Journal of Psychopathology and Behavioral Assessment (2022) 44:405–417
https://doi.org/10.1007/s10862-021-09903-1

Longitudinal Associations Between the Five-Factor Model of Personality and The Bi-Factor Model of Psychopathology: Continuity, Pathoplasty and Complication Effects in Adolescents

Paula Etkin[1] · **Manuel I. Ibáñez**[1,2] · **Generós Ortet**[1,2] · **Laura Mezquita**[1,2]

Accepted: 7 June 2021 / Published online: 30 June 2021

Abstract

The study of the bifactor structure of psychopathology, which includes a general factor of psychopathology (or p factor) in addition to the internalizing and 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

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 (Costa & McCrae, 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., 2017; 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

✉ Paula Etkin
etkin@uji.es

Manuel I. Ibáñez
iribes@uji.es

Generós Ortet
ortet@uji.es

Laura Mezquita
lmezquit@uji.es

[1] Department of Basic and Clinical Psychology and Psychobiology, Universitat Jaume I, Av. de Vicent Sos Baynat, Castelló, Spain

[2] Centre for Biomedical Research Network On Mental Health (CIBERSAM), Instituto de Salud Carlos III, Castelló, Spain

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; Hengartner, 2018; Krueger & Markon, 2006; Mezquita et al., 2015; Watts et al., 2019). Recently, a bi-factor 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., 2014; 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 bi-factor 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; 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 0.72 (Oltmanns et al., 2018) among both factors has been found, while in adolescents previous studies found beta indices from 0.42 to 0.47 ($p < 0.001$) (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 Fruyt et al., 2017a, b; 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 (Nigg, 2006; Tackett, 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; 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 abovementioned 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 bi-factor 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 bi-factor 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 bi-factor model, the assessed symptoms scales loaded both on the corresponding factors of internalizing, externalizing, hyperactivity/attention problems and a general p factor (see Etkin et al., 2020, Model 5 for a similar specification of the bi-factor 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 Fig. 1. 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

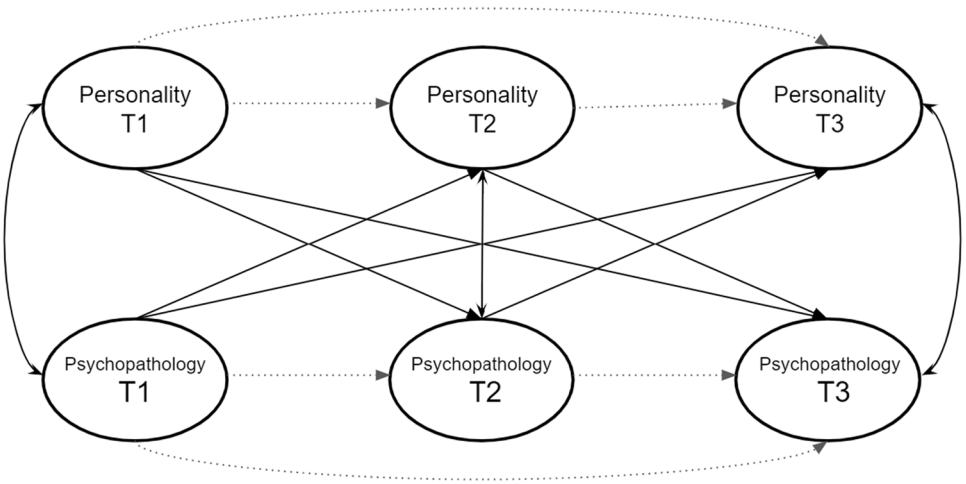

Fig. 1 Simplified Figure of the Cross-Lagged Panel Model

(i.e., CFA and cross-lagged panel models) were performed using the Mplus 7.4 software.

The models' fit was assessed using the Comparative Fit Index (CFI) > 0.90 (acceptable), > 0.95 (optimal), the Root Mean Square Error of Approximation (RMSEA) < 0.06 and the Standardized Root Mean Square Residual (SRMR) < 0.08 (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 1. 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 1 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.

Confirmatory Factor Analyses

CFAs were conducted separately for each personality trait, the bi-factor model of psychopathology (i.e., Bi-MP) and the GFP in waves one, two and three (see Table 2). 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 N and O suggested by the modification indices. The factor loadings of each item/scale on their factor are presented in the Supplementary Material.

