative associations with internalizing problems and for openness, we did not predict significant associations with psychopathological outcomes.

Method

Participants

In the first wave (T1), the sample consisted of 809 adolescents from two high schools from an urban area of the east of Spain, all between 12-18 years old (M = 14.33, SD = 1.58; 49.7% girls). In the second wave (n = 678), approximately one year later (T2), the gender distribution was 50.1% girls and the mean age was 14.83 years old (SD = 1.25). Again, one year later (T3), in the third wave (n = 503), the gender distribution was 51.4% girls and the mean age 15.33 years old (SD = 0.99). Across this 3-years period, participants completed a personality questionnaire once a year. From the total sample in the first wave, only 551 adolescents completed at least two of the three personality assessments, this considerable sample loss was mainly due to older students leaving school. So, the longitudinal analyses were performed with this last group: n = 551; 51.5% girls; mean age = 13.77, SD = 1.29 (at T1). The age distribution for this final group was as follows: 35.8% was between 12 to 13 years old, 54.7% between 14 to 16 years old and 9.5% between 17 to 18 years old. The sample was heterogeneous in terms of nationality, but most participants were Spanish (87.5%). The others came from Romania (4.5%), Latin America (3.5%), Africa (1.2%), Asia (0.8%), Russia and Ukraine (0.7%), the U.K (0.2%) and other European countries (1.6 %). According to self-report, the generally obtained grades were: 12.4% failed, 16.2% pass, 28.5% good, 32.6% remarkable, and 10.3% outstanding. Also, 68.9% of the students have never repeated the year, 21.2% have repeated only once and 9.9% have repeated the year twice or more. Regarding course distribution, 27.4% were in the first year, 25.2% in the second year, 18.3% in the third year, 15.7% in the fourth year, and 13.4% in the first preparatory year (which is not mandatory in Spain); there were no participants from

the second preparatory year. The monthly income of the family was distributed as follows: less than €450 (1.7%), €450 to €1500 (15.4%), €1500 to €2100 (16.8%), €2100 to €2700 (10.5%), €2700 to €3600 (15.8%), more than €3600 (39.8%).

Procedure

The research team contacted the school and sent documents to the principals, parents and students, explaining the aims and procedures of the study. All of them gave written consent, and they were all guaranteed that the data would be safeguarded and would only serve research purposes. The students' participation was anonymous, voluntary and the whole project was approved by the Deontological Committee of the authors' university.

All the data were collected on paper format, in the students' own classrooms. As a reward after completing each wave, every participant received a small present and participated in a ruffle for backpacks with school materials and boardgames. Two members of the research team were available for questions during each session and were responsible for safeguarding the completed questionnaires until taking them to a locked room in the university. For the follow up after the initial assessment, we continued assessing all the students available in their classroom on personality traits for T2 one year after, T3 the next year, and psychopathological symptoms, between 7 and 14 days after assessing personality in T3.

Measures

Personality traits. The Short form of the Junior Spanish version of the NEOPI-R (JS NEO-A60; Ortet-Walker et al., 2020) is an instrument that assesses the five broad domains of personality (McCrae & Costa, 2010) in adolescents: neuroticism, extraversion, openness, agreeableness, and conscientiousness, each consisting of 12 items. Participants answered the 60 items on a 5-point Likert scale, going from 0 *(strongly disagree*) to 4 (*strongly agree*). Internal consistency coefficients were satisfactory in previous studies, ranging from .75 to .84, and retest correlations were also adequate, ranging from .75 to .83 (Ortet-Walker et al., 2020). In the present study, the alphas ranged from questionable (.67; openness) to good (.81;

agreeableness) in Wave 1, from acceptable (.74; openness) to good (.86; conscientiousness) in Wave 2, and finally from acceptable (.78; openness) to good (.87; conscientiousness) in Wave 3, following the criteria of George and Mallery (2003).

Psychopathological symptomatology. The Children and Adolescents Evaluation System (SENA; Fernández-Pinto et al., 2015) assesses a wide range of psychopathological symptoms and has an application range of 3 to 18 years. Even though the SENA consists of different instruments, the parent or teacher forms were not used for this study, and only 12 of the 29 scales for 12 to 18 years-old were assessed using a 114-item self-report questionnaire. This questionnaire has a 5-point Likert format scale: 0 = *never or almost never*, 1 = *few times*, 2 = *sometimes*, 3 = *many times*, 4 = *always or almost always*. For this study, we used the following 12 scales: depression (14 items), anxiety (10 items), social anxiety (8 items), post-traumatic symptomatology (11 items), somatic complaints (9 items) (all belonging to the *internalizing factor*), hyperactivity/impulsivity (10 items), and attention problems (10 items) (both belonging to a separate hyperactivity/attention problems *factor*), and finally anger control problems (8 items), aggression (7 items), antisocial behavior (8 items) and defiant behavior (3 items) (all belonging to the *externalizing factor)*; as well as eating problems (8 items) a scale that did not belong to any of the factors according to the manual. With respect to psychometric characteristics, the test-retest reliability coefficients of the different scales were above .80, showing small and very small size effects (for most of them $d < .10$) (Sánchez- Sánchez et al., 2016) and internal consistency displayed all acceptable to excellent alphas (Sánchez-Sánchez et al., 2016). In the present study, the alphas were: poor (.46 for defiant behavior), questionable (.63 for attention problems, .62 for posttraumatic symptoms), acceptable (.72 for social anxiety, .78 for somatic complaints and .79 for aggression), good (.83 for eating problems, .83 for anger, .85 for antisocial behavior and .85 for hyperactivity), and excellent (.90 for anxiety and .92 for depression). Regarding the reliability of the supra-factors, Cronbach's alphas were acceptable

(.72 for externalizing), good (.82 for hyperactivity/attention problems) and excellent (.90 for internalizing).

Analyses

Participants who answered to the questionnaires with more than 5% missing values were deleted, remaining *n* = 551 for T1 (3 participants who incompletely filled out questionnaires were deleted), *n* = 524 for T2 (5 participants were deleted), *n* = 375 for T3 (4 participants were deleted) for the JS NEO-A60 and finally *n* = 352 for the SENA (2 incomplete questionnaires were deleted). Then, the remaining missing data, which were randomly distributed (less than 2% for each item of the questionnaire, according to the Little's Missing at Random Tests using SPSS25), were replaced by the mean of each subject on the corresponding scales, for both instruments.

To investigate change in personality and its effect on later psychopathology, we modeled the data in a stepwise procedure. In a preliminary step (i.e., step 0), we conducted five separate confirmatory factor analyses (CFA) – one for each personality trait – in waves 1, 2 and 3 using Mplus 7.4 software (Muthén & Muthén, 2015) to test whether a one-factor measurement model fitted the data well. In each of these models, the 12 items loaded on one latent personality trait. The model fit was assessed using several fit indices, such as the Root Mean Square of Error of Approximation (RMSEA), with values of .10 or higher pointing to unacceptable fit, values below .08 pointing to an acceptable model fit, and values below .05 suggesting a good model fit; the Standardized Root Mean Square Residual (SRMR) with .08 or lower indicating a good fit; and the Comparative Fit Index (CFI), with values of .90 or higher suggesting an adequate model fit (Hu & Bentler, 1999).

We modeled our data using a stepwise procedure to capture change in personality traits and because we aimed to measure growth in the Big Five traits across time, it was important that these traits were measured in the same way across the three different waves. Thus, we tested the longitudinal measurement invariance for the personality models across waves 1, 2

and 3. So, after we conducted the CFAs (i.e., step 0), measurement invariance was tested along the same five models with increasing restrictions on parameters: configural invariance (step 1, equality of factor structure), metric invariance (step 2, equality of factor structure and loadings), and scalar invariance (step 3, equality of factor structure, loadings, and intercepts). Maximum likelihood estimation with robust standard errors (MLR) was used because this estimator is less dependent on the assumption of multivariate normal distribution compared to the maximum likelihood estimator (Li, 2016). With the MLR estimator, the obtained chi-square value (χ^2) cannot be used for difference testing. Therefore, we relied on the scaling correction factor and the Satorra-Bentler scaled chi-square (Satorra & Bentler, 2001). Ideally, the *p* value of this test should be non-significant, indicating no significant difference in the fit of the compared nested models. However, because $\Delta\chi^2$ is sensitive to sample sizes, we used delta (Δ) RMSEA and delta (Δ) CFI to evaluate the difference in fit between the more restricted models and the less restricted models. Measurement invariance is supported when ΔRMSEA is < .015 and ΔCFI is < .010 (Chen, 2007; Klimstra, et al., 2014).

After testing for longitudinal measurement invariance, we explored the growth of the personality traits, by comparing a series of models that vary in their assumptions about the nature and form of growth. First, we tested a *free curve growth model*, where slope loadings are freely estimated, allowing any shape of growth that fits the data the best. Second, we tested a *no growth model*, where slope loadings are identical (1, 1 and 1). Finally, a *linear growth curve model* was tested, which assumes that the growth of the personality traits across time is linear. This is imposed by specifying slope loadings of 0, 1, and 2 for each wave respectively (separately for each personality trait). For all models, model fit was assessed using the same fit indices and cutoff criteria as described above.

Finally, we modeled the slopes and intercepts of the personality traits on the p factor, he three broad psychopathology factors, as well as the 12 psychopathology scales, to test if both growth and starting point of each trait are significant predictors of later psychopathological

symptoms. Previous to including these psychopathology factors in the analysis, confirmatory factor analyses (CFA) were performed to test if a bifactor model, consisting of a general p factor and three factors of psychopathology (internalizing, externalizing and hyperactivity/attention problems) could be found, in a similar way to previous studies (Etkin et al., 2020).

Results

Confirmatory Factor Analyses for Personality Traits

We conducted five CFAs (Table 19) to test the measurement models of personality for waves one, two and three, separately (i.e., 15 CFAs in total; step 0). For each personality trait on each measurement occasion, these analyses showed that a one-factor model fitted the data well, after adding minor modifications (based on the modifications indices output). These modifications consisted of adding correlations between some of the items in each model (except for neuroticism), in order to improve the fit indices and reach a CFI above .90. These changes were kept equal for each wave. The correlations added in the extraversion model were between one item addressing zest and vitality and three other items about positive emotions. For the openness model, three correlations were added to reach the cutoff point, all of them between pairs of highly similar items. The first correlated pair of items assessed the interest or pleasure in puzzle solving (items 18 and 43), the next assessed fantasizing (items 3 and 28), and the last pair of correlated items assessed interest in artistic activities (items 8 and 33). In the agreeableness model, one correlation was added between two items assessing humility (items 24 and 44). Finally, two correlations were added to the conscientiousness model, one between two items assessing impulsivity (items 30 and 60) and one between two items assessing organizing abilities (items 25 and 40).

Table 19.
Fit Indices of the Personality Trait CFA models for Waves 1, 2 and 3

Model	χ^2	*p*	*df*	CFI	RMSEA	SRMR
N wave 1	131.838	.000	54	.920	.051	.045
N wave 2	105.295	.000	54	.957	.043	.038
N wave 3	105.695	.000	54	.949	.051	.039
E wave 1	135.627	.000	52	.920	.055	.046
E wave 2	186.350	.000	52	.901	.070	.051
E wave 3	154.423	.000	52	.908	.073	.054
O wave 1	114.583	.000	51	.932	.048	.044
O wave 2	176.054	.000	51	.899	.068	.056
O wave 3	143.030	.000	51	.910	.069	.064
A wave 1	108.462	.000	53	.951	.044	.040
A wave 2	105.094	.000	53	.954	.043	.041
A wave 3	147.548	.000	53	.902	.069	.049
C wave 1	143.519	.000	52	.903	.057	.046
C wave 2	159.459	.000	52	.929	.063	.045
C wave 3	113.585	.000	52	.944	.056	.042

Note. N = Neuroticism, E = Extraversion; O = Openness; A = Agreeableness; C = Conscientiousness.

