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Exploring the p-Factor in Adolescence: A Bifactor Exploratory Structural Equation Modeling Approach and Its Association With Emerging Personality Pathology

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ABSTRACT

Introduction: To account for the limitations of categorical taxonomies, a general psychopathology factor (p-factor) has been proposed as a transdiagnostic dimension that captures the shared variance across various forms of psychopathology. However, further research is required to clarify the specific characteristics that define the p-factor, particularly in adolescence - a period marked by heightened vulnerability to psychological disorders and significant developmental changes.

Methods: This study utilized a sample of 1366 cisgender adolescents (56% assigned female at birth, $M_{age} = 16.25$, $SD = 1.44$) to examine the structure of the p-factor using Bifactor Exploratory Structural Equation Modeling. The study also explored the association between the p-factor and emerging personality pathology, focusing on self and interpersonal dimensions.

Results: The p-factor was characterized by items reflecting negative affectivity, emotional dysregulation, and behavioral problems. Greater difficulties in self-related (e.g., sense of self, self-acceptance, and goals) and interpersonal dimensions (e.g., family relationships, aggression, and sexuality) were associated with higher levels of general psychopathology. A small but significant negative association was found between the quality of peer relationships and the p-factor, suggesting a potential protective role of friendships.

Conclusions: The study highlights the multifaceted nature of the p-factor, confirming its relevance in capturing general psychological maladjustment during adolescence. The p-factor demonstrated a double-edged nature, encapsulating externalizing (e.g., impulsive behaviors, aggression) and internalizing symptoms (e.g., feelings of inadequacy and guilt). These findings provide insights into the interplay between general psychopathology and personality pathology, supporting a model that integrates self and interpersonal dimensions to understand adolescent psychopathology.

Ilaria Maria Antonietta Benzi and Andrea Fontana equally contributed to the manuscript.

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1 | Introduction

During the past decade, researchers have developed dimensional clinical models to identify taxonomies that comprehensively and meaningfully articulate the onset, maintenance, and trajectories of change in general psychopathology. The necessity of a dimensional switch appeared in light of the limitations of purely categorical approaches (e.g., high comorbidity, low clinical relevance, unclearly defined thresholds, multiplicity of clinical presentations of the same disorder) (Hopwood, Morey, and Markon 2023; Kotov et al. 2017; Krueger and Markon 2011). To account for these limitations, a general psychopathology factor (p-factor) has been proposed as a transdiagnostic dimension that captures the shared variance across various forms of psychopathology (Caspi et al. 2014; Lahey et al. 2012). The p factor sits at the top of a hierarchical structure of psychopathology, integrating lower-order factors such as internalizing (depression and anxiety), externalizing (antisocial behavior and substance abuse), and thought disorders (psychotic symptoms) (Caspi et al. 2014).

The dimensional approach is particularly relevant during adolescence, a period marked by significant psychological, biological, and social modifications (Blos 1962; Casey, Getz, and Galvan 2008; Erikson 1959; Normandin, Alan Weiner, and Karin Ensink 2023) and heightened vulnerability to general psychopathology. The research underscores that this developmental phase is susceptible to severe perturbations that can lead to maladaptive outcomes such as anxiety disorders, mood disorders, schizophrenia, substance abuse, and nonsuicidal self-injurious behaviors (Carragher et al. 2016; Powers and Casey 2015).

Research has confirmed that a general psychopathology factor can be identified in children and adolescents, is equally applicable across genders, and has substantial predictive power for future psychopathology and academic outcomes (Patalay et al. 2015). Moreover, the literature suggests that the p-factor in childhood and adolescence is highly heritable and stable over time, with significant genetic overlap with adult psychiatric disorders, further suggesting its utility in early identification and intervention (Allegrini et al. 2020). In another study, Murray and colleagues found that the general co-morbidity among psychopathological symptoms is stable from childhood to adolescence and posited that the p-factor might reflect shared etiological factors or the emergent result of a network of symptom interactions rather than a single underlying cause (Murray, Eisner, and Ribeaud 2016).