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 3). 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 < 0.015 and ΔCFI values < 0.010. 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 3).

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 ($\chi^2 = 140.495$; $p < 0.001$; $d.f. = 58$; CFI = 0.977; RMSEA = 0.047; SRMS = 0.032). Similarly, the second model, which included the p factor in addition to the four traits also showed good fit indices ($\chi^2 = 55.954$; $p < 0.05$; $d.f. = 37$; CFI = 993;

Table 1 Descriptive Results

	α	Total sample		Boys		Girls		*d*	t
		M	SD	M	SD	M	SD		
Neuroticism T1	0.83	22.899	8.683	21.536	7.859	24.184	9.267	0.31	-3.664***
Extraversion T1	0.82	31.996	7.588	31.633	6.971	32.369	8.160	0.08	-1.153
Agreeableness T1	0.81	33.748	6.960	31.462	7.799	36.659	7.149	0.43	-6.074***
Conscientiousness T1	0.84	28.931	6.966	29.080	8.036	31.192	8.263	0.26	-3.371**
Aggression T1	0.78	2.702	3.718	3.309	4.450	2.120	2.720	0.32	3.845***
Anxiety T1	0.88	14.006	8.878	11.221	7.648	16.695	9.163	0.65	-7.753***
Antisocial behavior T1	0.80	2.182	3.800	2.669	4.565	1.713	2.806	0.25	3.000**
Social anxiety T1	0.84	10.114	6.579	9.056	6.133	11.136	6.839	0.32	-3.825***
Attention problems T1	0.89	13.555	8.549	13.166	8.475	13.930	8.522	0.09	-1.067
Depression T1	0.90	10.607	9.461	8.304	7.255	12.831	10.739	0.50	-5.915***
Defiant behavior T1	0.67	1.599	1.966	1.480	1.881	1.713	2.041	0.12	-1.418
Hyperactivity T1	0.83	11.404	8.000	10.933	7.970	11.859	8.017	0.12	-1.383
Posttraumatic symptoms T1	0.80	9.759	6.880	8.217	6.225	11.249	7.160	0.45	-5.402***
Somatic Complaints T1	0.79	10.237	6.162	8.658	5.498	11.762	6.390	0.52	-6.225***
Neuroticism T2	0.85	20.983	8.864	19.263	8.097	22.625	9.258	0.39	-4.741***
Extraversion T2	0.83	32.184	7.547	31.142	7.177	33.178	7.767	0.11	-3.309**
Agreeableness T2	0.81	34.927	6.568	33.027	6.957	36.732	5.617	0.59	-7.151***
Conscientiousness T2	0.86	28.111	7.298	27.007	6.954	29.165	7.471	0.30	-3.671***
Aggression T2	0.75	2.218	3.163	2.613	3.559	1.831	2.631	0.25	3.084**
Anxiety T2	0.88	13.602	9.928	10.146	7.584	16.981	10.764	0.73	-9.148***
Antisocial behavior T2	0.82	1.932	3.137	2.303	3.689	1.569	2.433	0.23	2.915**
Social anxiety T2	0.87	9.454	6.809	8.018	5.985	10.853	7.263	0.43	-5.310***
Attention problems T2	0.88	13.041	8.206	12.315	7.700	13.755	8.625	0.18	-2.201*
Depression T2	0.91	10.091	9.175	8.082	7.473	12.056	10.213	0.44	-5.535***
Defiant behavior T2	0.63	1.462	1.781	1.313	1.729	1.608	1.822	0.17	-2.065*
Hyperactivity T2	0.85	10.419	7.561	9.728	7.660	11.096	7.414	0.18	-2.257*
Posttraumatic symptoms T2	0.85	8.696	6.806	6.880	5.835	10.467	7.218	0.55	-6.806***
Somatic Complaints T2	0.79	9.734	6.259	7.778	5.1457	11.646	6.654	0.11	-8.101***
Neuroticism T3	0.85	21.271	8.824	19.862	8.542	22.600	8.898	0.31	-3.315**
Extraversion T3	0.85	32.343	7.686	31.413	7.421	33.221	7.842	0.24	-2.506*
Agreeableness T3	0.84	34.744	7.041	32.855	7.172	36.543	6.430	0.54	-5.768***
Conscientiousness T3	0.87	28.384	7.214	26.723	6.796	29.965	7.258	0.46	-4.892***
Aggression T3	0.76	2.032	3.248	2.658	3.657	1.445	2.690	0.38	3.926***
Anxiety T3	0.85	12.990	8.895	10.166	7.688	15.639	9.148	0.65	-6.776***
Antisocial behavior T3	0.81	2.058	3.696	2.532	4.073	1.614	3.251	0.25	2.591**
Social anxiety T3	0.86	8.595	6.576	7.727	6.047	9.409	6.951	0.26	-2.689**
Attention problems T3	0.84	12.278	8.856	12.454	8.977	12.113	8.757	0.04	0.401
Depression T3	0.89	10.224	9.952	8.999	9.038	11.372	10.631	0.24	-2.516*
Defiant behavior T3	0.50	1.424	2.460	1.365	1.950	1.480	2.861	0.05	-0.487
Hyperactivity T3	0.87	9.862	7.519	9.734	7.873	9.982	7.186	0.03	-0.344
Posttraumatic symptoms T3	0.73	8.075	6.711	6.760	6.328	9.308	6.839	0.39	-4.031***
Somatic Complaints T3	0.88	9.392	5.993	7.903	5.673	10.788	5.961	0.50	-5.169***