Measurement Invariance Across Waves of Personality Traits

We tested the longitudinal measurement invariance of the five personality traits across waves one, two and three (Table 20). For all traits, all levels of measurement invariance were obtained (configural, metric, and scalar) based on the fact that the fit of the more restrained models did not worsen significantly, as indicated by ΔRMSEA values < .015 and ΔCFI values < .010 (except once ≤ .010 for conscientiousness in step 3). Mostly partial (instead of full) measurement invariance was obtained based on the modifications that were necessary to obtain a good model fit. In step 1, for neuroticism, a good model fit was obtained for the configural model, indicating that the same factor configuration held across waves (i.e., configural invariance, including identification constraints). Then, in step 2 (i.e., metric invariance by additionally constraining the factor loadings to be equal across waves), we obtained partial metric invariance, since it was necessary to release the invariance constraint in one of the factor loadings. Then, we additionally constrained the item thresholds across the three waves (i.e., step 3, scalar invariance) and obtained partial scalar invariance after releasing the invariance constraint in one of the intercepts. Concerning extraversion, two correlations were added to

improve the fit indices for the configural model: one between two different items assessing positive emotions from different waves, and another between two different items assessing gregariousness in the same wave. We obtained partial metric invariance, since for step 2 it was necessary to release the invariance constraint in one of the factors loadings. Then, we obtained partial scalar invariance after releasing the invariance constraint in one of the intercepts. For openness, one correlation was added (a previous correlation already present in the CFA but now also across waves). In step 2, no modifications were needed to reach the cutoff point and full metric invariance was found. For step 3, we obtained partial scalar invariance after releasing the invariance constraint in two of the intercepts. Regarding agreeableness, no extra correlations were needed for the configural model. Also, no modifications were needed to reach the cutoff point and full metric invariance was found. For step 3, we obtained partial scalar invariance after releasing the invariance constraint in one of the intercepts. Finally, for conscientiousness, no modifications were needed for the configural model, partial metric invariance was found after releasing the invariance constraint in one factor loading and partial scalar invariance was found after releasing the invariance constraint of one intercept. Overall, for metric invariance of all personality traits, less than 20% of parameters were freed, which is considered acceptable according to Dimitrov (2010). Regarding scalar invariance, neuroticism, openness and conscientiousness reached this criterion, nonetheless, for extraversion and agreeableness 33% of the intercepts were needed to be freed in order to reach acceptable CFI cutoff values.

Table 20.

Measurement Invariance Across Waves 1, 2 and 3

Model	χ^2	*p*	*df*	Scaled $\Delta\chi^2$	*p*	AIC	CFI	RMSEA	SRMR	Δ RMSEA	Δ CFI
N step 1	773.662	.000	555	-	-	51296.453	.950	.027	.044	-	-
N step 2	793.352	.000	575	18.544	.550	51274.491	.950	.026	.045	.001	.000
N step 3	852.764	.000	597	62.118	.000	51293.276	.942	.028	.047	.002	.008
E step 1	1035.572	.000	544	-	-	46042.550	.904	.040	.055	-	-
E step 2	1061.416	.000	564	24.237	.232	46027.187	.903	.040	.058	.000	.001
E step 3	1116.000	.000	580	58.577	.000	46052.779	.896	.041	.060	.001	.007
O step 1	958.627	.000	538	-	-	52924.220	.913	.038	.062	-	-
O step 2	1000.728	.000	560	42.322	.006	52923.694	.909	.038	.067	.000	.004
O step 3	1066.120	.000	580	68.656	.000	52951.823	.900	.039	.068	.001	.009
A step 1	926.047	.000	552	-	-	46317.574	.920	.035	.056	-	-
A step 2	957.809	.000	574	31.419	.088	46307.976	.918	.035	.060	.000	.002
A step 3	1013.217	.000	590	39.360	.001	46335.336	.909	.036	.061	.001	.009
C step 1	1056.773	.000	549	-	-	47929.722	.901	.041	.053	-	-
C step 2	1109.844	.000	569	53.927	.000	47947.427	.895	.042	.059	.001	.006
C step 3	1179.676	.000	587	75.473	.000	47986.377	.885	.043	.063	.001	.010

Note. Step 1 = configural invariance, Step 2 = metric invariance, Step 3 = scalar invariance; N = Neuroticism, E = Extraversion; O = Openness; A = Agreeableness; C = Conscientiousness.

Individual Differences in Starting Position and Development of Personality Traits

A series of competing growth models (i.e., free, no growth and linear models) were conducted to test their fit to the data (Table 21). First, the *free growth model* showed a good fit to the data for neuroticism, agreeableness and conscientiousness. However, the model for extraversion did not converge (number of iterations exceeded) and for openness the robust chi-square and standard errors could not be computed. Then, the *no growth model* achieved the worst fit when compared to the other models (regarding ΔRMSEA and ΔCFI). Finally, the *linear growth model* achieved the best fit for extraversion, openness and conscientiousness. Even though for neuroticism and agreeableness the free curve model presented slightly better fit indices, comparing these models to the linear models revealed that for the linear one, the fit did not decrease ($\Delta RMSEA < .015$, $\Delta CFI < .010$). These findings suggest that the linear model is the most appropriate for describing our data.

Table 21.

Unstandardized Results for Growth Models

Model	χ^2	*p*	*df*	CFI	RMSEA	SRMR	*r*S-I	Mean S	Variance I	Variance S
Free growth										
N	8 33.061	.000	595	.946	.027	.046	.065	-.103***	.114*	-.024
E	-	-	-	-	-	-	-	-	-	-
O	-	-	-	-	-	-	-	-	-	-
A	989.372	.000	588	.914	.035	.060	-.015	.084***	.100***	.038
C	1030.348	.000	579	.912	.038	.057	-.019	-.085**	.316***	.035
No growth										
N	852.764	.000	597	.942	.028	.047	-.021	-	.196***	.036**
E	1036.815	.000	577	.910	.038	.059	-.010	-	.240***	.033*
O	1011.759	.000	578	.910	.037	.065	.000	-	.089**	.018**
A	1013.217	.000	590	.909	.036	.061	.008	-	.076***	-0.002
C	1054.194	.000	581	.908	.038	.059	-.027	-	.326***	.041*
Linear growth										
N	845.271	.000	596	.943	.028	.047	-.022	-.038**	.199***	.034**
E	1036.043	.000	576	.910	.038	.059	-.010	-.013	.239***	.033*
O	1010.723	.000	577	.910	.037	.065	.000	-.010	.088**	.018*
A	1007.607	.000	589	.910	.036	.061	.008	.025*	.077***	-.002
C	1030.527	.000	580	.912	.038	.057	-.017	-.081***	.315***	.033*

Note. S = Slope; I = Intercept; N = Neuroticism, E = Extraversion; O = Openness; A=Agreeableness; C = Conscientiousness; R S-I = correlation between the Slope and Intercept. *$p < .05$. **$p < .01$. ***$p < .001$.

Regarding personality trajectories in the linear models, the results revealed some important dynamics (Table 21). Participants slightly significantly decreased in neuroticism (mean slope = -.038, $p < .01$) and in conscientiousness (mean slope = -.081, $p < .001$) across time. These significant means of the growth factor's slope indicate that there is development over time on average. Further, the variance of the latent intercept was significant for every trait, implying that there were significant individual differences in initial levels for the personality traits. In a similar way, the variance of the slope (i.e., the latent change factor) was significant for every trait except for trait agreeableness, suggesting significant individual differences in the development of these personality traits over time, as not all individuals change at the same rate. For agreeableness, the slope growth factor mean was significant (mean slope = .025, $p < .01$) meaning there is small positive development over time on average in this trait, nevertheless the slope growth factor variance being not significant suggests a similar growth rate among individuals. The correlations between the intercept and slope factor were not statistically significant, indicating that higher/lower scores on the personality factors initial levels were not associated with increases/decreases in the same trait across the three waves.

Structure of Psychopathology

The CFA showed a good fit for a bifactor structure of psychopathology (CFI = .930; RMSEA = .075; SRMR = .045). The model included a general p factor on the one hand, and the three factors of internalizing, externalizing and hyperactivity/attention problems on the other. The symptom scales loaded both into one of the three broad factors and also into the p factor (see Supplementary Material). From the 12 assessed scales, anger and eating problems were not included in the bifactor model, in order for the model to work, however they were included separately in the regression analyses. More specifically, the internalizing factor included symptoms of depression, anxiety, social anxiety, somatic complaints and posttraumatic symptoms; an externalizing factor included aggression, antisocial behavior and

defiant behavior; and a third factor of hyperactivity/attention problems grouped the scales of attention problems and hyperactivity.

Effects of Individual Differences in Starting Position and Development of Personality Traits on Psychopathology

To test whether the significant individual differences in onset and development of personality traits were related to individual differences in psychopathological factors and symptoms, we regressed the latent intercept and slope factors of the linear model on the factor scores from the bifactor model (three factors of psychopathology and the p factor) as well as the 12 scales, in two separate models for each personality trait (Table 22). These models fitted the data well for all traits: neuroticism with the bifactor model (CFI .932, RMSEA .030, SRMR .051) and the 12 scales (CFI .925, RMSEA .031, SRMR .050); extraversion with the bifactor model (CFI .904, RMSEA .038, SRMR .064) and the 12 scales (CFI .902, RMSEA .037, SRMR .065); openness with the bifactor model (CFI .905, RMSEA .037, SRMR .070) and the 12 scales (CFI .915, RMSEA .034, SRMR .072); agreeableness with the bifactor model (CFI .907, RMSEA .036, SRMR .067) and the 12 scales (CFI .914, RMSEA .033, SRMR .064); and conscientiousness with the bifactor model (CFI .903, RMSEA .039, SRMR .060) and the 12 scales (CFI .908, RMSEA .036, SRMR .060).

Table 22.

Standardized Regression Coefficients when Regressing Psychopathological Factors and Scales on Linear Growth Parameters of Personality Traits

	Neuroticism		Extraversion		Openness		Agreeableness		Conscientiousness	
Factors	I β	S β	I β	S β	I β	S β	I β	S β	I β	S β
P factor	.553***	.479***	.049	-.067	-.006	-.055	-.374***		-.368***	-.235*
Internalizing	.591***	.477***	-.229**	-.447***	.237**	-.003	.091	-	.120	.095
Externalizing	-.098	-.089	.046	.150	-.108	-.054	-.410***	-	-.125*	.029
Hyperactivity/ inattention	.421***	.389***	.159*	.043	-.046	-.092	-.237***	-	-.359***	-.248**
Scales										
Depression	.638 ***	.605 ***	-.192**	-.331***	.105	.015	-.201*	-	-.265***	-.163
Somatic complaints	.572 ***	.378 ***	-.012	-.146	.081	-.064	-.186*	-	-.217 ***	-.146
Eating problems	.571 ***	.445 ***	-.004	-.128	.095	.048	-.073	-	-.113	-.024
Anxiety	.651 ***	.586 ***	-.009	-.238**	.191**	-.026	.037	-	-.005	-.004
Post-traumatic symptoms	.633 ***	486 ***	-.099	-.239*	.132	-.034	-.182*	-	-.107	-.062
Social anxiety	.580 ***	.463 ***	-.297***	-.420***	.068	-.052	-.001	-	-.139*	.004
Defiant behavior	.228 ***	.205 ***	-.002	.020	.021	.055	-.237*	-	-.229***	-.139*
Antisocial behavior	.165 **	.137*	.061	.090	-.071	.049	-.381***	-	-.268***	-.094
Anger problems	.383 ***	.324 ***	.108	-.074	-.050	-.023	-.208	-	-.220***	-.028
Aggression	.216 ***	.192 **	.062	.040	-.105	.065	-.409***	-	-.240***	-.096
Attention problems	.472 ***	.432 ***	.055	-.030	-.086	-.077	-.148	-	-.414***	-.274**
Hyperactivity	.291 ***	.273 ***	.261***	.130	.007	-.094	-.107	-	-.252***	-.164*

Note. S = Slope; I = Intercept. *$p < .05$. **$p < .01$. ***$p < .001$.