1.1 | The p-Factor as a Clinically Relevant Indicator of General Psychopathology

Interestingly, the debate regarding the clinical meaningfulness and manifestations of the p-factor remains ongoing. Although its existence is statistically confirmed, its clinical importance is still under consideration. On the one hand, critics caution against the risk of reification, warning that treating the p-factor as a real, causal entity without robust evidence may lead to misleading conclusions and hinder the exploration of alternative, potentially more accurate models of psychopathology (Van Bork et al. 2017). On the other hand, studies also

stemming from clinical evidence underscore the opportunity of finally being able to capture manifestations of psychopathology that might be elusive to diagnostic taxonomies and provide crucial transdiagnostic indicators of individuals' suffering and impairment.

Southward and colleagues (Southward, Cheavens, and Coccato 2023) identified different interpretations of the p-factor: dispositional negative emotionality (i.e., neuroticism), impulsive responsiveness to emotions, thought dysfunction, and low cognitive functioning, along with a nonspecific theory of functional impairment. Neuroticism involves frequent intense negative emotions and is linked to various psychiatric disorders (Barlow et al. 2014; Tackett et al. 2013). Impulsive responsiveness to emotions leads to maladaptive behaviors like aggression and substance use (Carver, Johnson, and Timpano 2017). The interpretation of the p-factor as a thought disorder, conceptualized on a continuum that ends on reality-distorted cognitions, is related to conditions such as schizophrenia and mania (Caspi et al. 2014; Lahey et al. 2017). Similarly, the p-factor interpreted as low cognitive functioning is associated with lower IQ and executive functioning, raising the risk of psychopathology (Caspi et al. 2014; Caspi and Moffitt 2018; Castellanos-Ryan et al. 2016). Another interesting perspective is the theory, which views the p-factor as an index of functional impairment, explaining how seemingly different symptom presentations result in significant dysfunction (Smith et al. 2020). Southward and colleagues integrated these theories and found the p-factor most strongly associated with neuroticism, impulsivity, and impairment, proposing a tripartite model where impulsivity and frequent negative emotions interact to cause impairment (Southward, Cheavens, and Coccato 2023).

1.2 | Emerging Personality Pathology and the p-Factor

Adolescents undergo profound transformations in self-perception, relationships with family and peers, and the emergence of romantic and sexual investments. These transformations are integral to personality formation as adolescents strengthen their identities and reflective functioning while investing in their goals and interests related to school and future aspirations, contributing to the development of an integrated and stable personality over time (Benzi et al. 2022, 2023; Ensink et al. 2024; Locati et al. 2023; Normandin, Alan Weiner, and Karin Ensink 2023). In this context, emerging personality pathology might concur to further stiffening the adolescent's functioning and ability to process experiences of emotional dysregulation and, in general, to understand one's own and others' mental states (Sharp 2020; Sharp and Wall 2018; Shiner 2009).

Although personality disorders cannot be formally diagnosed until adulthood, research has shown that adolescents might exhibit emotional dysregulation, interpersonal difficulties, impulsivity, and other maladaptive coping strategies, which align with adults' personality disorders (Westen, Dutra, and Shedler 2005). Adolescents with emerging personality pathology may display emotional volatility, heightened sensitivity to rejection, and unstable relationships, as well as impulsive decision-making, aggression, and self-harm (Shiner 2009).

These behaviors are often coupled with externalizing symptoms like substance use and internalizing symptoms such as anxiety and depression (Chapman 2019; Sharp 2018). These maladaptive coping strategies are often linked to disturbances in identity formation, fostering impairments in adolescents' sense of self and interpersonal relationships (Normandin, Alan Weiner, and Karin Ensink 2023). The rapid developmental changes (physical, neurophysiological, and psychological) during this phase can exacerbate these difficulties, often leading to borderline-like traits in adolescence (Sharp and Wall 2018; Sharp 2020).

Building on available evidence on personality pathology, Sharp's expansion of Caspi's model posits that self and interpersonal vulnerabilities (as defined in the AMPD model in the DSM Fifth edition) are central to the development of general psychopathology during adolescence (APA 2013; Sharp and Wall 2018). Building on this model, another contribution suggested that these vulnerabilities include not only impairments in self-regulation (often reflected in borderline traits) but also in self-esteem (reflected in narcissistic personality features) (Benzi et al. 2024; Somma et al. 2020). Previous research has shown that these features are associated with internalizing and externalizing dimensions of psychopathology, indicating a complex interplay between personality traits and general psychopathology (Benzi et al. 2023; Biberdzic et al. 2022; Sharp 2020).