Small, medium and large effect sizes correspond to Cohen's d values of 0.20, 0.50 and 0.80, respectively (Cohen, 1992). Cronbach's alphas are considered as: > 0.9 (Excellent), > 0.8 (Good), > 0.7 (Acceptable), > 0.6 (Questionable), > 0.5 (Poor), and < 0.5 (Unacceptable) according to George and Mallery (2003)

N Neuroticism, *E* Extraversion, *A* Agreeableness, *C* Conscientiousness

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

Table 2 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	< 0.001	54	0.906	0.068	0.046
N wave 2	156.111	< 0.001	54	0.943	0.059	0.038
N wave 3	129.274	< 0.001	54	0.950	0.059	0.038
E wave 1	164.546	< 0.001	50	0.922	0.068	0.046
E wave 2	209.561	< 0.001	50	0.918	0.077	0.049
E wave 3	172.590	< 0.001	50	0.914	0.078	0.051
A wave 1	139.206	< 0.001	53	0.938	0.057	0.044
A wave 2	150.530	< 0.001	53	0.940	0.058	0.044
A wave 3	157.737	< 0.001	53	0.931	0.070	0.043
C wave 1	171.346	< 0.001	52	0.916	0.065	0.047
C wave 2	204.943	< 0.001	52	0.928	0.072	0.046
C wave 3	137.098	< 0.001	52	0.945	0.062	0.039
Bi-MP wave 1	171.273	< 0.001	26	0.931	0.080	0.041
Bi-MP wave 2	114.418	< 0.001	26	0.932	0.074	0.054
Bi-MP wave 3	140.069	< 0.001	26	0.900	0.090	0.037
GFP wave 1	11.270	0.023	4	0.950	0.057	0.028
GFP wave 2	11.556	0.021	4	0.935	0.055	0.031
GFP wave 3	18.624	0.001	4	0.881	0.089	0.041

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

Table 3 Measurement Invariance across Waves 1, 2 and 3

		χ^2	*p*	*df*	CFI	RMSEA	SRMR	Δ CFI	Δ RMSEA
N	Configural	860.600	< 0.001	555	0.940	0.031	0.046	-	-
	Metric	888.766	< 0.001	577	0.939	0.031	0.049	0.001	0.00
	Scalar	937.927	< 0.001	601	0.934	0.031	0.050	0.005	0.00
E	Configural	1060.907	< 0.001	540	0.898	0.041	0.061	-	-
	Metric	1124.253	< 0.001	562	0.890	0.042	0.065	0.008	0.001
	Scalar	1181.694	< 0.001	582	0.883	0.042	0.066	0.007	0.00
A	Configural	905.711	< 0.001	552	0.925	0.033	0.056	-	-
	Metric	950.531	< 0.001	574	0.920	0.034	0.062	0.005	0.001
	Scalar	1012.953	< 0.001	594	0.911	0.035	0.064	0.009	0.001
C	Configural	991.912	< 0.001	549	0.917	0.037	0.050	-	-
	Metric	1041.180	< 0.001	571	0.912	0.038	0.056	0.005	0.001
	Scalar	1102.869	< 0.001	589	0.904	0.039	0.060	0.008	0.001
Bi-MP	Configural	779.282	< 0.001	336	0.944	0.045	0.057	-	-
	Metric	818.156	< 0.001	366	0.943	0.043	0.059	0.001	0.002
	Scalar	912.339	< 0.001	389	0.934	0.045	0.061	0.009	0.002
GFP	Configural	176.722	< 0.001	72	0.960	0.047	0.064	-	-
	Metric	185.926	< 0.001	80	0.960	0.045	0.067	0.003	0.003
	Scalar	240.732	< 0.001	105	0.942	0.051	0.070	0.006	0.003