Regarding individual differences in starting position (intercept), the standardized regression coefficients indicated that a high early onset of neuroticism (followed by its change) is most predictive for the p factor and various psychopathological symptoms, especially internalizing and hyperactivity/attention problems. At a more specific symptomatology scale level, both intercept and slope were significantly and positively associated with all the symptom scales, mainly anxiety, depression and post-traumatic symptoms.

For extraversion, both the individual differences in onset and (especially) the change negatively predicted internalizing symptoms, while only onset positively predicted hyperactivity and attention problems. At a more specific level, mainly the slope was negatively associated with social anxiety, depression, anxiety and post-traumatic symptoms, while a higher onset of extraversion was positively associated with hyperactivity.

The starting position in the openness factor was positively associated with internalizing problems, and only significantly predicted anxiety symptoms. Growth did not appear to signify a risk factor for any of the assessed scales. For agreeableness, the slope variance was not significant, suggesting no significant individual differences in growth trajectories. Therefore, the slope was not used as a predictor for later psychopathological factors and scales, and only results with the intercept as predictor were reported. The onset of agreeableness appeared to be highly negatively associated with the p factor and externalizing problems, followed by hyperactivity/attention problems. The symptoms with the strongest negative associations were aggression, antisocial behavior and defiant behavior, followed by depression. Finally, the onset and change of conscientiousness were negatively associated with the p factor and hyperactivity/attention problems. Onset was also associated with externalizing problems. At a symptom level, attention problems presented the strongest negative associations, followed by antisocial behavior, depression and hyperactivity.

Discussion

The main aim of the present study was to explore the longitudinal associations between personality traits and psychopathological symptoms, using latent growth curve modeling in adolescence. To this end, in the first place, we explored the growth models of the FFM personality traits. Once the slope and intercept of the personality traits were established, we examined the links between on the one hand starting points and changes in a three-year period of the FFM and on the other specific psychopathological symptoms, three spectra factors and the p factor of psychopathology.

Our results suggested that a linear model better fitted the data than other competing models, as it showed better fit indices compared to a no growth model and better or similar fit indices compared to a free growth model, for all the traits. Previous studies that have modeled the trajectories of personality traits in adolescence mostly have found a combination of linear and curvilinear (quadratic) slopes for the traits (Borghuis et al., 2017; Klimstra et al., 2009; Vecchione et al., 2012). However, evidence of such curvilinear patterns was explored in these investigations by analyzing at least four measurement waves, which were not available in our study. Although agreeableness, openness and conscientiousness have displayed linear growth in some studies (Borghuis et al., 2017; Vecchione et al., 2012), these trends vary according to gender and age. Meanwhile, conscientiousness has shown a linear trend for girls (Borghuis et al., 2017) or both genders (Vecchione et al., 2012) from middle to late adolescence in previous studies. On the other hand, stable trajectories (no-growth over time) have also been reported for extraversion for both genders and neuroticism in girls (Vecchione et al., 2012). Differences across studies may be due to, among other things, the number of assessment occasions, the different instruments employed, the various time intervals between waves and the age of the samples.

Based on the latent growth curve modeling, as predicted, we found significant individual differences concerning the starting points and developmental trajectories of the personality

dimensions. Adolescents showed substantial variation in the degree of onset and direction of personality trait changes. This may suggest that not every person starts from the same place regarding thoughts and behavior patterns and not every individual starting from a similar place evolves through time in the same way. Such findings also imply that change in personality is possible, although not in the same degree and shape for every person. Moreover, the parameters of personality traits' onset and change over time showed no association between them, implying different pathways, independent from each other, in line with other studies (O'Meara & South, 2019).

The overall longitudinal changes in personality found in the present study appear to be small but significant as hypothesized, which are in accordance to previous studies in adolescents (Elkins et al., 2017; Göllner et al., 2017; Mann et al., 2020). Thus, although personality is relatively stable across life, change can be also significant in this period (Borghuis et al., 2017; Denissen et al., 2013; Elkins et al., 2017; Klimstra et al., 2009; Roberts et al., 2006; Soto et al., 2011). Our results indicated a significant decreasing trend for conscientiousness and a subtle increasing trajectory for agreeableness, over a three-year period, during the whole adolescence, similarly to Mann et al. (2020). Previous studies have found a trajectory of decreasing scores in conscientiousness and agreeableness from early to middle adolescence, which is associated with a rebellious pattern of behavior known as the disruption hypothesis (Soto & Tackett, 2015), and an increase of both traits closer to early adulthood, a trend called the maturity principle (Roberts, et al., 2006). Regarding neuroticism, as expected, we found a small but significant declining trend over time in line with most previous studies (Elkins et al., 2017; Göllner et al, 2017; Klimstra et al., 2009; Mann et al., 2020; Roberts et al., 2006), reflecting growth in the direction of greater emotional stability (Roberts et al., 2006). These findings may reflect an improvement of emotion regulation strategies to reduce negative affect over the years during adolescence (Denissen et al., 2013; Soto et al., 2011).

Further, the longitudinal results for extraversion and openness indicated that the mean scores of the slopes were not statistically significant, in line with previous findings for extraversion (Denissen et al., 2013) and openness (Elkins et al., 2017). In contrast, some previous findings point to an increasing trend in extraversion (Gollner et al., 2017; Klimstra et al., 2009), while some show evidence for a decreasing trend (Elkins et al., 2017; Soto et al., 2011). For openness, previous studies have found U-shaped trends (Denissen et al., 2013; Soto et al., 2011), some show increasing trends (Klimstra et al., 2009; Mann et al., 2020), decreasing trends (Gollner et al., 2017) or display trends that differ by gender (Borghuis et al., 2017). Discrepancies across studies could be due to these subtle trends being affected by untested moderators, differences in measurement tools and sample heterogeneity, as older samples show steeper slopes than younger ones (Graham et al., 2020).

After analyzing the onset and growth parameters of the FFM, we examined the specific associations of individual differences in the trajectories of the personality traits with later psychopathological outcomes. A high onset level of neuroticism, as well as a positive growth pathway, appeared to be risk factors for all 12 psychopathological symptoms, mainly internalizing, such as depression, anxiety, social anxiety, somatic complaints, post-traumatic symptoms and eating problems; which is in line with previous studies (Aldinger et al., 2014; Andrés et al., 2016; Bagby et al., 2008; Hengartner et al., 2017; Mezquita et al., 2015; Muris, et al., 2018; van den Akker, et al., 2010; Wichstrøm et al, 2018). In addition, despite of the general declining trend for neuroticism, we found that both the starting point and increase of neuroticism are risk factors for other symptoms, such as externalizing and hyperactivity/attention problems (Smith & Martel, 2019), and also for a broader p factor (Brandes et al., 2019; Mann et al., 2020). Thus, neuroticism appears as the most important predictor and risk factor for multiple kinds of psychopathology, which is in line with previous research (De Bolle et al., 2012; Duberstein et al., 2008; Durbin & Hicks, 2014; Hengartner, 2018; South, et al., 2010).

Regarding agreeableness, high onset was negatively associated with all the psychopathological factors. It was mostly associated with the externalizing spectrum (i.e., aggression and antisocial behavior) (Kotov et al., 2010; Mezquita et al., 2015), and also with the p factor (Caspi et al., 2014; Castellanos-Ryan et al., 2016; Etkin et al., 2020; Mann et al., 2020). Our results also showed, as predicted, that the conscientiousness onset was negatively associated with the externalizing factor (De Bolle et al., 2012; Mann et al., 2020), hyperactivity/attention problems (Mann et al., 2020; Stanton & Watson, 2016), and the p factor (Etkin et al., 2020; Mann et al., 2020), although we found a significant association with scales pertaining to the internalizing factor too. Moreover, conscientiousness' growth was negatively associated with p and hyperactivity/attention problem factors, which differs from Mann et al. (2020). Our results confirm that this trait is relevant for various mental health impairing symptoms (Carou et al., 2017; Hengartner et al., 2016; Kotov et al., 2010; Mezquita et al., 2015; Walton et al., 2017). In the case of extraversion, its onset and mainly its change negatively predicted many internalizing symptoms (depression, anxiety, social anxiety and post-traumatic symptoms) as in previous studies (Andrés et al., 2016; Caspi et al., 2014; Kotov et al., 2010; van den Akker, et al., 2010; Walton et al., 2018), while its onset also predicted hyperactivity symptoms, in line with what some research suggests (Stanton & Watson, 2016). Although for openness we did not expect significant associations with psychopathology, the initial levels of openness were positively associated with the internalizing factor (and the anxiety scale). This is in line with recent findings that suggest some facets within this trait may be related both positively and negatively with fear and distress (Walton et al., 2018).

When considering these findings from an overarching developmental framework (Cicchetti, 2014) they suggest that early personality traits constitute overall risk or protective factors for later psychopathology. Our results empirically underscore the relevance of focusing on core personality features from youth onward (Cicchetti, 2018), as they reflect the multifinality principle, that indicates that a single vulnerability factor may carry different

pathways to later pathological symptoms (Cicchetti & Rogosch, 1996). Also, we might consider equifinality effects, as different personality traits can have an effect on the same pathology (for instance both high neuroticism and low conscientiousness may predict attention problems; or low agreeableness and low conscientiousness may predict defiant behavior). Thus, our results point out there might be different pathways to later pathology; as different variables (both onset and growth of different traits) can lead to the same symptoms. Considering that traits relate meaningfully to psychopathology, as they predict the onset of symptoms, their relationship might be considered in line with either vulnerability or spectrum models, which may operate conjointly (Martel et al., 2019).

Clinical Implications

Considering the early scores on personality traits, but also the study of their change over time, may bring important clinical benefits when developing prevention programs in mental health and specific therapeutic actions. As already shown above, both high onset scores and an increase in neuroticism appear to be risk factors (Duberstein et al., 2008) associated with different psychopathological symptoms, mainly internalizing problems such as depression and anxiety (De Bolle et al., 2012; Mezquita et al., 2015) and a general factor of psychopathology (Brandes et al., 2019; Caspi et al., 2014; Castellanos-Ryan et al., 2016; Etkin et al., 2020). Thus, a problematic personality development, mainly marked by early increases in neuroticism and decreases in agreeableness and conscientiousness entails important implications for later mental health problems (Hengartner, 2018). Moreover, the association of early personality to a general factor of psychopathology, may be useful in clinic prognostics, as the p factor may represent an index of impairment that informs duration and intensity of the mental health treatment (Smith et al., 2020). Also, elucidating the degree to which change in personality traits is possible might be therapeutically valuable, as this process of change may become a more realistic goal (Ferguson, 2010).

Limitations

Despite its strengths, the current work also presents some limitations. First, the attrition rate between waves was considerable, mainly because older students from the first wave were no longer attending school the following years. Second, although self-report instruments are useful to assess adolescents' thoughts and behaviors, especially in case of internalizing problems (Fernández-Pinto et al., 2015), future studies should also consider obtaining reports from other sources, such as parents and teachers to compare results, as there is evidence for substantial differences between observer ratings and self-reports (Göllner et al., 2017). Third, in our study, the interactive effects of participants' environmental factors such as life events, peer influence or other variables that may potentially affect the studied trajectories were not explored. This may be relevant considering the differences on the shape of the slope for traits such as conscientiousness in different studies (Borguis et al., 2017; Denissen, et al, 2013; Elkins et al., 2017; Ibáñez et al., 2016; van den Akker, et al., 2014). Finally, as the current study used a nonclinical population, it may be relevant to replicate these findings in clinical samples.

