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ABSTRACT

Although personality is closely related to the psychopathology structure, to our knowledge no study has explored the associations between the Five-Factor traits and a bifactor psychopathology model within a personality developmental framework. Consequently, this study aims to explore intercept and growth of personality traits across three assessments in a 2-year period and their associations with psychopathology in a nonclinical sample of 551 adolescents (51.5% girls; $M_{age} = 13.77$, $SD = 1.29$). Confirmatory Factor Analysis supported the bifactor structure of psychopathology. Latent growth curve modeling showed a slightly declining trend in neuroticism and conscientiousness. Individual differences in starting point and change in personality independently predicted later psychopathology. This highlights the importance of these parameters as risk or protective factors, when developing prevention programs.

1. Introduction

The intersection of personality and psychopathology appears to be an active area of research (Krueger et al., 2020), requiring more longitudinal studies that empirically test the latest proposed structures. Despite previous research pointing out that dimensional structures of personality and psychopathology share similar characteristics (Krueger et al., 2018), to our knowledge no previous study has explored the associations between the Five-Factor Model of personality and a bifactor psychopathology model within a personality developmental framework. Consequently, this study aimed to explore how baseline and growth trajectories of personality relate to different levels of the bifactor structure of psychopathology.

1.1. Personality development

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 some change (i.e., individual, mean-level and rank-order changes) (Bleidorn & Hopwood, 2019). Specifically, cross-sectional studies have shown that mean levels of agreeableness, conscientiousness, and openness to experience decline from late childhood into early adolescence and then increase again from late adolescence into early adulthood (Soto et al., 2011; Soto, 2016). Stability of these dimensions is mainly found during adulthood and middle age, with some declines also being documented around older adulthood (age 60 on) (Kandler et al., 2015; Mõttus et al., 2012). These results have been also replicated in a *meta*-analysis that included longitudinal data of youths from ages 10 to 20 (Denissen et al., 2013), at least for conscientiousness and openness to experience. These results suggest that adolescents show a tendency to experience temporary 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 subsequent increments in the mean levels of conscientiousness, agreeableness, and emotional stability during late adolescence and the beginning of adulthood have been interpreted according to the maturity principle, indicating that these traits tend to slightly increase reflecting greater adjustment (Caspi et al., 2005; Roberts, et al., 2006).

The results on mean level trends of neuroticism and extraversion are

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less consistent across studies, showing non increments (Denissen et al., 2013; Ibáñez et al., 2016), increments (Borghuis et al., 2017; Roberts et al., 2006; Soto et al., 2011) and some decrements across time (Elkins et al., 2017; Roberts et al., 2006; Soto et al., 2011). In addition, how these patterns of personality stability and change are related to psychopathology at the different levels of its hierarchy is less clear. Thus, further research on the intersection of personality development and psychopathology in youth is required (e.g., Soto & Tackett, 2015).

1.2. Structure of psychopathology

The structure of the most prevalent mental disorders (i.e., anxiety, depression, and conduct-related disorders) has been explored for decades. Classically, a correlated model of psychopathology, which differentiates an internalizing and an externalizing factor, has been proposed in youths (Achenbach, 2011; Cosgrove et al., 2011) and adults (Krueger, 1999). This structure appears to emerge independently of using symptom scales, symptom counts, or categorical diagnoses (Achenbach 2020; Mezquita et al., 2015). Recently, several 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, better fits the data than other competing models (Carragher et al., 2015; Caspi et al., 2014; Etkin et al., 2020). Even when the bifactor model of psychopathology has been criticized mostly because of its overfitting tendencies (Bornovalova et al., 2020; Watts et al., 2020; Watts et al., 2019), there is also increasing construct-related evidence about the p factor that points towards its utility. This p factor appears to be highly heritable (Allegrini, et al., 2020) and stable over time (Murray et al., 2016); and has also been related to symptom severity (Caspi et al., 2020), duration, and intensity of treatment (Smith et al., 2020). These kinds of studies have relevant implications, as they suggest the adequacy of transitioning from DSM/ICD categorical conceptualizations to more dimensionally-oriented models, such as the RDoC framework (Cuthbert, 2014) or the Hierarchical Taxonomy of Psychopathology (HiTOP; Kotov et al., 2021).