N Neuroticism, *E* Extraversion, *A* Agreeableness, *C* Conscientiousness, *Bi-MP* Bi-factor Model of Psychopathology

RMSEA = 0.028; SRMS = 0.035). The associations between the personality and psychopathology factors of both models are presented in Table 4. 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 ($\chi^2 = 2.011$; $p < 0.150$; $d.f. = 1$; CFI = 0.998; RMSEA = 0.039; SRMS = 0.012). The correlations between the GFP and the p factor were 0.52 ($p < 0.001$) and 0.27

Table 4 Standardized Estimates for the Cross-Lagged Panel Model, including Psychopathology Factors

P	PF	Pathoplasty			Continuity			Complication		
		P1 → PF2	P2 → PF3	P1 → PF3	P1-PF1	P2-P2	P3-PF3	PF1 → P2	PF2 → P3	PF1 → P3
N										
	INT	**0.08***	0.06	0.09	**0.56*****	**0.19*****	**0.26*****	**0.24*****	0.04	0.08
	EXT	-0.09	-0.08	-0.03	-0.10	0.01	-0.10	0.00	0.05	0.03
	HAP	**0.08***	0.08	0.05	**0.35*****	**0.25*****	**0.23*****	**0.16*****	0.01	0.06
	P	**0.28*****	0.09	0.04	**0.45*****	**0.38*****	**21*****	**0.12****	0.05	0.06
E										
	INT	**-0.17*****	**-0.11***	0.04	**-0.29*****	**-0.14****	**-0.21****	-0.06	-0.00	-0.06
	EXT	**0.14****	0.03	-0.02	0.04	-0.03	0.14	-0.03	0.06	-0.06
	HAP	**0.10****	**0.14****	-0.01	0.04	0.07	0.03	-0.02	0.07	-0.02
	P	-0.01	**0.11***	0.04	-0.03	0.00	0.00	-0.02	0.04	-0.02
A										
	INT	**0.11***	0.04	0.01	0.04	0.03	0.10	0.02	-0.06	-0.03
	EXT	**-0.31*****	-0.06	-0.08	**-0.36*****	**-0.22*****	**-0.18***	-0.07	**-0.21****	-0.02
	HAP	0.04	-0.04	-0.03	**-0.32*****	**-0.23*****	**-0.19****	-0.04	-0.08	-0.07
	P	0.07	-0.10	-0.11	**-0.37*****	**-0.14****	**-0.31*****	-0.04	0.01	-0.07
C										
	INT	0.06	**0.14****	0.00	0.02	**0.13****	**0.14***	0.06	0.01	0.11
	EXT	-0.09	0.10	-0.11	**-0.11****	-0.07	0.04	**-0.09***	0.00	0.05
	HAP	-0.02	-0.08	0.07	**-0.47*****	**-0.16*****	-0.09	-0.06	0.06	-0.02
	P	0.08	**-0.10***	0.05	**-0.46*****	-0.04	0.04	-0.04	0.10	-0.01

In bold = all significant associations

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

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

($p < 0.001$) 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 0.62 ($p < 0.001$), while the path from the p factor at time 1 to the same factor at time 2 was 0.55 ($p < 0.001$). Additionally, the p factor at time 1 was related to the GFP at time 1 ($\beta = 0.10$, $p < 0.01$), while the association between the GFP at time 1 with the p factor at time 2 was not significant ($\beta = 0.02$, $p > 0.05$).