Conclusions

This research longitudinally explored developmental trajectories of adolescents' personality traits by focusing on onset and growth parameters and their associations with a bifactor model of psychopathology (p, internalizing, externalizing and hyperactivity/attention problem factors), and also various single subscales of symptoms. The use of latent growth curve modeling allowed us to account for individual differences regarding the onset and change of personality traits, and to examine whether these traits are specific predictors for psychopathological symptoms. Such findings may be relevant for clinical practice and useful for prevention programs, as they highlight the importance of early detection of risk profiles in adolescence.

Supplementary Material

Table 23.

Standardized Model Results for Personality Traits' Confirmatory Factor Analyses

Item	N T1	N T2	N T3	E T1	E T2	E T3	O T1	O T2	O T3	A T1	A T2	A T3	C T1	C T2	C T3
1	.43***	.41***	.45***	.65***	.65***	.70***	.29***	.28***	.25***	.38***	.33***	.30***	.58***	.53***	.50***
2	.48***	.46***	.46***	.46***	.50***	.54***	.31***	.48***	.61***	.68***	.68***	.68***	.55***	.54***	.59***
3	.58***	.63***	.64***	.41***	.47***	.50***	.45***	.52***	.40***	.51***	.47***	.55***	.47***	.48***	.59***
4	.44***	.58***	.54***	.47***	.54***	.58***	.32***	.37***	.35***	.45***	.41***	.56***	.57***	.71***	.69***
5	.35***	.40***	.48***	.33***	.41***	.44***	.12	.01	.14*	.38***	.42***	.55***	.59***	.61***	.58***
6	.46***	.44***	.49***	.46***	.47***	.46***	.39***	.34***	.47***	.36***	.38***	.30***	.43***	.44***	.53***
7	.17**	.56***	.63***	.45***	.48***	.47***	.35***	.32***	.42***	.72***	.71***	.73***	.45***	.54***	.64***
8	.49***	.48***	.45***	.61***	.65***	.65***	.22***	.33***	.33***	.61***	.62***	.67***	.56***	.53***	.47***
9	.64***	.65***	.72***	.62***	.65***	.65***	.40***	.45***	.41***	.31***	.46***	.52***	.54***	.75***	.67***
10	.55***	.65***	.61***	.03	.66***	.71***	.67***	.76***	.81***	.38***	.39***	.41***	.41***	.69***	.75***
11	.66***	.73***	.73***	.51***	.50***	.52***	.65***	.73***	.79***	.69***	.66***	.69***	.21***	.70***	.61***
12	.65***	.60***	.65***	.77***	.72***	.64***	.51***	.44***	.49***	.62***	.55***	.65***	.61***	.36***	.41***

Note: *$p < .05$. **$p < .01$. ***$p < .001$.

N = Neuroticism; E = Extraversion; O = Openness; A = Agreeableness; C = Conscientiousness.

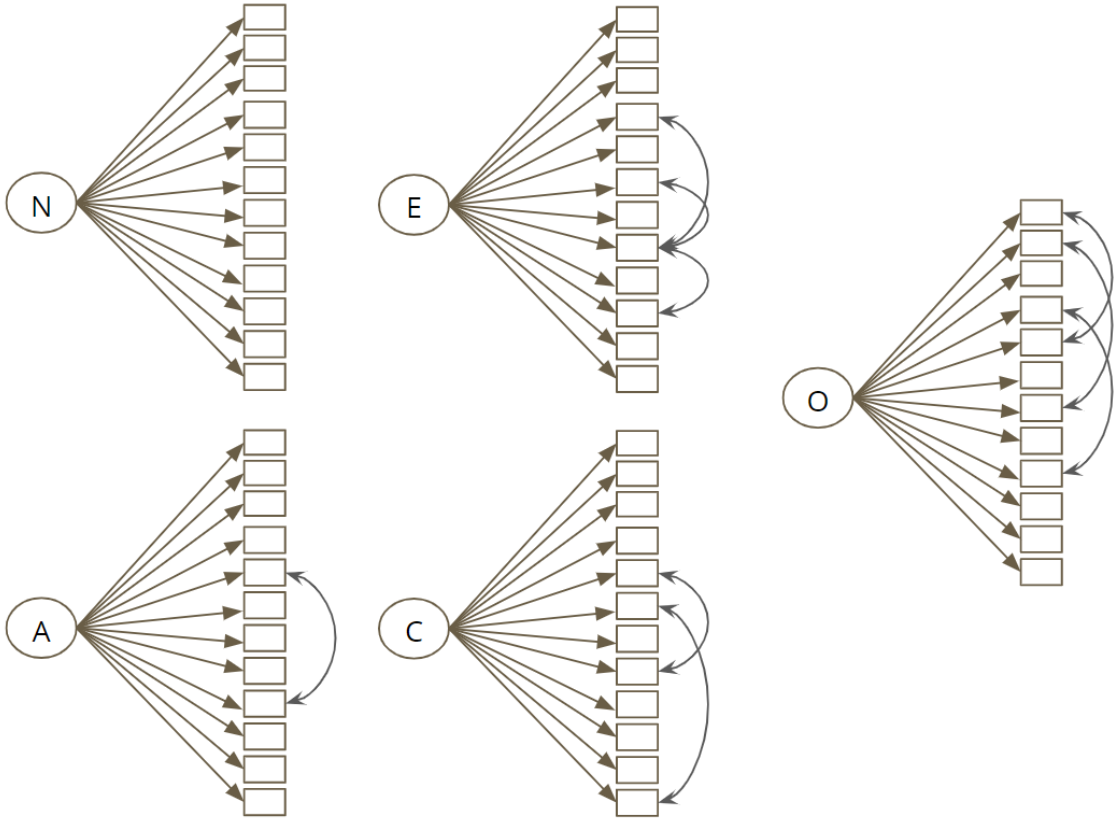

Figure 19. Confirmatory Factor Analyses for Each Wave of the FFM Personality Traits

Table 24.

Standardized Model Results for the Bifactor Model of Psychopathology

Symptom Scales	P	INT	EXT
Depression	.65***	.54***	-
Anxiety	.58***	.63***	-
Social Anxiety	.44***	.54***	-
Posttraumatic symptoms	.68***	.53***	-
Somatic complaints	.62***	.46***	-
Aggression	.58***	-	.50**
Antisocial behavior	.51***	-	.69***
Defiant behavior	.59***	-	.16*
Attention problems	.74***	-	-
Hyperactivity	.69***	-	-

Note: *p < .05. **p < .01. ***p < .001

INT = Internalizing Factor; EXT = Externalizing Factor; P = General Factor of Psychopathology.

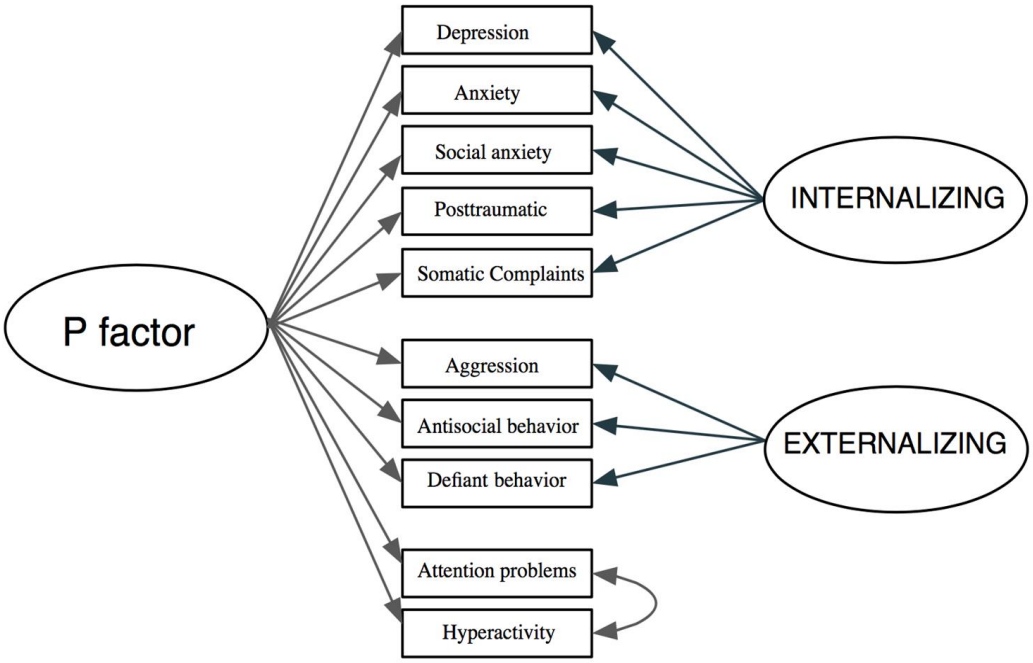

Figure 20. Bifactor Model of Psychopathology

CHAPTER 6

GENERAL DISCUSSION

The present work attempts to answer questions about the links between personality and psychopathology in adolescence. Although advances in this area have grown in recent years, there are still gaps in our knowledge about the nature of these complex constructs, their structure and the mechanisms by which they influence one another over time. Consequently, as different leading researchers in the field indicate, associations between personality and psychopathology constitute a vibrant and active area of inquiry (Krueger et al., 2020). Therefore, the main reasons that motivated this study were: few studies conducted in the adolescent population on the structure of psychopathology and its relation with personality traits, especially between the FFM and the broader factors of psychopathology (i.e., internalizing, externalizing and specially a general p factor); lack of studies that have explored functional associations between general factors of personality and psychopathology; lack of longitudinal studies from a developmental perspective on the relation between personality and the bifactor structure of psychopathology.

This doctoral thesis sought to extend previous knowledge on the trait-symptoms interplay by investigating the associations between personality traits according to the FFM with different psychopathological symptoms and broad factors of the bifactor structure of psychopathology in adolescence. Specifically, the present work aimed to:

1) Explore the psychopathology structure in adolescents by testing correlated vs. bifactor models; the location of hyperactivity and attention problems in the correlated and bifactor models (i.e., externalizing or a specific factor); the associations of the FFM broad traits with the resulting factors of psychopathology; finally, the convergence between a general (p) factor of psychopathology and the general factor of personality in a sample of adolescents.

2) Study associations between personality traits (i.e., neuroticism, extraversion, agreeableness and conscientiousness) and broad factors of psychopathology (i.e. internalizing, externalizing, hyperactivity-attention problems and a general p factor) with a 3-year longitudinal design in adolescents by testing different trait-symptom association hypotheses (i.e. continuity, pathoplasty and complication models).

3) Examine individual differences in onset and growth over time of the FFM traits (i.e., personality developmental trajectories across a three-wave assessment) and their association with different levels of the bifactor structure of psychopathology (i.e., the broad factors of internalizing, externalizing, hyperactivity-attention problems and a general factor of psychopathology) and single scales of symptoms (i.e., depression, anxiety, social anxiety, eating problems, post-traumatic symptomatology, somatic complaints, hyperactivity/impulsivity, attention problems, anger control problems, aggression, antisocial behavior, and defiant behavior).

In order to fulfill these objectives, three studies were carried out in adolescents. The first one was cross-sectional and the other two were longitudinal. All three followed different methodological approaches. In Study 1, a series of confirmatory factor analyses were performed to test different models for the structure of ten of the most prevalent symptoms associated with internalizing and externalizing spectra. Next regression analyses were conducted to explore associations between personality traits and the resulting psychopathology factors. In Study 2, cross-lagged panel models were performed as we sought to extend previous knowledge on the interplay across time of personality and psychopathological symptoms in adolescents. The performed cross-lagged models consisted of three waves of personality traits, with three waves of psychopathology broad factors on the one hand, and personality traits and a general p factor on the other hand. Finally, in Study 3, with a view to examine individual differences in onset and growth of

the FFM traits, latent growth curve modeling was used, which allowed us to observe individual growth trajectories of personality and their links with different symptoms and psychopathological broad factors.