Paulina Kernberg and Otto Kernberg's contributions further facilitate the reflection on the associations between self and interpersonal dimensions and the p-factor (Fontana et al. 2021; Kernberg, Weiner, and Bardenstein 2000; Normandin, Alan Weiner, and Karin Ensink 2023). Indeed, this framework emphasizes the importance of self, self-acceptance, investments and goals, sexuality, aggression, and the quality of interpersonal relationships with family and friends as critical dimensions of emerging personality in adolescence. Adolescence personality pathology involves disturbances in these key self and interpersonal dimensions, leading to difficulty maintaining a stable sense of self and forming healthy relationships (Kernberg 1978; Normandin, Ensink, and Kernberg 2014; 2015).

However, the literature on the relationship between personality and the p-factor is still evolving: most contributions only consider nonpathological personality traits (e.g., neuroticism) (Carragher et al. 2016; Caspi et al. 2014; Castellanos-Ryan et al. 2016; Tackett et al. 2013), and only a few studies have explored the associations between maladaptive personality traits or personality disorders and general psychopathology (Benzi et al. 2024; Choate et al. 2023).

1.3 | The Present Study

Building on the available literature, the present study pursues two objectives in a large sample of adolescents. First, to explore the structure of the general psychopathology factor using Bi-factor Exploratory Structural Equation Modeling (ESEM) at the item level. This approach further explores the characteristics most representative of the p-factor in adolescence. We hypothesized that items describing emotional dysregulation, negative affectivity, and behavioral impairment would best

describe general psychopathology (Southward, Cheavens, and Coccaro 2023). Second, to explore the associations between the p-factor and emerging personality dimensions, emphasizing impairments in self and interpersonal functioning (Benzi et al. 2024; Sharp and Wall 2018). We hypothesized that greater difficulties in personality dimensions would be associated with the p-factor.

2 | Methods

2.1 | Design and Procedures

This study utilizes a cross-sectional data set comprising students from secondary schools in Italy. Before data collection, informed consent was secured from the adolescents and their parents. Each student was assigned a unique identifier to ensure anonymity and provided a private URL to complete their self-report questionnaires. Eligibility for participation was guided by several criteria: an age range of 13 to 21 years, no intellectual or neurodevelopmental disabilities, and proficiency in Italian. The data were collected anonymously, and the participating adolescents were offered no incentives. The study participants were informed that the study aimed to explore their personality and self-other perception. The assessment process was designed to be completed within approximately 30 min. All methodologies and materials used in this study were approved by the Ethical Committee of the University of Milano-Bicocca and conducted in line with the Declaration of Helsinki and the APA ethical guidelines.

2.2 | Participants

The study involved 1366 cisgender adolescents (56% of whom were assigned female at birth) aged 13–21 years ($M = 16.25$, $SD = 1.44$). Most participants were natives of Italy ($N = 1272$; 93.1%), while a smaller proportion were born in other countries ($N = 94$; 6.9%). However, all participants were fluent in Italian.

An initial power analysis was conducted to select the minimum number of participants required to detect at least small effects, utilizing the *semPower* package in R (Moshagen and Bader 2023). We set the Alpha and RMSEA levels at 0.05. According to the analysis, to achieve an 80% power to detect a small effect, considering three latent and 112 observed variables, a minimum sample size of $N = 1258$ was required. Consequently, our acquired sample was deemed adequately powered.

2.3 | Materials

Participants were asked to provide self-reports on emerging personality pathology and internalizing and externalizing problems.