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 bi-factor 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). 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 (Hengartner, 2018; McElroy et al., 2017). 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. 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; Watts et al., 2019) 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., 2012; van den Akker et al., 2010), and in the hyperactivity-attention problems (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 et al. (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, 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; Watts et al., 2019), 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; 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, 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 (Etkin et al., 2020; Gomez & Corr, 2014; 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; Watts et al., 2019). 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). 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 bi-factor 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; Castellanos-Ryan et al., 2016; Etkin et al., 2020). 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; Castellanos-Ryan et al., 2016; Etkin et al., 2020).

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. Finaly, while the factors of general, externalizing and internalizing symptoms help reduce the data to broad types of pathology, it will also be the case that the field of psychology and psychiatry will require finer grained consideration of personality conditions. 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 Information The online version contains supplementary material available at https://doi.org/10.1007/s10862-021-09903-1.

Authors' Contributions (CRediT Author Statement) Paula Etkin: Writing—Original Draft; Investigation; Formal analysis.

Manuel I. Ibáñez: Funding acquisition; Review & Editing; Project administration.

Generós Ortet: Funding acquisition; Supervision; Writing, Review & Editing.

Laura Mezquita: Funding acquisition; Methodology; Data curation; Review & Editing.

Funding The first author received a Predoctoral Scholarship (GRISOLIA/2017/129) from the Generalitat Valenciana. 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.

Data Availability The raw data used for this study is available to ensure data transparency.

Code Availability Not applicable.

Declarations

Declaration of Conflicting Interests Paula Etkin, Manuel I. Ibáñez, Generós Ortet and Laura Mezquita have no conflicts of interest to declare that are relevant to the content of this article.

Ethics Approval This study was approved by the Deontological Committee of the authors' university.

Consent to Participate Informed consent to participate was received by the participants, their school, and parents or guardians.

Consent for Publication Consent for the publication of the obtained anonymous data was received by the participants, their school, and parents or guardians.

References

Barlow, D. H., Farchione, T. J., Sauer-Zavala, S., Latin, H. M., Ellard, K. K., Bullis, J. R., & Cassiello-Robbins, C. (2017). *Unified protocol for transdiagnostic treatment of emotional disorders: Therapist guide*. Oxford University Press.

Brandes, C. M., Herzhoff, K., Smack, A. J., & Tackett, J. L. (2019). The p factor and the n factor: Associations between the general factors of psychopathology and neuroticism in children. *Clinical Psychological Science, 7*, 1266–1284. https://doi.org/10.1177/2167702619859332

Carragher, N., Krueger, R. F., Eaton, N. R., & Slade, T. (2015). Disorders without borders: Current and future directions in the meta-structure of mental disorders. *Social Psychiatry and Psychiatric Epidemiology, 50*, 339–350. https://doi.org/10.1007/s00127-014-1004-z

Caspi, A., Houts, R. M., Belsky, D. W., Goldman-Mellor, S. J., Harrington, H., Israel, S., & Moffitt, T. E. (2014). The p factor: One general psychopathology factor in the structure of psychiatric disorders? *Clinical Psychological Science, 2*, 119–137. https://doi.org/10.1177/2167702613497473

Castellanos-Ryan, N., Briere, F. N., O'Leary-Barrett, M., Banaschewski, T., Bokde, A., Bromberg, U., The IMAGEN Consortium. (2016). The structure of psychopathology in adolescence and its common personality and cognitive correlates. *Journal of Abnormal Psychology, 125*, 1039–1052. https://doi.org/10.1037/abn0000193

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 155–159. https://doi.org/10.1037/0033-2909.112.1.155

Cosgrove, V. E., Rhee, S. H., Gelhorn, H. L., Boeldt, D., Corley, R. C., Ehringer, M. A., & Hewitt, J. K. (2011). Structure and etiology of co-occurring internalizing and externalizing disorders in adolescents. *Journal of Abnormal Child Psychology, 39*, 109–123. https://doi.org/10.1007/s10802-010-9444-8

Costa, P. T., Jr., & McCrae, R. R. (2010). Bridging the gap with the five-factor model. *Personality Disorders: Theory, Research, and Treatment, 1*, 127–130. https://doi.org/10.1037/a0020264

De Bolle, M., Beyers, W., De Clercq, B., & De Fruyt, F. (2012). General personality and psychopathology in referred and non-referred children and adolescents: An investigation of continuity, pathoplasty, and complication models. *Journal of Abnormal Psychology, 121*, 958–970. https://doi.org/10.1037/a0027742

De Bolle, M., De Clercq, B., De Caluwé, E., & Verbeke, L. (2016). Exploring the complexity of the childhood trait-psychopathology association: Continuity, pathoplasty and complication effects. *Development and Psychopathology, 28*, 139–148. https://doi.org/10.1017/S0954579415000346

De Fruyt, F., De Clercq, B., & De Bolle, M. (2017a). The Five Factor Model of Personality and Consequential Outcomes in Childhood and Adolescence. In T. A. Widiger (Ed.), *The Oxford Handbook of the Five Factor Model. 507–520.* Oxford University Press.