Structure of Psychopathology in Adolescents

Taken together, the results of the three studies provided evidence in favor of a bifactor structure of psychopathology, in which apart from internalizing and externalizing factors, a specific factor of hyperactivity and attention problems and a p factor arose (Castellanos-Ryan et al., 2016; Carragher et al., 2015; Caspi et al., 2014; Gomez et al., 2019; Laceulle et al., 2015; Murray et al., 2016).

Previous studies have considered inattention and hyperactivity-impulsivity symptoms to pertain to the externalizing factor (Carragher et al., 2014; Cosgrove et al., 2011; Laceulle et al., 2015; Tackett et al., 2013), although they usually present the lowest factor loadings (Lahey et al., 2017; Snyder et al., 2017), or even negative loadings, on the externalizing factor (Castellanos-Ryan et al., 2016). Other studies have instead associated these symptoms with the internalizing factor (Greenbaum & Dedrick, 1998; Sellbom et al., 2020). However, our results support the notion that hyperactivity-impulsivity symptoms should be considered a differentiated factor, as found by different authors (Mann et al., 2020; Murray et al., 2016; Niarchou et al., 2017; Snyder et al., 2017), and also according to other studies that used the SENA (Sánchez-Sánchez et al., 2016), the CBCL/6-18 or the YSR as assessment tools (Achenbach et al., 2001). These results also support the changes made in the recent version of the DSM-5. The TDAH disorder has been moved from the Attention Deficit and Disruptive Behavior Disorders section in the DSM-IV TR (APA, 2000) to a specific Attention-Deficit/Hyperactivity Disorder section in the DSM-5 (APA, 2013), which reflects the conception that conduct disorders and the TDAH have a different etiology.

As indicated in previous studies, our results reveal the existence of a p factor (Brandes et al., 2019; Castellanos-Ryan et al., 2016; Caspi et al., 2014; Gómez et al., 2019; Haltigan et al., 2018; Laceulle et al., 2015; Lahey et al., 2012; Niarchou et al., 2017). The p factor might explain the high comorbidity between psychopathological syndromes and disorders (Eaton et al., 2010, Krueger & Markon, 2006; Krueger & Finger, 2001), and represents non specified vulnerability to psychopathology (Caspi et al., 2014; Lahey et al., 2012; Selzam et al., 2018; Brandes et al., 2019; Carragher et al., 2016; Laceulle et a., 2015; Murray, et al., 2016). Some authors also argue that the p factor represents an impairment index that might inform about duration and intensity regarding treatment (Smith et al., 2020). This p factor could also account for a person's psychopathology severity and such disorders persisting over time (Caspi & Moffitt, 2018). Our results also support this latter idea as the bifactor structure appears to remain longitudinally stable with time (second study) when longitudinal measurement invariance is tested (Gluschkoff et al., 2019; Hengartner, 2018; McElroy et al., 2018). This marked stability over time evidences robust homotypic continuity between higher-order latent factors in adolescence, as previous studies have found (Snyder et al., 2017).

It is noteworthy that the adequacy of the bifactor model, in which a p factor arose, has been criticized. The bifactor model is favored methodologically over other competing models when structural equation modeling is used (Bonifay et al., 2017; Bornovalova et al., 2020; Greene et al., 2019; Watts et al., 2019). For this reason, it has been suggested that apart from demonstrating the overall fit of the bifactor model, other piece of evidence for its utility should be provided (Bornovalova et al., 2020; Smith, et al., 2020). Thus besides performing studies about the structure of psychopathology, further research that links personality and psychopathology (as in Study 2 and Study 3) should provide

evidence for the criterion validity of such structure, especially about the nature of the p factor.

Associations between Personality and Psychopathology

Throughout this thesis, associations between personality and psychopathology have been investigated and not only at one set time point, but also longitudinally and from a developmental perspective. All three studies composing this work offer contributions to the existing literature about the association between personality traits and the commonest symptoms and broad factors of psychopathology in adolescents.

First in Study 1, the associations between the FFM and the factors resulting from a bifactor structure of psychopathology were studied by a cross-sectional design. The regression analysis results showed that the p factor was related mainly to high neuroticism (Brandes et al., 2019; Caspi et al., 2014; Castellanos-Ryan et al., 2016) and low conscientiousness and, to a lesser extent, to extraversion and low agreeableness (Caspi et al., 2014, Castellanos-Ryan et al., 2016). Moreover, the internalizing factor was associated mainly with neuroticism and introversion (Castellanos-Ryan et al., 2016; Hengartner, 2018; Kushner et al, 2011; Levin-Aspenson et al., 2019; Slobodskaya & Akhmetova, 2010; van der Akker et al., 2010), and the externalizing factor mainly with low agreeableness (Caspi et al., 2014; De Bolle et al., 2012; Hengartner, 2018; Slobodskaya & Akhmetova, 2010; van der Akker et al., 2010; Watts et al., 2019). Finally, the hyperactivity and attention problems factor was related mainly to low conscientiousness and high neuroticism (Mann et al., 2020; Nigg et al., 2002). These associations followed the same line as in the second and third studies, and both cross-sectionally and longitudinally. It was interesting to note that these differential trait-symptom associations supported the structural differentiation between hyperactivity-

attention problems and other externalizing symptoms as all these psychopathological dimensions were related to specific personality traits.

When specifically comparing our findings to the few previous studies found into the association of the FFM with the bifactor model of psychopathology (Castellanos-Ryan et al., 2016; Caspi et al., 2014), similarities were found, but also discrepancies. First, the association of the p factor with high neuroticism, low agreeableness and low conscientiousness is robust across studies in both adolescents (Castellanos-Ryan et al., 2016) and adults (Caspi et al., 2014). However, the relation of personality dimensions to internalizing and externalizing factors differs across studies. Neuroticism is the personality trait most closely associated with the internalizing factor, as in previous studies, although associations are usually more marked in youths (Castellanos-Ryan et al., 2016) than in adults (Caspi et al., 2014). Discrepancies among the associations of the FFM with the externalizing factor can be partly explained by the different symptom scales included in each structural model. Hence in Study 1, where the externalizing factor comprises exclusively behavioral problems, low agreeableness and low neuroticism are the traits showing the closest association with this factor. In the Caspi et al., (2014), the externalizing factor comprises behavior problems, but also substance use, and is linked with low agreeableness, low conscientiousness and extraversion. The externalizing factor in the work by Castellanos-Ryan et al. (2016) comprises mainly substance use disorder symptoms, which can explain why these authors report externalizing to be related only to extraversion.

In relation to the general factors, a substantial association emerges between the GFP and the p factor (Studies 1 and 2). Like previous studies, the cross-sectional associations between the GFP and the p factor in Study 1 (between $r = .42$, $p < .001$ and $r = .47$, $p < .001$) and in Study 2 ($r = .52$, $p < .001$ for T1 and $r = .27$, $p < .001$ for T2) are

similar regardless of the extraction method employed to obtain the GFP (van der Linden et al, 2017). Beta indices are also similar in magnitude to the correlations reported by Rosenstrom et al. (2019), and are somewhat lower than those reported by Oltmanns et al. (2018) and Littlefield et al. (2020). Overall, our results support that these general factors share a considerable amount of variance, and may reflect the extent of impairment or dysfunction in respective persons' lives, irrespectively of whether that impairment is attributed to psychopathological symptoms, personality disorders or a certain personality configuration (Oltmanns et al., 2018). They also suggest certain specificity for each general factor, at least in adolescents.

Although existing associations between personality and psychopathology seem well-documented, it is not enough to only study correlations between these constructs, but it is important to study the mechanisms underlying these associations over time (Durbin, 2019). Therefore in Study 2, cross-lagged panel modeling was performed to longitudinally tackle the bidirectional associations between personality traits and the bifactor structure of psychopathology. Very few previous studies have simultaneously explored different personality and psychopathology association models in adolescence (De Bolle et al., 2012; Klimstra et al., 2010). Nonetheless, Study 2 in this thesis is the first to include three broad factors of psychopathology (i.e., internalizing, externalizing, hyperactivity-attention problems) and also the p factor in a cross-lagged model to study personality trait-psychopathology symptom associations prospectively in adolescents. This is also the first study to explore functional associations (i.e., continuity, pathoplasty and complication) between the GFP and the p factor.

The cross-lagged panel models (Study 2) show that neuroticism presents the most robust continuity effects with internalizing symptoms, hyperactivity-attention problems (De Bolle et al., 2012; 2016; Du Rietz et al., 2018) and the p factor (Brandes et al., 2019).

There is also evidence for the pathoplasty model, with neuroticism predicting increases in the p factor, the internalizing factor (Castellanos-Ryan et al., 2016; Klimstra et al., 2010; Kushner et al., 2012; Mann et al., 2020; van den Akker et al., 2010), and hyperactivity-attention problems (Gomez & Corr, 2014; Mann et al., 2020). For the complication model, neuroticism is predicted by internalizing problems (De Bolle et al., 2012; Klimstra et al., 2010), hyperactivity-attention problems and the p factor. Extraversion presents continuity effects with (low) internalizing symptoms (De Bolle et al., 2012), pathoplastic effects with hyperactivity-attention problems, externalizing symptoms (De Bolle et al., 2012), (low) internalizing symptoms (Klimstra et al., 2010; van den Akker et al. 2010) and the p factor. For agreeableness, negative continuity associations appear with externalizing symptoms (De Bolle et al., 2012), hyperactivity-attention problems, and the p factor (Mann et al., 2020). Externalizing problems negatively predict agreeableness (Klimstra et al., 2010), while low agreeableness predicts changes in externalizing symptoms (De Bolle et al., 2012; Hengartner, 2018), which can consequently lead to later adult antisocial behavior (Moffitt et al., 2011). Thus less agreeable individuals appear more likely to develop externalizing problems and, as they become less agreeable over time, they subsequently present more symptoms. To a lesser extent, agreeableness is positively linked with later internalizing problems (Mann et al., 2020), and also with weak pathoplastic effects. Low conscientiousness displays continuity effects with all the factors, mostly with hyperactivity-attention problems (Gomez & Corr, 2014; Mann et al., 2020; Nigg et al., 2002), the p factor (as in Study 1) and externalizing problems (De Bolle et al., 2012; Slobodskaya & Akhmetova, 2010; Van Heel, et al., 2019). Complication effects appear with externalizing (De Bolle et al., 2012) and some pathoplastic effects as low conscientiousness predicts increments in the p factor (Castellanos-Ryan et al., 2016; Mann et al., 2020). Continuity and pathoplastic

associations between conscientiousness and the internalizing factor are also reported, which might be due to the p factor capturing non specific variance. Finally, continuity (Oltmans et al., 2018) and, to a lesser extent, complication effects are observed between the GFP and the p factor.

To summarize, the results of the performed cross-lagged models in Study 2 for trait-symptom associations show strong continuity effects, which falls in line with previous studies (De Bolle et al., 2012, 2016). These associations, as in Study 1, show a high degree of specificity: the internalizing factor with neuroticism and introversion (Castellanos-Ryan et al., 2016; Etkin et al., 2020); the externalizing factor with low agreeableness and low conscientiousness (Caspi et al., 2014; Etkin et al., 2020); the hyperactivity and attention problems score with low conscientiousness and neuroticism (Etkin et al., 2020); the p factor with neuroticism, low conscientiousness and low agreeableness (Caspi et al., 2014, Etkin et al., 2020; Castellanos-Ryan et al., 2016).