The *Adolescent Personality Structure Questionnaire* (APS-Q) (Benzi et al. 2022) is a 35-item self-report that explores adolescent personality across seven dimensions: Sense of Self, Self-acceptance, Sexuality, Investments and Goals, Relationships with Family,

Relationships with Friends, and Aggression. The Sense of Self measures the stability and coherence of self-perception over time (e.g., “I see myself in completely different ways depending on the situation,” and “I often feel emotions, and I don’t understand why”). Self-acceptance includes items associated with feelings of shame and perceptions of body image (e.g., “I often feel ashamed of myself” and “I often think that my body is defective”). Investments and Goals examines the presence and stability of goals and objectives beyond academics and work (e.g., “I throw myself into hobbies and new interests and then abandon them”). Aggression explores the propensity to express aggression (e.g., “Sometimes I am so angry I am afraid I can become violent,” and “I happened to beat someone because he/she deserved it”). The Sexuality dimension explores adolescents’ relationship with their sexual impulses or desires (e.g., “When I think about sex, I feel very embarrassed”). The Relationships with Family and Friends dimensions explore the quality of relationships with the most significant person within and outside the family. Items include “I don’t want my family to know anything about my life” and “With my best friend, I share every intimate aspect of my life.” Participants are requested to rate their agreement for each statement on a 5-point Likert scale (1 = Never true to 5 = Always true), with higher scores signaling greater difficulties within a particular personality dimension. The APS-Q was developed starting from the Interview of Personality Organization Processes in Adolescence (IPOP-A) (Fontana et al. 2021), a semi-structured interview protocol specifically designed for the evaluation of personality functioning during adolescence, applying the object relations framework to personality pathology (Kernberg et al. 2000). All the dimensions showed acceptable to good internal consistency coefficients, with α values ranging from 0.64 (Relationship with Friends) to 0.85 (Sense of Self).

The *Youth Self Report* (YSR) (Achenbach 2001) is a comprehensive 112-item self-evaluation instrument used to assess adolescents’ overall behavioral and psychological issues. Respondents rate each item on a 3-point Likert scale, with 0 being “not true” and 2 “very or often true.” This measure yields two subscales, namely, Externalizing and Internalizing problems, and eight subscales: Anxious/Depressed Symptoms, Withdrawn/Depressed Symptoms, Somatic Complaints, Social Problems, Aggressive Behavior, Rule-breaking Behavior, Attention Problems, Thought Problems, and Other Problems. Higher scores indicate an increase in psychological problems within the given dimension. All scales exhibited acceptable to good internal consistency, with α values ranging from 0.62 (Other Problems) to 0.84 (Anxious/Depressed). Studies have shown that the YSR is a reliable measure of the p-factor (Achenbach et al. 2024; Petot, Petot, and Chahed 2023).

2.4 | Statistical Analyses

Statistical analyses were conducted using Mplus v.8.3 (Muthén and Muthén 2017). First, we calculated descriptive statistics (Supporting Information S1: Table S1) and zero-order correlations for the main variables under study (Supporting Information S1: Table S2). Next, we implemented structural equation modeling (SEM) to validate our core hypotheses. Initially, we conducted a Bifactor Confirmatory Factor Analysis (Model 1;