De Fruyt, F., De Clercq, B., De Caluwé, E., & Verbeke, L. (2017b). Personality development and psychopathology. In J. Specht (Ed.), *Personality development across the lifespan (pp. 385–400).* Academic Press. https://doi.org/10.1016/B978-0-12-804674-6.00024-7

Dimitrov, D. (2010). Testing for Factorial Invariance in the Context of Construct Validation. *Measurement and Evaluation in Counseling and Development, 43*, 121–149. https://doi.org/10.1177/0748175610373459

Du Rietz, E., Coleman, J., Glanville, K., Choi, S. W., O'Reilly, P. F., & Kuntsi, J. (2018). Association of polygenic risk for attention-deficit/hyperactivity disorder with co-occurring traits and disorders. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging, 3*, 635–643. https://doi.org/10.1016/j.bpsc.2017.11.013

Durbin, C. E. (2019). Personality development and internalizing psychopathology. In D. P. McAdams, R. L. Shiner, & J. L. Tackett (Eds.), *Handbook of personality development (p. 518–533).* The Guilford Press.

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

Fernández-Pinto, I., Santamaría, P., Sánchez-Sánchez, F., Carrasco, M. A., & del Barrio, V. (2015). *Sistema de Evaluación de Niños y Adolescentes (SENA). Manual Técnico*. TEA Ediciones.

George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference, 11.0 update* (4th ed.). Allyn & Bacon.

Gomez, R., & Corr, P. J. (2014). ADHD and personality: A meta-analytic review. *Clinical Psychology Review, 34*(5), 376–388. https://doi.org/10.1016/j.cpr.2014.05.002

Gomez, R., Stavropoulos, V., Vance, A., & Griffiths, M. D. (2019). Re-evaluation of the latent structure of common childhood disorders: Is there a general psychopathology factor (p-factor)? *International Journal of Mental Health and Addiction, 17*(2), 258–278. https://doi.org/10.1007/s11469-018-0017-3

Hengartner, M. P. (2018). Developmental course of child personality traits and their associations with externalizing psychopathology: Results from a longitudinal multi-informant study in a representative cohort. *Journal of Research in Personality, 73*, 164–172. https://doi.org/10.1016/j.jrp.2017.12.001

Hengartner, M. P., Ajdacic-Gross, V., Wyss, C., Angst, J., & Rössler, W. (2016). Relationship between personality and psychopathology in a longitudinal community study: A test of the predisposition model. *Psychological Medicine, 46*, 1693. https://doi.org/10.1017/S0033291716000210

Herzhoff, K., Smack, A. J., Reardon, K. W., Martel, M. M., & Tackett, J. L. (2017). Child personality accounts for oppositional defiant disorder comorbidity patterns. *Journal of Abnormal Child Psychology, 45*, 327–335. https://doi.org/10.1007/s10802-016-0162-8

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1–55. https://doi.org/10.1080/10705519909540118

Jeronimus, B. F., Kotov, R., Riese, H., & Ormel, J. (2016). Neuroticism's prospective association with mental disorders halves after adjustment for baseline symptoms and psychiatric history, but the adjusted association hardly decays with time: A meta-analysis on 59 longitudinal/prospective studies with 443 313 participants.

Psychological Medicine, 46, 2883–2906. https://doi.org/10.1017/S0033291716001653

Jeronimus, B. F., Riese, H., Sanderman, R., & Ormel, J. (2014). Mutual reinforcement between neuroticism and life experiences: A five-wave, 16-year study to test reciprocal causation. *Journal of Personality and Social Psychology, 107*, 751. https://doi.org/10.1037/a0037009

John, O. P., Naumann, L. P., & Soto, C. J. (2008). Paradigm shift to the integrative big five trait taxonomy. In J. Robins & Pervin (Eds.), *Handbook of personality: Theory and research (pp. 114–158).* The Guilford Press.