Some specific pathoplastic and complication effects are also found (De Bolle et al., 2012; 2016; Klimstra et al., 2010). As in the cross-sectional associations, prospective associations show that pathoplasty and the complication hypotheses are especially tenable for conceptually closer personality-psychopathology combinations (De Bolle et al., 2016). These results confer evidence for both the relevance of personality characteristics in predicting symptomatology, and symptomatology possibly 'scarring' later personality in adolescents (Krueger & Tackett, 2003). Overall, this second study contributes to scarce longitudinal studies on associations between personality traits and psychopathology in youths. To our knowledge, this is the first to study the etiological association hypotheses between the FFM and the bifactor structure of psychopathology, including a separate hyperactivity-attention problems factor and the general personality and psychopathology factors.

Regarding the interpretation of these association models, although the continuity model displays stronger effects than others, studies on this issue state that different etiological models might not be mutually exclusive (De Bolle et al, 2012; Durbin & Hicks, 2014) and distinct models may better explain various types of psychopathology (Dolan-Sewell et al., 2001). As most traits relate meaningfully to varied psychopathology, their links can be considered to fall in line with more than one hypothesis, which may also operate conjointly (Martel et al., 2019). Thus when approaching these complex associations, it is important to recognize the existence of etiological heterogeneity because these models might be more useful as heuristics for processes than as competing theories that outperform one another (Durbin, 2019).

Despite several studies revealing associations between personality and psychopathology, only a few have longitudinally studied these associations and almost none has done so from a developmental perspective (Durbin & Hicks, 2014; Durbin, 2019). For this reason, Study 3 proposes examining the association between developmental trajectories in personality traits by considering different levels of the bifactor structure of psychopathology. To this end, we firstly explore growth models of personality traits. Having established the slope and intercept of traits, we examine associations between starting points and changes for a 3-year period of the FFM by predicting 12 specific symptoms, three broad factors and p.

Our results suggest that a linear model better fits data than other competing models, and for all traits and in a similar way to some other studies (Borghuis et al., 2017; Mann et al., 2020; Vecchione et al., 2012). Significant individual differences in the starting points and developmental trajectories of personality dimensions emerge as adolescents show substantial variation in the degree of onset and direction of personality trait changes. This suggests that not everyone starts from the same place as regards

thoughts and behavior patterns, and not all the individuals who commence from a similar place evolve in the same way. Moreover, these two parameters show no association with one another, which implies different pathways that are independent of one another (O'Meara & South, 2019). The overall longitudinal changes in personality are small, but significant (Elkins et al., 2017; Göllner et al., 2017; Mann et al., 2020). So although personality is relatively stable across one's life span, change may also be significant in adolescence (Borghuis et al., 2017; Denissen et al., 2013; Elkins et al., 2017; Klimstra et al., 2009; Roberts et al., 2006; Soto et al., 2011).

We found a significant decreasing trend for conscientiousness and a subtle increasing trajectory for agreeableness, similarly to a recent study about personality development and its associations with a hierarchical model of psychopathology in adolescents from Mexico (Mann et al., 2020). However, other previous studies indicate a decreasing trajectory for not only conscientiousness, but also agreeableness, and from early to mid-adolescence, which is associated with a rebellious pattern of behavior known as disruption hypothesis (Soto & Tackett, 2015). We also found an increase in both traits closer to early adulthood, a trend that is called the maturity principle (Roberts, et al., 2006). Differences across studies can be due to, among other things, the number of assessment occasions, the different instruments employed, the various time intervals between waves and samples' ages. For neuroticism, a declining trend appears (Elkins et al., 2017; Göllner et al, 2017; Klimstra et al., 2009; Mann et al., 2020; Roberts et al., 2006) that reflects growth toward greater emotional stability (Roberts et al., 2006) and an improvement in emotion regulation strategies to reduce negative affect (Denissen et al., 2013; Soto et al., 2011). Finally, changes in extraversion and openness are not statistically significant (Denissen et al., 2013; Elkins et al., 2017).

After analyzing these onset and growth parameters of the FFM, we looked at the specific associations of their trajectories with later psychopathological outcomes. A high onset level of neuroticism, as well as a positive growth, came over as risk factors for the 12 assessed psychopathological symptoms, mainly internalizing problems (Aldinger et al., 2014; Andrés et al., 2016; Bagby et al., 2008; Hengartner et al., 2017; Mezquita et al., 2015; Muris, et al., 2018; van den Akker, et al., 2010; Wichstrøm et al, 2018). In addition, the starting point and increased neuroticism are risk factors for other symptoms, such as externalizing and hyperactivity-attention problems (Smith & Martel, 2019), and the p factor (Brandes et al., 2019; Mann et al., 2020). Thus neuroticism appears as the most important predictor and risk factor for multiple psychopathology (De Bolle et al., 2012; Duberstein et al., 2008; Durbin & Hicks, 2014; Hengartner, 2018; South et al., 2010).

Regarding agreeableness, high onset is negatively associated with all the factors, mostly with the externalizing spectrum (Kotov et al., 2010; Mezquita et al., 2015) and the p factor (Caspi et al., 2014; Castellanos-Ryan et al., 2016; Mann et al., 2020). Conscientiousness onset is negatively associated with externalizing (De Bolle et al., 2012; Mann et al., 2020), hyperactivity-attention problems (Mann et al., 2020; Stanton & Watson, 2016) and p factors (Mann et al., 2020), although we also note a significant association with the internalizing factor. Conscientiousness growth is associated with p and hyperactivity-attention problems, which differs from Mann et al. (2020). Our results confirm that this trait is relevant for several mental health-impairing symptoms (Carou et al., 2017; Hengartner et al., 2016; Kotov et al., 2010; Mezquita et al., 2015; Walton et al., 2017). For extraversion, onset and change negatively predict internalizing symptoms (Andrés et al., 2016; Caspi et al., 2014; Kotov et al., 2010; van den Akker, et al., 2010; Walton et al., 2018), while its onset also predicts hyperactivity symptoms (Stanton & Watson, 2016). Unexpectedly, onset of openness is associated with internalizing. This

falls in line with findings suggesting that some facets in this trait may be related both positively and negatively to fear and distress (Walton et al., 2018).

If we consider these longitudinal findings from an overarching developmental framework (Cicchetti, 2014), they suggest that early personality traits constitute overall risk or protective factors for later psychopathology. This empirically underscores the relevance of focusing on core personality features from youth onward (Cicchetti, 2018) as they reflect the multifinality principle, which indicates that a single vulnerability factor may carry different pathways toward later pathological symptoms (Cicchetti & Rogosch, 1996). Equifinality effects may be considered because different personality traits can have an effect on the same pathology. Hence there might be different pathways to later pathology, and distinct variables (e.g. onset and growth) can lead to the same symptoms. As traits relate meaningfully to psychopathology in predicting onset of symptoms, their relation might be perceived to fall in line with either vulnerability or continuity models, which may operate conjointly (Martel et al., 2019).

From the work carried out in the three studies, we reach some final considerations. On the structure of psychopathology, the study of these models and the factors emerging at their different levels can lead to new perspectives to help to approach the taxonomical discussion on mental disorders. While classification rubrics are traditionally established as the cornerstone of both research and clinical practice, these systems are not well-supported empirically (Carragher et al., 2015). As a categorical classification of separate disorders (APA, 2013), the categorical model in the DSM-5 is still problematic (Widiger et al., 2018). This is because classic systems have defined psychological problems as categories, and a vast body of empirical efforts, including the studies that compose this thesis, continue to provide evidence that psychopathology exists along a continuum (Kotov et al. 2017, Wright et al. 2013). Although some sections of the manual

successfully shift toward more dimensional conceptualizations (i.e., autism spectrum disorder, substance use problems), there is still much to do in relation to the latest evidence for, on the one hand, the structure of psychopathology (characterized by suprafactors) and, on the other hand, personality traits being a foundational base for this structure (Krueger et al., 2018; Widiger et al 2018). Specifically by considering the revised literature altogether with the results of the present work, research coalesces on empirical-based models that suggest common mental disorders are structured according to correlated latent dimensions (Carragher et al., 2015; Caspi et al., 2014; Conway et al., 2019; Krueger et al., 2018; Lahey et al., 2012; Smith et al., 2020).

Therefore, although understanding observed variables (i.e., traits, symptoms, disorders) as separate categories is useful to easily build statistical models that study them and represent their structure, this could oversimplify these complex constructs, and does not account for their dimensional and continuous nature (Krueger et al., 2018). Hence the importance of understanding health-disease processes as dynamic and complex processes that do not consist in isolated categories, but develop in an interaction with the environment (Eslava-Castañeda, 2017). Accordingly, both researchers and clinical professionals should carefully proceed when approaching these diagnostic categories from rigid and dichotomous distinctions, which have been strongly criticized (Durbin 2019; Durbin & Hicks, 2014). Conversely, taking a dimensional perspective implies understanding that the line between what is normal and pathological, especially in non adult populations, which might not be so clear, and cut-off points are still being discussed (Fernandez-Pinto et al., 2015). Hence a dimensional diagnosis would be more appropriate than more closed taxonomic categories as definitions and limits are not as precise in psychology as they are in the natural sciences (Fernandez-Pinto et al., 2015).

This continuity-based perspective on psychopathology can be extended to associations between personality and psychopathology given, on the one hand, the structural similarities displayed by both personality and psychopathology (Krueger et al., 2020; Widiger et al 2018) and the high covariation between general factors of personality and psychopathology (Littlefield et al., 2020; Oltmans et al., 2018) observed throughout this thesis. Consequently, it is noticed that the normative personality variation and maladaptive dispositions related to psychopathology appear to be organized as domains that can be well-conceptualized as maladaptive extensions of FFM domains (Krueger et al., 2020). Therefore, we consider a general factor of personality to be a social effectiveness factor that conceptually overlaps both emotional intelligence and adaptability (van der Linden et al., 2017) and, on the other hand, a p factor that reflects vulnerability to psychopathology and worse treatment prognosis (Shields et al., 2020; Smith, et al., 2020) that overlaps neuroticism (Brandes et al., 2019; Caspi et al., 2014) as extremes of the same continuum. Hopefully, this work can add to recent evidence collected in this field to pave the way to a more dimensional perspective in the study of psychopathology, where disorders and personality traits are not that far apart as constructs.

CLINICAL IMPLICATIONS

The findings in all three studies entail important clinical implications. On the one hand, all three studies support a dimensional structure of psychopathology organized around broad factors that falls in line with previous studies showing that such higher-order factors account for the continuity of different disorders over time beyond disorder-specific persistence (Shields et al., 2020). This suggests that different clinical interventions may be relevant at various levels of this psychopathology hierarchy. Thus intervention protocols, such as the unified protocol proposed by Barlow et al. (2017), can be useful for preventing and treating internalizing transdiagnostic spectra. This shift to understand psychopathology from a more dimensional perspective, by considering mental health problems as within a spectrum rather than closed categories, can lead to less stigmatization and rigidity in clinical processes and diagnoses. Furthermore, the general factor of psychopathology, studied throughout this work, also entails some clinical implications. The p factor findings support the notion that the general psychopathology factor describes a transdiagnostic etiology (Gluschkoff et al., 2019). Hence the existence of a general factor highlights an opportunity to implement transdiagnostic prevention/intervention programs at early ages, even though children usually manifest a tangle of undifferentiated symptoms (Forbes et al., 2019).

On the other hand, and as evidenced by all three studies, FFM traits appear to be closely associated with the different bifactor structure levels of psychopathology both cross-sectionally and longitudinally, and traits can be considered early indicators of riskier personality profiles. Traditionally in clinical contexts, the utility of youth

personality assessments for decision making has been largely ignored, although traits and symptoms appear to be closely interwoven and should, therefore, be considered in conjunction (De Bolle et al., 2012, 2016). Thus as suggested in Study 2, associations between personality and psychopathological symptoms across time are bidirectional. This implies that focusing treatment and prevention interventions on riskier personality profiles might prevent some symptoms from developing later (Jeronimus et al., 2014) and, in turn, treating psychopathological symptoms at early ages might change the course of some personality aspects and prevent dysfunctional personality development (Hengartner, 2018).