In addition, the resemblance between the recently proposed models for the structure of psychopathology and the 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 symptoms (Krueger et al., 2018; Widiger et al., 2018).

1.3. Personality and psychopathology

Numerous studies in the last decades have addressed the close relationships between the FFM and mental disorders. In youths, neuroticism has repeatedly been associated with anxiety and depression 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 the lifespan, 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., 2017; Klimstra et al., 2010) and, in some studies, with hyperactivity/attention problems (Nigg et al., 2002). These patterns have been observed in adults too (for *meta*-analyses see Kotov et al., 2010; Malouff et al., 2005).

Regarding the associations of the FFM with broad psychopathological factors in youths, cross-sectional studies show that when a correlated model is specified, 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) similar to what is found in adults (Mezquita et al., 2015). This spectra-trait specificity has

been also found in longitudinal studies. Thus, De Bolle et al. (2012) found that latent change in emotional stability and agreeableness was negatively linked to change in internalizing and externalizing problems, respectively. Latent change in extraversion was negatively linked to change in internalizing symptoms, and change in conscientiousness was related to variation in externalizing behaviors.

The exploration of the FFM and its association with bifactor or hierarchical models of psychopathology is even scarcer. However, it seems robust that the p factor is cross-sectionally (Caspi et al., 2014; Etkin et al., 2020) and longitudinally (Castellanos-Ryan et al., 2016; Mann et al., 2020) related to high neuroticism, low agreeableness, and low conscientiousness regardless of the specified model (bifactor vs. hierarchical). In addition, and despite some minor differences across studies (i.e., samples employed, scales included), when a bifactor model is specified, it seems that neuroticism is related to the internalizing factor (Castellanos-Ryan et al. 2016; Etkin et al., 2020), low agreeableness and low conscientiousness are associated with a disinhibited externalizing factor (Caspi et al., 2014), low agreeableness is related to an antagonistic externalizing factor (Etkin et al., 2020), and low conscientiousness and high neuroticism are associated with hyperactivity and attention problems (Etkin et al., 2020).

To our knowledge, only one recent study has explored the associations between changes over time in FFM traits and variations in broad factors from a hierarchical model of psychopathology in Mexican adolescents (Mann et al., 2020). They found that initial levels of conscientiousness, agreeableness, and emotional stability were associated with lower initial levels of the p factor; and average increases in extraversion and decreases in neuroticism were related to decreases in p (Mann et al., 2020). Also, initial levels of conscientiousness were negatively related to ADHD and the externalizing factor; both initial level and change in extraversion were positively linked to externalizing symptoms; initial levels of agreeableness were negatively associated with internalizing and externalizing spectra; and neuroticism's initial levels were associated with all the factors, and its change was also related to all factors except for internalizing (Mann et al., 2020).

1.4. The present study

Due to the lack of previous studies, we aimed 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. Specifically, we aimed to explore the associations of intercept and change in personality with the resulting factors of the bifactor structure and also with 10 symptom scales.

We expected to find significant individual differences on the personality traits' intercepts and patterns of change over time. In addition, we predicted that both parameters would not be significantly associated. Concerning growth trajectories, we hypothesized small but significant changes in most personality traits. Moreover, we expected to find specific associations of both parameters (intercept and slope) with later psychopathological outcomes: neuroticism's parameters would be positively associated with the internalizing factor, internalizing-related symptom scales (e.g., depression, anxiety), hyperactivity/attention problems and the p factor; whereas agreeableness and conscientiousness would be negatively associated with externalizing factor, externalizing-related symptom scales (e.g., aggression, antisocial behavior), as well as the p factor. In addition, conscientiousness' parameters would be negatively related to hyperactivity/attention problems, both to the single factor and to each separate scale. Finally, extraversion's parameters would be negatively related to internalizing problems and the corresponding scales, mainly with anxiety-related symptoms.