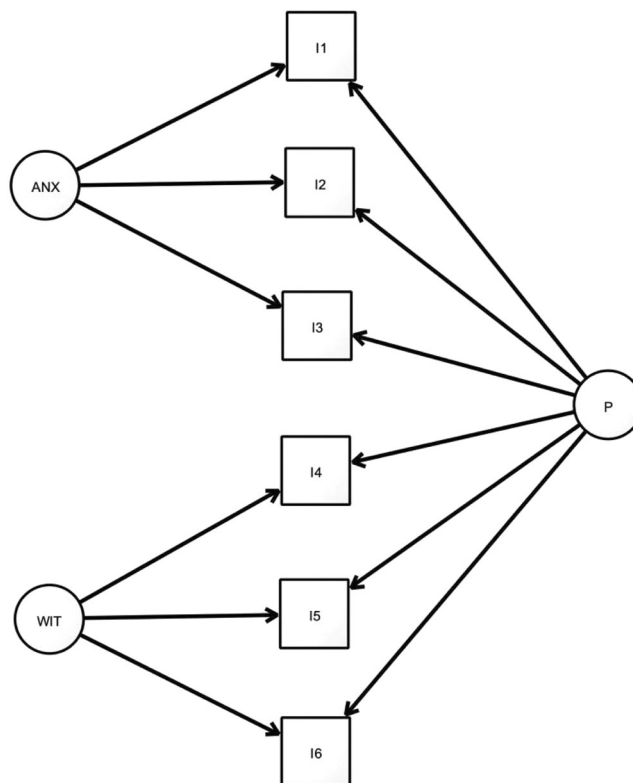


FIGURE 1 | Example of Model 1 specification of Bifactorial Confirmatory Factor Analysis. Example of Bifactorial Model 1. ANX = anxious_depressed symptoms; WIT = depressed_withdrawn symptoms; I_i = YSR Item *i*; P = general factor of psychopathology. Not all the YSR scales and items are reported in the Figure.

Figure 1) to evaluate the appropriateness of the general psychopathology factor (p) as a latent factor related to the YSR items. Following this, we performed a (ESEM; Model 2; Figure 2), comparing the suitability of the two models. ESEM amalgamates the benefits of Confirmatory Factor Analysis (CFA) and Exploratory Factor Analysis (EFA) in a single analytical structure (Alamer 2022; Asparouhov and Muthén 2009). ESEM allows for cross-loadings of items on all factors, akin to EFA, while integrating SEM characteristics like model fit indices, measurement errors, model invariance, and including different model specifications (Mai, Zhang, and Wen 2018). In CFA, items load only on the hypothesized factors, which could potentially overlook significant cross-loadings. Ignoring these cross-loadings often yields biased results and reduced goodness of fit indices (Alamer 2022) since items frequently overlap and correspond with other relevant constructs. ESEM, developed to mitigate these limitations, offers a more flexible and accurate methodology. To ensure that our chosen model was the most appropriate representation of the data, we employed the targeted rotation method described by Morin (2023) for our ESEM approach. This method, implemented using the ESEM Code Generator for Mplus (Van Zyl and Ten Klooster 2022; de Beer and van Zyl 2019), was selected to minimize cross-loadings, targeting them to be as close to zero as possible while allowing them to be freely estimated. The latent factors in both models are fully orthogonal, meaning their correlations are zero (Morin, Myers, and Lee 2020).

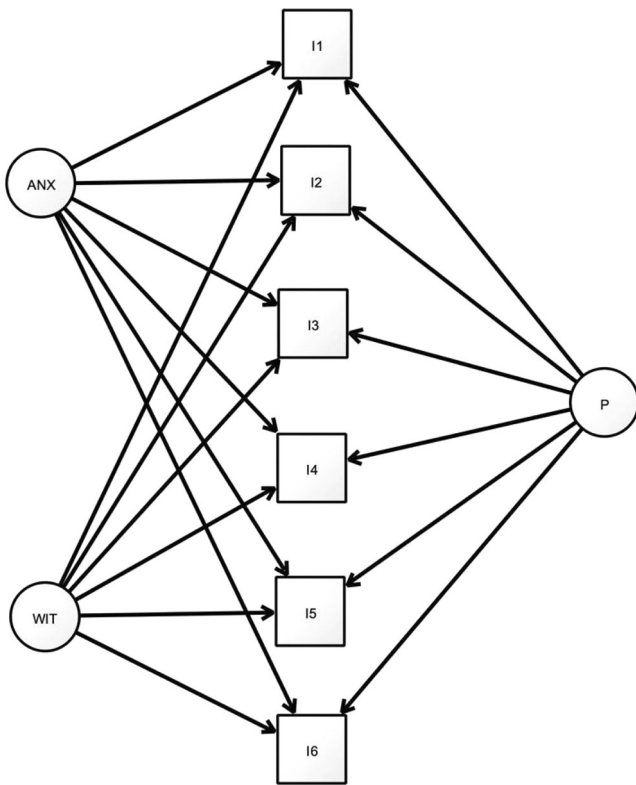


FIGURE 2 | Example of Model 2 specification of Bifactorial ESEM. Example of Bifactorial Model 2. ANX = anxious_depressed symptoms; WIT = depressed_withdrawn symptoms; I_i = YSR Item i ; P = general factor of psychopathology. Not all the YSR scales and items are reported in the Figure.