Moreover, the study of associations between personality and psychopathology from a developmental perspective can be useful in clinical practice. Considering early scores for personality traits, but also the study of their change over time, may bring about important clinical benefits when developing prevention programs for mental health and specific therapeutic actions. As shown in Study 3, both high onset scores and increased neuroticism appear as risk factors (Duberstein et al., 2008; Mann et al., 2020) in relation to different psychopathological symptoms, mainly internalizing problems like depression and anxiety (De Bolle et al., 2012; Mezquita et al., 2015) and p (Brandes et al., 2019; Caspi et al., 2014; Castellanos-Ryan et al., 2016; Mann et al., 2020). These parameters emerge as differential predictors for later symptoms and can account for those trajectories that are more prone to lead to psychopathological outcomes. Thus problematic personality development, mainly marked by early increases in neuroticism and decreases in agreeableness and conscientiousness, may entail major implications for later mental health problems (Hengartner, 2018). Moreover, the association of early personality with p can be useful in clinical prognosis as the p factor may represent an impairment index that informs about treatment duration and intensity (Smith et al., 2020). Finally, this study

implies that change in personality is possible, albeit not in the same degree and shape for everyone. So elucidating the degree to which change in personality traits is possible might be therapeutically valuable because this process of change could become a more realistic goal in clinical processes (Ferguson, 2010).

Altogether in relation to the clinical implications of the two longitudinal studies, analyzing the dynamic interactions between traits and symptoms across time could provide us with a better understanding of the etiological processes of most prevalent mental disorders, and new ways to tackle them at early ages. Such interventions at early ages are important because evidence reveals that they are can shorten the duration of mental health problems and prevent morbidity later in life (Patton et al., 2014). Knowing etiological factors can help to develop more effective personalized early detection, prevention, treatment and health promotion strategies. Indeed parents and teachers are encouraged to pay attention to specific signs of changes in both personality traits and exhibited symptomatology in their children/students, and to seek help before it evolves into more problematic conditions (Klimstra et al., 2014). In the previous literature, some antecedents on detection and therapeutic interventions based on personality characteristics in youths come over, which are designed to act on the motivational processes linked with personality traits (Conrod et al., 2011; Conrod, 2016; Edalati & Conrod, 2019; O'Leary-Barrett et al., 2016). As personality can be considered to provide a foundational basis for a dimensional structure of psychopathology, early screening for personality and protocols to treat adolescents with risky personality traits may contribute to improve their quality of life (Widiger et al 2018).

Finally, our results generally support the notion of a continuity between personality and psychopathology, which is reflected in the similarities found between the structures of both constructs (Krueger et al., 2018) and the significant correlations

between the GFP and p (van der Linden et al, 2017). Empirical evidence might help to develop an overarching model by grouping symptoms/disorders according to their empirical affinities along their shared trait vulnerability to, hence, promote the study and clinical approach of personality and psychopathology within a unified framework (Krueger & Markon, 2011).

LIMITATIONS AND FUTURE RESEARCH LINES

The research works carried out in this doctoral thesis provide evidence to gain a better understanding of associations between personality and psychopathology in adolescence. However, the three studies also have their limitations. On the one hand, our findings on personality and psychopathological symptoms are based only on participants' self-reports, which can result in biased answers. Although self-report instruments are useful for assessing adolescents' thoughts, emotions and behaviors, especially with internalizing problems (Fernández-Pinto et al., 2015), future studies should consider data collection from multiple informants, which might improve our understanding of these processes. Reports from parents and teachers are important (Achenbach & Ndetei, 2012) for comparing results given the evidence for substantial differences between parent ratings and self-reporting (Göllner et al., 2017). On the other hand, including additional psychopathology measures might help to depict a more complete structure, and to refine the associations of the FFM with the resulting broad factors. As the three studies only used SENA scales, in future research it may be relevant to study the DSM-5 psychopathological constructs as outcome variables. Our sample consisted solely of non clinical participants, which makes it difficult to draw conclusions about the predictability of specifically diagnosed mental disorders. Furthermore, considering recent relevance in the p factor field, it is important for future research to continue making efforts to comprehend its nature in order to better understand sources of comorbidity between different mental disorders (Snyder et al., 2017). Although we characterize the resulting factors by linking them with personality traits, other studies like twin studies, or studies

linking different psychological and environmental factors (maltreatment, life events, etc.) with the p factor, can also help to understand the nature of p.

Finally, one of the limitations of Study 1, with its cross-sectional design, was solved in Studies 2 and 3. However, Studies 2 and 3 also present some specific limitations. First, the attrition rate between waves is considerable, mainly because older students from the first wave no longer went to school in the following years. Second, the interactive effects of participants' environmental factors, such as life events, peer influence or other variables that may potentially affect the studied trajectories and longitudinal links, were not explored. This may be relevant when considering the differences in Study 3 in the shape of the slope for traits like conscientiousness compared to previous studies (Borguis et al., 2017; Denissen et al., 2013; Elkins et al., 2017; Ibáñez et al., 2016; Van den Akker et al., 2014). Lastly, it is advisable to include more assessment waves as our design does not allow other trajectories other than linear and non linear growth to be tested. Including four or more assessment waves would allow us to test curvilinear trajectories of personality development, as in previous studies (Borghuis et al., 2017; Klimstra et al., 2009; Mann et al., 2020; Soto et al., 2011; Van den Akker et al., 2014). We also explored how personality trajectories are related to psychopathology in the last assessment wave. However, future research should apply more complex designs and also explore how personality trajectories are related to psychopathology trajectories as the field would benefit from focusing more on processes and mechanisms concerning these constructs (Durbin, 2019; Wilson & Olino, in press*)*. These complex designs would allow us to test the functional associations between personality and psychopathology (i.e., continuity, pathoplasty and complication models) from a developmental perspective.

CHAPTER 7

CONCLUSIONS

Study 1

- A bifactor model of psychopathology, in which an internalizing, externalizing, hyperactivity and attention problems, and a p factor were differentiated, better fitted our data.
- Hyperactivity and attention problems did not load on the internalizing or externalizing factors, and represented an independent factor.
- The structure of psychopathology and the resulting factors were supported by its different associations with the FFM:
    - neuroticism and introversion with the internalizing factor;
    - low agreeableness with the externalizing factor;
    - low conscientiousness with the hyperactivity and attention problems score;
    - high neuroticism, low conscientiousness and low agreeableness with the p factor.
    - The general factor of personality and the p factor appeared to be closely related.

Study 2

- The bifactor structure of psychopathology and personality traits showed structural stability with time.
- Our results support the notion that the main associations between the bifactor structure of psychopathology and FFM traits can be explained with the continuity model.
- Minor, but additional pathoplasty and complication, effects were found.

- The main cross-sectional and longitudinal associations between the FFM traits and the bifactor structure of psychopathology showed the same specificity as those found in Study 1.
- Continuity and, to a lesser extent, complication effects were observed between the GFP and the p factor.

Study 3

- A slightly declining trend in neuroticism and conscientiousness, and a small increase in agreeableness, were found over time.
- Personality onset and growth emerged as independent predictors for symptoms at the different levels of the bifactor structure of psychopathology.
- Both onset and change of neuroticism predicted the p factor, internalizing and hyperactivity-attention problems.
- At a specific scale level, onset and change of neuroticism were associated with all the scales, mainly anxiety, depression and post-traumatic symptoms.
- For extraversion, both onset and change negatively predicted internalizing symptoms, while only onset predicted hyperactivity-attention problems.
- At a scale level, the slope of extraversion was mainly and negatively associated with social anxiety and depression, while higher onset was positively associated with hyperactivity.
- The starting position for openness was associated with internalizing problems, but only predicted anxiety symptoms.

- The onset of agreeableness was negatively associated with the p factor and externalizing behavior, followed by hyperactivity-attention problems. The symptoms with the strongest associations were aggression, antisocial behavior and defiant behavior.
- Conscientiousness onset and change were negatively associated with the p factor and hyperactivity-attention problems, while onset was also associated with externalizing problems.
- At the symptom level, conscientiousness onset presented the strongest negative associations with attention problems, followed by antisocial behavior, depression and hyperactivity problems. Its change was linked with attention problems, hyperactivity and defiant behavior.
- The present study evidences that both individual differences at starting points and change in personality traits over time may predict later psychopathology
- The results also suggest the relevance of considering personality development when studying associations between personality and psychopathology.

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APPENDIX 1

INFORMED CONSENT

UNIVERSITAT JAUME·I

COMISSIÓ DEONTOLÒGICA

Full d'informació sobre el projecte de recerca

Hoja de información sobre el proyecto de investigación

Dades personals / *Datos personales*

Nom i cognoms / *Nombre y apellidos* DNI

.....

Responsable legal de / *Responsable legal de*

.....

Nom del projecte / *Nombre del proyecto*

Estudi prospectiu de variables psicosocials implicades en les conductes addictives durant l'adolescència (sociodemogràfics)

Estudio prospectivo de variables psicosociales implicadas en las conductas adictivas durante la adolescencia (sociodemográficos)

Autoritzat per / *Autorizado por*

Ministerio de Economía y Competitividad, Conselleria d'Educació, Comissió Deontològica de la Universitat Jaume I i Consell Escolar de l'IES Caminàs

Investigadors principals del projecte / *Investigadores principales del proyecto*

Generós Ortet Fabregat i Manuel Ignacio Ibáñez Ribes

Informació del tractament: Sociodemogràfics (per favor, marcar en la casella)

Información del tratamiento: Sociodemográficos (por favor, marcar en la casilla)

☐ **He sigut informat de que el Grup d'Investigació en Personalitat i Psicopatologia de la Universitat Jaume I durà a terme el tractament de les meves dades personals d'acord amb el Reglament General de Protecció de Dades (UE) 2016/679.**

☐ ***Me han informado de que el Grupo de Investigación en Personalidad y Psicopatología de la Universitat Jaume I llevará a cabo el tratamiento de mis datos personales de acuerdo con el Reglamento general de protección de datos (UE) 2016/679*.**

Informació bàsica sobre protecció de dades

Responsable del tractament	Universitat Jaume I Personalitat i Psicopatologia
Finalitat del tractament	Gestió de les dades de caràcter personal dels participants als estudis que duu a terme el grup d'investigació.
Legitimació	Recerca científica.
Destinataris	No se cediran dades a tercer, tret que sigui obligació legal.
Drets	Podeu exercir els vostres drets d'accés, rectificació, supressió i portabilitat, i a la limitació o l'oposició al tractament davant la Secretaria General de la Universitat Jaume I mitjançant el Registre Electrònic (https://ujiapps.uji.es/reg/rest/publicacion/solicitud_generica) o, presencialment, a l'Oficina d'Informació i Registre (InfoCampus), situada a l'Àgora Universitària - Locals 14-15.
Informació addicional	Pot consultar la informació addicional i detallada sobre aquest tractament de dades a https://www.uji.es/protecciodades/clausules/?t=I011

Información básica sobre protección de datos

Responsable del tratamiento	*Universitat Jaume I* *Personalidad y Psicopatología*
Finalidad del tratamiento	*Gestión de los datos de carácter personal de las partes participantes en los estudios que lleva a cabo el grupo de investigación.*
Legitimación	*Investigación científica.*
Destinatarios	*No se cederán datos a terceras partes salvo que sea obligación legal.*
Derechos	*Puede ejercer sus derechos de acceso, rectificación, supresión y portabilidad, y a la limitación o la oposición al tratamiento ante la Secretaría General de la Universitat Jaume I mediante el Registro Electrónico (https://ujiapps.uji.es/reg/rest/publicacion/solicitud_generica) o, presencialmente, en la Oficina de Información y Registro (InfoCampus), situada en el Ágora Universitaria - Locales 14-15.*
Información adicional	*Puede consultar la información adicional y detallada sobre este tratamiento de datos a Información https://www.uji.es/protecciodades/clausules/?t=I011*

MANIFESTE / *MANIFIESTO*

Que he estat informat suficientment de les proves que rebrà el menor de qui sóc responsable legal com a conseqüència de la investigació que es practica.
Que estic d'acord i accepte lliurement i voluntària formalitzar els qüestionaris que es presenten.
Que, com a representant legal del menor, puc decidir que el xiquet/a abandone la col·laboració en el moment que jo ho desitge.
Que, salvaguardant sempre el dret a la intimitat personal i familiar del menor, accepte que les dades que es puguen derivar d'aquesta investigació puguen ser utilitzades per a la divulgació científica.