2. Method

2.1. Participants

In the first wave (T1), the sample consisted of 809 adolescents from two high schools in an urban area of eastern Spain, all between 12 and 18 years old ($M = 14.33$, $SD = 1.58$; 49.7% girls). In the second wave ($n = 678$), approximately 1 year later (T2), the gender distribution was 50.1% girls and the mean age was 14.83 years old ($SD = 1.25$). Again, 1 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 2 years, participants completed a personality questionnaire at each wave. 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 and 13 years old, 54.7% between 14 and 16 years old and 9.5% between 17 and 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 grades that were generally obtained were: 12.4% failed, 16.2% pass, 28.5% good, 32.6% remarkable, and 10.3% outstanding. Also, 68.9% of the students had never repeated the year, 21.2% had repeated only once, and 9.9% had 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%).

2.2. Procedure

The research team contacted the school and sent documents to the principals, parents, and students explaining the aims and procedure 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 raffle 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 at the university. Initial assessment was conducted in 2015 and 2016 for each school, respectively. For the follow up we continued assessing all the students available in their classroom on personality traits for T2 1 year after and T3 the next year. Finally, psychopathological symptoms were assessed, between 7 and 14 days after assessing personality at T3.

2.3. Measures

Personality Traits. The 60-item Abridged form of the Short 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, ranging from 0 (*strongly disagree*) to 4 (*strongly agree*). Internal

consistency coefficients were satisfactory in previous studies, ranging from 0.75 to 0.84, and retest correlations were also adequate, ranging from 0.75 to 0.83 (Ortet-Walker et al., 2020). Alphas and McDonalds' Omegas obtained in the present study are shown in Table 1, ranging from 0.79 to 0.87.

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 3–18 years. Even though the SENA consists of different instruments, the parent or teacher forms were not used for this study, and only 10 out of 29 scales for 12–18 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*. In the present study, we included the following 10 scales, which have been previously placed within the internalizing and externalizing spectrums, as well as the ADHD symptoms (Etkin et al., 2020): depression (14 items), anxiety (10 items), social anxiety (8 items), post-traumatic symptomatology (11 items), somatic complaints (9 items), hyperactivity/impulsivity (10 items), attention problems (10 items), aggression (7 items), antisocial behavior (8 items), and defiant behavior (3 items). With respect to psychometric characteristics, the test-retest reliability coefficients of the different scales were above 0.80 and for internal consistency all scales displayed acceptable to excellent alphas (Sánchez-Sánchez et al., 2016). For the present study, the alphas and omegas are presented in Table 1, ranging from 0.77 to 0.91, except for defiant behavior (0.66), since it only consists of three items.

2.4. Analyses

Participants who completed the questionnaires with>5% missing values were deleted, with $n = 551$ remaining for T1 (3 participants who filled out questionnaires incompletely 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). Remaining, missing data were randomly distributed (less than 2% for each item of the questionnaire, according to Little's Missing at Random – MAR – Tests using SPSS25) and were handled using full information maximum likelihood, which is more efficient and has less bias than alternative procedures (Enders & Bandalos, 2001; Enders, 2001). When personality scores of the initial assessment ($n = 809$) were compared with the final sample at wave 1, no significant mean differences were found, and the few significant differences across the subsequent waves were small ($d < 0.22$) (see supplementary material).

To investigate change in personality and its effects on later psychopathology, we modeled the data in a stepwise procedure. In a preliminary step (i.e., step 0), we conducted 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 for each trait fitted the data well (See Supplementary Material). Second, we tested the longitudinal measurement invariance for the personality models across waves (see Supplementary Material for a detailed description of the longitudinal measurement invariance procedure of the personality traits).

Third, we explored the growth of personality traits, by comparing a series of models that vary in their assumptions about the nature and form of growth. Thus we tested a *free curve growth model*, where slope loadings are freely estimated, allowing any shape of growth that fits the data the best. Then, 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).

Fourth, we modeled the slopes and intercepts of the personality traits on the p factor, the three broad psychopathology factors, and the scales

Table 1
Descriptive statistics.