Klimstra, T. A., Akse, J., Hale, W. W., III., Raaijmakers, Q. A., & Meeus, W. H. (2010). Longitudinal associations between personality traits and problem behavior symptoms in adolescence. *Journal of Research in Personality, 44*, 273–284. https://doi.org/10.1016/j.jrp.2010.02.004

Kotov, R., Gamez, W., Schmidt, F., & Watson, D. (2010). Linking "Big" personality traits to anxiety, depressive, and substance use disorders: A meta-analysis. *Psychological Bulletin, 136*, 768–821. https://doi.org/10.1037/a0020327

Krueger, R. F., Kotov, R., Watson, D., Forbes, M. K., Eaton, N. R., Ruggero, C. J., & Bagby, R. M. (2018). Progress in achieving quantitative classification of psychopathology. *World Psychiatry, 17*, 282–293. https://doi.org/10.1002/wps.20566

Krueger, R. F., & Markon, K. E. (2006). Reinterpreting Comorbidity: A model-based approach to understanding and classifying psychopathology. *Annual Review of Clinical Psychology, 2*, 111–133. https://doi.org/10.1146/annurev.clinpsy.2.022305.095213

Krueger, R. F., & Markon, K. E. (2011). A dimensional-spectrum model of psychopathology: Progress and opportunities. *Archives of General Psychiatry, 68*(1), 10–11. https://doi.org/10.1001/archgenpsychiatry.2010.188

Krueger, R. F., & Tackett, J. L. (2003). Personality and psychopathology: Working toward the bigger picture. *Journal of Personality Disorders, 17*, 109–128. https://doi.org/10.1521/pedi.17.2.109.23986

Kushner, S. C., Tackett, J. L., & Bagby, R. M. (2012). The Structure of Internalizing Disorders in Middle Childhood and Evidence for Personality Correlates. *Journal of Psychopathology and Behavioral Assessment, 34*, 22–34. https://doi.org/10.1007/s10862-011-9263-4

Laceulle, O. M., Vollebergh, W. A., & Ormel, J. (2014). The structure of psychopathology in adolescence: Replication of a general psychopathology factor in the TRAILS study. *Clinical Psychological Science, 3*, 850–860. https://doi.org/10.1177/2167702614560750

Lahey, B. B., Applegate, B., Hakes, J. K., Zald, D. H., Hariri, A. R., & Rathouz, P. J. (2012). Is There a general factor of prevalent psychopathology during adulthood? *Journal of Abnormal Psychology, 121*, 971–977. https://doi.org/10.1037/a0028355

Levin-Aspenson, H. F., Khoo, S., & Kotelnikova, Y. (2019). Hierarchical taxonomy of psychopathology across development: Associations with personality. *Journal of Research in Personality, 81*, 72–78. https://doi.org/10.1016/j.jrp.2019.05.006

Malouff, J. M., Thorsteinsson, E. B., Rooke, S. E., & Schutte, N. S. (2007). Alcohol involvement and the five-factor model of personality: A meta-analysis. *Journal of Drug Education, 37*, 277–294. https://doi.org/10.2190/DE.37.3.d

Marsh, H. W., Hau, K. T., & Wen, Z. (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Bentler's (1999) findings. *Structural Equation Modeling, 11*, 320–341. https://doi.org/10.1207/s15328007sem1103_2

McElroy, E., Shevlin, M., & Murphy, J. (2017). Internalizing and externalizing disorders in childhood and adolescence: A latent transition analysis using ALSPAC data. *Comprehensive Psychiatry, 75*, 75–84. https://doi.org/10.1016/j.comppsych.2017.03.003

Mervielde, I., & De Fruyt, F. (2002). Assessing children's traits with the hierarchical personality inventory for children. In B. D. Raad & M. Perugini (Eds.), *Big five assessment.* Hogrefe & Huber Publishers.