Que he sido informado suficientemente de las pruebas que recibirá el menor de quien soy responsable legal como consecuencia de la investigación que se practica.
Que estoy de acuerdo y acepto libre y voluntariamente formalizar los cuestionarios que se presenten.
Que, como representando legal del menor, puedo decidir que el menor abandone la colaboración en el momento que yo lo desee.
Que, salvaguardando siempre el derecho a la intimidad personal y familiar del menor, acepto que los datos que se puedan derivar de esta investigación puedan ser utilizados para la divulgación científica.

El/la responsable legal
El/la responsable legal

Els investigadors principals del projecte
Los investigadores principales del proyecto

Castelló de la Plana, ... de/d' ..... de 201….

Per Favor, signeu aquest full i lliureu-lo al tutor del vostre fill/a
Por favor, firme esta hoja y entréguela al tutor de su hijo/a

INFORMACIÓ PEL PARTICIPANT / INFORMACIÓN PARA EL PARTICIPANTE

Objectiu i descripció de l'estudi L'objectiu fonamental d'aquesta investigació és estudiar quins són els factors psicològics i socials més rellevants en el desenvolupament de distints	***Objetivo y descripción del estudio.*** *El objetivo fundamental de esta investigación es estudiar cuáles son los factores psicológicos y sociales más relevantes en el desarrollo de*

comportaments potencialment problemàtics durant l'adolescència. Per això, realitzarem un seguiment dels alumnes durant 2-3 anys, de manera que puguem identificar més fàcilment els factors involucrats en el desenvolupament de diferents comportaments. Per exemple, estudiarem com les característiques de personalitat, el grup d'amics, o els esdeveniments negatius que poden donar-se en la vida, poden influir en el consum de substàncies futur, o en el desenvolupament de problemes emocionals, entre altres aspectes. Així, i en hores lectives, psicòlegs del grup d'investigació, amb la col·laboració del tutor i/o professor, donaran les instruccions i administraran diversos qüestionaris. Els alumnes complimentaran voluntàriament, i en 3 sessions aproximadament, aquests qüestionaris. Únicament s'usaran per a la investigació les escales d'aquells alumnes el pares o tutors legals del quals hagen donat el seu consentiment. Els qüestionaris del alumnes que no tinguen el consentiment corresponent, o que decidisquen retirar-se de l'estudi, seran destruïts. **Possibles incomoditats i beneficis associats a la seua participació en l'estudi** Participar en la investigació no comporta cap risc. No obstant, existeixen algunes preguntes relacionades amb el consum de substàncies, sobre companys de classe, sobre sentiments desagradables (infelicitat, ansietat, pors...), o sobre l'ocurrència de successos negatius que poden produir certa incomoditat o desgrat en algun alumne. Per exemple, un aspecte important de la investigació se centra en l'avaluació d'esdeveniments vitals negatius, que inclouen preguntes sobre la mort de familiars i/o amics, entre altres esdeveniments negatius. Som conscients que preguntar aquest tipus de qüestions quan s'han experimentat recentment pot resultar desagradable o inclús dolorós per algun jove. Tanmateix, és important saber que la informació que aporten els joves és extremadament valuosa, perquè permet conèixer millor, per exemple, quin és l'impacte dels esdeveniments vitals en la salut psicològica.	*distintos comportamientos potencialmente problemáticos durante la adolescencia. Para ello, realizaremos un seguimiento de los alumnos durante 2-3 años, de forma que podamos identificar más fácilmente los factores involucrados en el desarrollo posterior de distintos comportamientos.* *Por ejemplo, estudiaremos cómo las características de personalidad, el grupo de amigos, o los acontecimientos negativos que pueden ocurrir en la vida, pueden influir en el consumo de sustancias futuro, o en el desarrollo de problemas emocionales, entre otros aspectos.* *Así, y en horas lectivas, psicólogos del grupo de investigación, con la colaboración del tutor y/o profesor, darán las instrucciones y administrarán diversos cuestionarios. Los alumnos cumplimentarán voluntariamente, y en 3 sesiones aproximadamente, estos cuestionarios.* *Únicamente se utilizarán para la investigación las escalas de aquellos alumnos cuyos padres o tutor legal hayan dado su consentimiento. Los cuestionarios de los alumnos que no tengan el consentimiento correspondiente, o que decidan retirarse del estudio, serán destruidos.* ***Posibles incomodidades y beneficios asociados a su participación en el estudio*** *Participar en la investigación no conlleva ningún riesgo.* *No obstante, existen algunas preguntas relacionadas con el consumo de sustancias, sobre compañeros de clase, sobre sentimientos desagradables (infelicidad, ansiedad, miedos…), o sobre la ocurrencia de sucesos negativos que pueden producir cierta incomodidad o desagrado en algún alumno.* *Por ejemplo, un aspecto importante de la investigación se centra en la evaluación de acontecimientos vitales negativos, que incluyen preguntas sobre la muerte de familiares y/o amigos, entre otros acontecimientos negativos. Somos conscientes que preguntar este tipo de cuestiones cuando se han experimentado recientemente puede resultar desagradable o incluso doloroso para algún joven. Sin embargo, es importante saber que la información que aportan los jóvenes es extremadamente valiosa, porque permite conocer mejor, por ejemplo, cual es el impacto de los acontecimientos vitales negativos en la salud psicológica.*

Encara que aquesta investigació no comporte cap benefici immediat per als joves que paricipen, permetrà en un futur el desenvolupament d'estratègies més eficaces de detecció precoç, prevenció i tractament de problemes psicològics, així com el disseny de programes de promoció de la salut per als adolescents. **Voluntarietat** En qualsevol cas, la participació és voluntària, i un jove sempre pot optar per no contestar a una o vàries preguntes, o fins i tot abandonar la investigació sense necessitat de donar explicacions ni de patir cap perjudici per aquesta raó. **Confidencialitat** Encara que els qüestionaris no són anònims, les dades són absolutament confidencials. Únicament l'equip investigador tindrà accés a aquestes, i els investigadors principals garanteixen la absoluta confidencialitat i privadesa de les dades, que mai seran publicades ni revelades a nivell individual, i se'n fan responsables de la custòdia i privadesa d'aquestes, d'acord amb la legislació vigent. En els qüestionaris es preguntarà el nom dels alumnes degut a què es estrictament necessari per la naturalesa de la investigació. Donat que l'estudi és de caràcter longitudinal, és a dir, se segueix durant 2-3 anys als mateixos alumnes, es necessari identificar i seguir als mateixos participants any rere any. A més a més, un aspecte important de la investigació fa referència a la influència del amics en diferents comportaments, pel que és necessari conèixer els noms del alumnes i dels seus companys. Per tant, el nom dels alumnes seran únicament usats per a emparellar les dades necessàries per les anàlisis estadístiques, i mai seran tractats a nivell individual, sinó de forma grupal. La informació obtinguda mitjançant els qüestionaris podrà aparèixer en articles d'investigació i ponències en diferents reunions científiques. Tal com hem dit, serà tractada i analitzada a nivell grupal, mai individual, pel que la informació personal serà absolutament confidencial. **Conflicte d'interès de l'investigador** Cap dels investigadors té conflicte d'interès amb els participants.	*Aunque esta investigación no comporte ningún beneficio inmediato para los jóvenes que participan, permitirá en un futuro el desarrollo de estrategias más eficaces de detección precoz, prevención y tratamiento de problemas psicológicos, así como el diseño de programas de promoción de la salud para adolescentes.* ***Voluntariedad*** *En cualquier caso, la participación es voluntaria, y un joven siempre pueden optar por no contestar a una o varias preguntas, o incluso abandonar la investigación sin necesidad de dar explicación alguna ni de sufrir perjuicio alguno por esta razón.* ***Confidencialidad*** *Aunque los cuestionarios no son anónimos, los datos son absolutamente confidenciales. Únicamente el equipo investigador tendrá acceso a los mismos, y los investigadores principales garantizan la absoluta confidencialidad y privacidad de los datos, que nunca serán publicados ni revelados a nivel individual, y se hacen responsable de la custodia y privacidad de los mismos, de cuerdo con la legislación vigente.* *En los cuestionarios se preguntará el nombre de los alumnos debido a que es estrictamente necesario por la naturaleza de la investigación. Dado que el estudio es de carácter longitudinal, es decir, se sigue durante 2-3 años a los mismos alumnos, es necesario identificar y seguir a los mismos participantes año tras año. Además, un aspecto importante de la investigación se refiere la influencia de los amigos en diferentes comportamientos, por lo que es necesario conocer los nombres de los alumnos y sus compañeros. Por tanto, los nombres de los alumnos serán únicamente utilizados para emparejar los datos necesarios para los análisis estadísticos, y nunca serán tratados a nivel individual, sino de forma grupal.* *La información obtenida mediante los cuestionarios podrá aparecer en artículos de investigación y ponencias en diferentes eventos científicos. Tal y como se ha mencionado, será tratada y analizada a nivel grupal, nunca individual, por lo que la información personal será absolutamente confidencial.* ***Conflicto de interés del investigador*** *Ninguno de los investigadores tiene conflicto de interés con los participantes.*

Contactes / Contactos:

Si té algun dubte, pregunta o suggeriment, si vol conèixer alguna cosa més del projecte, o si vol estar informat sobre els resultat de la present investigació, o d'investigacions anteriors del grup, pot contactar amb nosaltres a:

Si tiene alguna duda, pregunta o sugerencia, si desea conocer algo más del proyecto, o si desea estar informado acerca de los resultados de la presente investigación, o de investigaciones anteriores del grupo, puede contactar con nosotros en:

Generós Ortet (correu electrònic: ortet@uji.es, tel.: 964 729 687) - Manuel I. Ibáñez (correu electrònic: iribes@uji.es, tel.: 964 729 690)
Departament de Psicologia Bàsica, Clínica i Psicobiologia
Facultat de Ciències de la Salut
Universitat Jaume I
Adreça Postal: Av. de Vicent Sos Baynat, s/n 12071 Castelló de la Plana

Pàgina web del grup: http://www.idap.uji.es/IDAP.html

APPENDIX 2

RESOLUTION FROM THE DEONTOLOGICAL COMMITTEE

UNIVERSITAT JAUME·I

Beatriz Tomás Mallén, secretaria de la Comisión Deontológica de la Universitat Jaume I de Castelló de la Plana,

CERTIFICO: Que la Comisión Deontológica de la Universitat Jaume I ha emitido informe FAVORABLE sobre el proyecto con número de expediente CD/010/2019 "Personalidad, estrés y salud mental en la adolescencia: un estudio longitudinal en muestras de población normal y clínica" cuyo personal investigador principal es Generós Ortet Fabregat, por considerar que cumple las normas deontológicas exigidas.

UNIVERSITAT JAUME·I

Castellón de la Plana, 2 de mayo de 2019