	α	ω	Total sample		Boys		Girls		d	t
			M	SD	M	SD	M	SD		
Neuroticism T1	0.81	0.82	22.819	8.585	21.594	7.747	23.940	9.156	0.28	−3.205**
Extraversion T1	0.82	0.82	31.994	7.593	31.623	6.907	32.350	8.195	0.09	−1.104
Agreeableness T1	0.80	0.79	33.945	6.751	32.003	6.987	35.733	6.004	0.57	−6.590***
Conscientiousness T1	0.83	0.84	29.102	6.868	28.057	6.838	30.089	6.762	0.29	−3.475**
Neuroticism T2	0.83	0.84	20.887	8.730	19.133	8.135	22.446	8.958	0.39	−4.367***
Extraversion T2	0.85	0.85	32.378	7.628	31.184	7.202	33.441	7.850	0.30	−3.369**
Agreeableness T2	0.81	0.82	35.039	6.478	33.096	6.847	36.752	5.613	0.58	−6.623***
Conscientiousness T2	0.86	0.87	28.051	7.327	26.705	6.992	29.247	7.423	0.35	−3.988***
Neuroticism T3	0.84	0.86	21.005	8.850	19.473	8.488	22.362	8.964	0.33	−3.156**
Extraversion T3	0.86	0.85	32.505	7.863	31.371	7.556	33.487	8.009	0.27	−2.576**
Agreeableness T3	0.84	0.85	34.824	7.158	33.011	7.211	36.387	6.747	0.48	−4.594***
Conscientiousness T3	0.87	0.87	28.278	7.183	26.579	6.776	29.757	7.216	0.45	−4.324***
Aggression	0.77	0.78	1.983	3.306	2.512	3.670	1.521	2.883	0.31	2.833**
Anxiety	0.89	0.90	12.844	8.944	10.075	7.777	15.259	9.211	0.61	−0.658***
Antisocial behavior	0.85	0.86	2.001	3.695	2.384	3.948	1.676	3.438	0.20	1.755
Social anxiety	0.86	0.87	8.531	6.625	7.665	6.134	9.286	6.954	0.25	−2.324*
Attention problems	0.83	0.84	12.204	9.082	12.401	9.078	12.032	9.107	0.04	0.380
Depression	0.90	0.91	9.855	9.501	8.611	8.128	10.940	10.455	0.25	−2.309*
Defiant behavior	0.66	0.68	1.448	2.621	1.372	2.006	1.516	3.062	0.06	−0.528
Hyperactivity	0.87	0.87	9.791	7.643	9.672	7.877	9.894	7.452	0.03	−0.270
Post-traumatic symptoms	0.81	0.82	7.932	6.495	6.575	6.051	9.116	6.652	0.40	−3.751***
Somatic Complaints	0.77	0.77	9.329	5.884	7.936	5.652	10.544	5.826	0.45	−4.256***

*p < .05. ** p < .01. ***p < .001. Small, medium and large effect sizes correspond to Cohen's d values of 0.20, 0.50 and 0.80, respectively (Cohen, 1992) which were calculated using https://www.socscistatistics.com/effectsize/default3.aspx. Cronbach's alphas and McDonald's omegas 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).

to test if both growth and starting point of each trait were significant predictors of later psychopathological symptoms. Prior to including psychopathology 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 internalizing, externalizing, and hyperactivity/attention problems could be found, in a similar way to previous studies (Etkin et al., 2020).

For all models, model fit was assessed using the Root Mean Square Error of Approximation (RMSEA), with values of 0.10 or higher pointing to unacceptable fit, values below 0.08 pointing to an acceptable model fit, and values below 0.05 suggesting a good model fit; the Standardized Root Mean Square Residual (SRMR) with 0.08 or lower indicating a good fit; and the Comparative Fit Index (CFI), with values of 0.90 or higher suggesting an adequate model fit (Hu & Bentler, 1999).

3. Results

3.1. Descriptive results and correlation analyses

Cronbach's alphas and mean differences by gender are presented in Table 1, while correlations between all the variables included in the study can be consulted in the Supplementary Material.

3.2. Individual differences at the starting point and development of personality traits

Once the stability of the personality models was tested in each wave of data and the bifactor structure of psychopathology was also tested (see Supplementary Material), the change in personality over time was analyzed. A series of competing growth models (i.e., free, no growth and linear models) were conducted to test their fit to the data (see Table 2). First, the *free growth model* showed a good fit to the data. Then, the *no growth model* achieved similar but worse fit (regarding ΔRMSEA and

Table 2
Unstandardized Results for Growth Models.