Mezquita, L., Ibáñez, M. I., Villa, H., Fañanás, L., Moya-Higueras, J., & Ortet, G. (2015). Five-factor model and internalizing and externalizing syndromes: A 5-year prospective study. *Personality and Individual Differences, 79*, 98–103. https://doi.org/10.1016/j.paid.2015.02.002

Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H., & Sears, M. R. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences, 108*, 2693–2698. https://doi.org/10.1073/pnas.1010076108

Murray, A. L., Eisner, M., & Ribeaud, D. (2016). The development of the general factor of psychopathology 'p factor' through childhood and adolescence. *Journal of Abnormal Child Psychology, 44*(8), 1573–1586. https://doi.org/10.1007/s10802-016-0132-1

Nigg, J. T. (2006). Temperament and developmental psychopathology. *Journal of Child Psychology and Psychiatry, 47*, 395–422. https://doi.org/10.1111/j.1469-7610.2006.01612.x

Nigg, J. T., John, O. P., Blaskey, L. G., Huang-Pollock, C. L., Willcutt, E. G., Hinshaw, S. P., & Pennington, B. (2002). Big five dimensions and ADHD symptoms: Links between personality traits and clinical symptoms. *Journal of Personality and Social Psychology, 83*, 451.

Oltmanns, J. R., Smith, G. T., Oltmanns, T. F., & Widiger, T. A. (2018). General factors of psychopathology, personality, and personality disorder: Across domain comparisons. *Clinical Psychological Science, 6*, 581–589. https://doi.org/10.1177/2167702617750150

Ortet-Walker, J., Mezquita, L., Vidal-Arenas, V., Ortet, G., & Ibáñez, M. I. (2020). Validation of an Abridged, 60-item form, of the Junior Spanish NEO Inventory (JS NEO-A60). *Current Psychology*. https://doi.org/10.1007/s12144-020-01135-y

Ruiz, M. A., Pincus, A. L., & Schinka, J. A. (2008). Externalizing pathology and the Five-Factor Model: A meta-analysis of personality traits associated with antisocial personality disorder, substance use disorder, and their co-occurrence. *Journal of Personality Disorders, 22*, 365–388. https://doi.org/10.1521/pedi.2008.22.4.365

Samuel, D. B., Simms, L. J., Clark, L. A., Livesley, W. J., & Widiger, T. A. (2010). An item response theory integration of normal and abnormal personality scales. *Personality Disorders: Theory, Research, and Treatment, 1*, 5. https://doi.org/10.1037/a0018136

Shiner, R. L., Masten, A. S., & Tellegen, A. (2002). A developmental perspective on personality in emerging adulthood: Childhood antecedents and concurrent adaptation. *Journal of Personality and Social Psychology, 83*, 1165.

Slobodskaya, H. R., & Akhmetova, O. A. (2010). Personality development and problem behavior in Russian children and adolescents. *International Journal of Behavioral Development, 34*, 441–451. https://doi.org/10.1177/0165025409352825

South, S. C., Eaton, N. R., & Krueger, R. F. (2010). The connections between personality and psychopathology. In T. Millon, R. F. Krueger, & E. Simonsen (Eds.), *Contemporary directions in psychopathology: Scientific foundations of the DSM-V and ICD-11* (pp. 242–262). The Guilford Press.

Tackett, J. L. (2006). Evaluating models of the personality–psychopathology relationship in children and adolescents. *Clinical Psychology Review, 26*, 584–599. https://doi.org/10.1016/j.cpr.2006.04.003

Trautmann, S., Rehm, J., & Wittchen, H. U. (2016). The economic costs of mental disorders: Do our societies react appropriately to

the burden of mental disorders? *EMBO Reports, 17*, 1245–1249. https://doi.org/10.15252/embr.201642951

Van den Akker, A. L., Deković, M., & Prinzie, P. (2010). Transitioning to adolescence: How changes in child personality and over-reactive parenting predict adolescent adjustment problems. *Development and Psychopathology, 22*, 151–163. https://doi.org/10.1017/S0954579409990320

Van der Linden, D., Pekaar, K. A., Bakker, A. B., Schermer, J. A., Vernon, P. A., Dunkel, C. S., & Petrides, K. V. (2017). Overlap between the general factor of personality and emotional intelligence: A meta-analysis. *Psychological Bulletin, 143*, 36–52. https://doi.org/10.1037/bul0000078

Watts, A. L., Poore, H. E., Lilienfeld, S. O., & Waldman, I. D. (2019). Clarifying the associations between Big Five personality domains and higher-order psychopathology dimensions in youth. *Journal of Research in Personality, 82*. https://doi.org/10.1016/j.jrp.2019.07.002