Model	χ²	p	df	CFI	RMSEA	SRMR	rS-I	Mean S	Variance I	Variance S
Free growth										
N	860.436	0.000	597	0.942	0.028	0.048	0.052	−0.108	0.125*	−0.008
E	1085.819	0.000	574	0.900	0.040	0.061	0.058	0.021	0.189	0.000
A	1025.972	0.000	592	0.900	0.036	0.061	0.009	0.060***	0.090***	0.047
C	1095.013	0.000	587	0.905	0.040	0.060	0.023	−0.114***	0.313***	0.046
No growth										
N	883.834	0.000	599	0.938	0.029	0.049	−0.015	–	0.189***	0.031**
E	1086.839	0.000	576	0.903	0.040	0.061	−0.024	–	0.270***	0.041**
A	1041.827	0.000	594	0.902	0.037	0.062	0.007	–	0.075***	−0.001
C	1137.220	0.000	589	0.898	0.041	0.064	−0.031	–	0.323***	0.051**
Linear growth										
N	892.139	0.000	600	0.941	0.030	0.049	−0.017	−0.050**	0.204***	0.032*
E	1086.462	0.000	575	0.903	0.040	0.061	−0.024	0.007	0.271***	0.041**
A	1040.161	0.000	593	0.902	0.037	0.062	0.006	0.013	0.075***	−0.001
C	1095.542	0.000	588	0.905	0.040	0.060	−0.018	−0.104***	0.308***	0.038**

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

ΔCFI). Finally, the *linear growth model* achieved the best fit for almost every trait. Despite the free curve model presenting slightly better fit indices for neuroticism, the fit did not decrease for the linear model (ΔRMSEA < 0.015, ΔCFI < 0.010). These findings suggest that the linear model is the most appropriate for describing our data and can therefore be used in the following analyses.

Regarding personality trajectories in the linear models, the results revealed some important dynamics (see Table 2). Participants slightly but significantly decreased in neuroticism (Mean slope = -0.050, $p <$ .01) and in conscientiousness (Mean slope = -0.104, $p <$ .001) on average 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 agreeableness, suggesting significant individual differences in the development of these personality traits over time, as all individuals did not change at the same rate. 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.

3.3. Structure of psychopathology

The CFA showed a good fit for a bifactor structure of psychopathology (see Supplementary Material). 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 onto one of the three broad factors and also onto the p factor (see Supplementary Material). 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 the factor of hyperactivity/attention problems consisted of a correlation between the scales of attention problems and hyperactivity, as a factor consisting of only two variables could not be computed.

3.4. Effects of individual differences at the starting point and development of personality traits on psychopathology

To test whether the significant individual differences in intercept and development of personality traits were related to individual differences in psychopathological factors and symptoms, we regressed the factor scores from the bifactor model (three factors of psychopathology and the

p factor, see Table 3) as well as the 10 scales, on the latent intercept and slope factors of the linear model, in two separate models for each personality trait. These models fitted the data well for all traits: neuroticism with the bifactor model (CFI 0.929, RMSEA 0.031, SRMR 0.052) and the scales (CFI 0.912, RMSEA 0.033, SRMR 0.053); extraversion with the bifactor model (CFI 0.898, RMSEA 0.040, SRMR 0.065) and the scales (CFI 0.901, RMSEA 0.039, SRMR 0.066); agreeableness with the bifactor model (CFI 0.903, RMSEA 0.036, SRMR 0.066) and the scales (CFI 0.917, RMSEA 0.033, SRMR 0.065); and conscientiousness with the bifactor model (CFI 0.904, RMSEA 0.039, SRMR 0.062) and the scales (CFI 0.910, RMSEA 0.037, SRMR 0.062).

Regarding individual differences at the starting point (intercept), the standardized regression coefficients indicated that a high intercept of neuroticism (followed by its change) was the most predictive for the p factor and various psychopathological symptoms, especially internalizing and hyperactivity/attention problems. For extraversion, both the individual differences in intercept and (especially) the change negatively predicted internalizing symptoms, while only intercept positively predicted hyperactivity and attention problems. 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 psychopathology and only results with the intercept as a predictor were reported. The intercept of agreeableness appeared to be highly negatively associated with the p factor and externalizing problems. Finally, the intercept and change of conscientiousness were negatively associated with the p factor and hyperactivity/attention problems. Its intercept was also associated with externalizing problems. The results regarding the associations between intercept and change of the traits and the 10 specific scales are displayed in Table 3.

4. Discussion

The main aim of the present study was to explore the trajectories of the FFM personality traits and their association with the bifactor structure of psychopathology and each single symptom scale, using latent growth curve modeling in adolescence. Whereas the growth models of the personality traits explored in the present study suggested that a linear model (vs. non-linear model) best fit the data, previous studies have found a combination of linear (Borghuis et al., 2017; Klimstra et al., 2009; Vecchione et al., 2012) and curvilinear (Borghuis et al., 2017; Klimstra et al., 2009; Van den Akker et al., 2014) slopes for the personality traits of adolescents. However, it is important to note that curvilinear mean-level trajectories could not be tested in the present study, as at least four measurement waves are needed to explore the curvilinear model.

Table 3
Standardized Regression Coefficients when Regressing Psychopathological Factors and Scales on Linear Growth Parameters of Personality Traits.

Factors	Neuroticism		Extraversion		Agreeableness		Conscientiousness	
	I β	S β	I β	S β	I β	S β	I β	S β
P factor	0.545***	0.454***	0.03	−0.04	−0.289**	–	−0.341***	−0.273**
Internalizing	0.572***	0.477***	−0.268***	−0.449***	0.086	–	0.098	0.115
Externalizing	−0.091	−0.094	0.028	0.176	−0.390***	–	−0.148*	0.068
Hyperactivity/inattention	0.417***	0.363***	0.162*	0.068	−0.155	–	−0.322***	−0.300**
Scales								
Depression	0.601 ***	0.590 ***	−0.192**	−0.316***	−0.198*	–	−0.265***	−0.163
Somatic complaints	0.582 ***	0.378 ***	−0.012	−0.146	−0.192*	–	−0.217 ***	−0.146
Anxiety	0.611 ***	0.556 ***	−0.009	−0.238**	0.03	–	−0.005	−0.004
Post-traumatic symptoms	0.603 ***	0.486***	−0.099	−0.239*	−0.185**	–	−0.107	−0.062
Social anxiety	0.560 ***	0.453 ***	−0.227***	−0.411***	−0.01	–	−0.139*	0.004
Defiant behavior	0.228 ***	0.205 ***	−0.002	0.020	−0.308**	–	−0.229***	−0.139*
Antisocial behavior	0.165 **	0.137*	0.061	0.090	−0.390***	–	−0.268***	−0.094
Aggression	0.216 ***	0.192 **	0.062	0.040	−0.427***	–	−0.240***	−0.096
Attention problems	0.472 ***	0.432 ***	0.055	−0.030	−0.161	–	−0.534***	−0.374**
Hyperactivity	0.291 ***	0.273 ***	0.251***	0.130	−0.125	–	−0.282***	−0.164*

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

Based on the latent growth curve modeling, as predicted, we found significant individual differences concerning the starting points (intercept) and developmental trajectories (direction of change) of the personality dimensions. This may suggest that adolescents differ regarding the starting point of their thoughts and behavior patterns, and also that, regardless of a similar starting point, individuals vary on the manner in which they evolve on these patterns. Such findings also imply that change in personality is possible, although not to the same degree and shape for every person. Moreover, traits' intercept and change over time showed no association, implying different pathways independent from each other, in line with other studies (O'Meara & South, 2019).

The overall longitudinal changes in personality appeared to be small but significant as hypothesized, in accordance with previous studies in adolescents (Elkins et al., 2017; Göllner et al., 2017; Mann et al., 2020). Thus, although personality is relatively stable across the lifespan, change can also be 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).

Regarding specific trait trajectories, the significant decreasing trend we found for conscientiousness over a 2-year period was in line with Mann et al. (2020). As for neuroticism, the small but significant declining trend over time was in the same vein as 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 agreeableness indicated that the mean scores of the slopes were not statistically significant, in line with some previous findings (Denissen et al., 2013; Van den Akker et al., 2010). In contrast, other studies point to an average increasing trend in extraversion (Göllner et al., 2017; Klimstra et al., 2009) and agreeableness (Borghuis et al., 2017; Mann et al., 2020), or, conversely, to a decreasing trend in extraversion (Elkins et al., 2017; Soto et al., 2011) and agreeableness (Göllner 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).

Concerning the specific associations between the trajectories of the personality traits with later psychopathological outcomes, several trait trajectories were linked to distinct risk factors. Despite the general declining average trend for neuroticism, a high initial level of this trait, along with a positive growth pathway, appeared to be a particularly important risk factor for internalizing psychopathological symptoms, in line with previous studies (Hengartner et al., 2017; Mezquita et al., 2015; Muris, et al., 2018; van den Akker, et al., 2010). In addition, both initial levels and increase of neuroticism were risk factors for hyperactivity/attention problems (Smith & Martel, 2019), and also for a broader p factor (Brandes et al., 2019; Mann et al., 2020). Therefore, neuroticism appeared as the most important predictor and risk factor for multiple kinds of psychopathological symptoms, in line with previous research (De Bolle et al., 2012; Durbin, 2019; Hengartner, 2018; South, et al., 2010). The commonly reported personality risk factors for the externalizing spectrum and its related scales, namely agreeableness and conscientiousness (De Bolle et al., 2012; Kotov et al., 2010; Mann et al., 2020; Mezquita et al., 2015), were replicated in this study, as both traits' intercepts were negatively linked to externalizing, and also with the p factor (as found previously in Caspi et al., 2014; Castellanos-Ryan et al., 2016; Etkin et al., 2020; Mann et al., 2020). Moreover, conscientiousness' growth was negatively associated with p and hyperactivity/attention problem factors.

In the case of extraversion, its intercept and mainly its change negatively predicted 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); while its intercept also predicted hyperactivity/inattention symptoms, in line with what some research suggests (Stanton & Watson, 2016). Overall, these results suggest a high degree of specificity between each FFM personality trait and specific groups of symptoms at a scale level, but also with the different factors of psychopathology (i.e., neuroticism mainly with internalizing and p; extraversion with internalizing; agreeableness with both p and externalizing; and conscientiousness with p and hyperactivity/inattention factors). In addition, the fact that early personality traits constitute overall risk or protective factors for later psychopathology could be interpreted from the predisposition/vulnerability model (Martel et al., 2019). However, other competing models that try to explain the close association between personality and psychopathology (i.e., continuity/spectrum, complication/scar, or pathoplasty/exacerbation) have been proposed (for a review see De Fruyt et al., 2017), but could not be discarded due to the design of the present research.

4.1. Clinical implications

Examining early scores on personality traits, coupled with the study of their change over time and the link to later psychopathology, may bring important clinical benefits when developing prevention programs in mental health. Thus, a problematic personality configuration and/or development, mainly marked by early increases in neuroticism and decreases in conscientiousness, could be the focus for personality target interventions even before psychopathology has developed (e.g., Conrod, 2016).

4.2. 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 the case of internalizing problems (Fernández-Pinto et al., 2015), future studies should also consider obtaining reports from other sources, such as parents and teachers (Göllner et al., 2017). Third, as the current study used a nonclinical population, it may be relevant to replicate these findings in clinical samples. Fourth, the interactive effects of participants' environmental factors (e.g., life events), or specific cultural factors that may potentially affect the studied trajectories were not explored. Fifth, given this study used only three measurement waves, it was not possible to test whether mean-level changes followed a curvilinear trajectory. Sixth, the inclusion of biological data (i.e., twin studies) could help to test it the spectrum model (i.e., shared etiology between personality and psychopathology) better explains the close associations between personality-psychopathology across time. Finally, our results are specific to the Spanish context and might not be generalizable to other adolescent populations. However, similar results have been found in Mexican-origin adolescents (Mann et al., 2020), suggesting similar patterns of personality development in, at least, Hispanic youths.

4.3. Conclusions

Despite the limitations, the present research showed that differences regarding the intercept and change of FFM personality traits are predictors of specific psychopathology factors and symptoms at different levels of the bifactor model of psychopathology. 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.

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Declaration of Competing Interest

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

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jrp.2022.104205.

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