Within CFA and ESEM frameworks, a bifactor model can be employed. Both bifactor and higher-order models acknowledge the coexistence of general and specific factors. In bifactor models, general factors directly affect the indicators (items), meaning all items load on specific and general factors. The variance of indicators is divided into three elements: the specific factor, the general factor, and the measurement error. Conversely, in higher-order models, the second-order factor influences the indicators indirectly via first-order factors. Hence, several researchers have argued against employing higher-order models when investigating construct-relevant psychometric multidimensionality (Howard et al. 2018). For instance, Howard and colleagues suggest that bifactor models should be favored unless there is substantial conceptual justification for higher-order models. Thus, bifactor models are generally recommended unless a strong theoretical argument for a higher-order representation exists (Howard et al. 2018). This study aligns with this perspective. Moreover, consistent with recommendations from Caspi et al. (2014) and DeMars (2013), we interpreted the bifactor model by assessing factor loadings (Caspi et al. 2014; DeMars 2013). If loadings are low on specific factors and high on general factors when testing a bifactor model, only the general factors score warrants a reliable interpretation. Moreover, following Bornoalova and colleagues' recommendations (2020), we also compute hierarchical omega for the general factor, which represents the proportion of variance in a total sum score attributable to the general factor. Given the ordinal nature of our data and the noticeable

skewness in most items, we used the Diagonally Weighted Least Square with Mean- and Variance-adjusted (WLSMV) Chi-square estimator in Mplus software. Following the method Ivanova et al. (2007) used, we tested different models on a tetrachoric correlation matrix, merging YSR item scores 1 and 2 (Ivanova et al. 2007). We evaluated the fit of these models by considering a variety of goodness of fit indices (Ullman and Bentler 2012): the chi-square (χ^2) statistic (where a nonsignificant χ^2 implies a model fit with the observed data, but must be interpreted in a larger context due to its sensitivity to sample size (Bollen 1989); the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI), with values ≥ 0.95 indicating a good fit and values ≥ 0.90 suggesting an adequate fit; and the Root Mean Square Error of Approximation (RMSEA), where values < 0.05 signify an excellent model fit, values between 0.05 and 0.08 a moderate fit, and values between 0.08 and 0.10 an acceptable fit.

Finally, to rule out alternative interpretations, we tested three additional models: (1) a more parsimonious unidimensional model where all items are loaded onto one single general factor; (2) a bifactor ESEM analysis using the reference domain approach as outlined by Eid et al. (2017), with Anxiety/Depression as the reference domain, to better specify the quality of the p factor; and (3) a targeted model in which specific factors were allowed to correlate, to assess whether relaxing the orthogonality assumption could improve model fit or the interpretability of the specific factors, even if this approach is not considered a canonical approach (Morin 2023).

Upon determining the optimal model, we examined the associations between personality dimensions and the p-factor (Model 3; Figure 3).

3 | Results

Model 1 tested a bifactor CFA model with a general factor of psychopathology (p-factor) encompassing latent variables of psychopathology and orthogonal latent variables of the eight Achenbach's YSR Syndrome (Figure 1). The fit indices suggested a poor fit ($\chi(df) = 15,170.257$ (6683), $p = 0.0001$; $\chi/df = 2.27$; CFI = 0.629; TLI = 0.617; RMSEA = 0.039 [90% CI (0.038, 0.000)], $p = 1.000$).

In Model 2, we explored the bifactor model through an ESEM approach, allowing the cross-loadings between specific factors and observed indicators (Figure 2). The fit indices showed an adequate fitting model ($\chi(df) = 6775.862$ (5877), $p < .0001$; $\chi/df = 1.15$; CFI = 0.961; TLI = 0.954; RMSEA = 0.013 [90% CI (0.012, 0.015)], $p = 1.000$). Most standardized loadings were positive, with a few exceptions, as detailed in Table 1: average loadings for the p-factor were 0.375, and 71% of the YSR items evidenced loadings ≥ 0.320 on the general psychopathology factor. Additionally, a significant percentage of YSR items—ranging from 86% in the Withdrawn scale to 18% in the Social Problems scale—still loaded significantly on the specific factors (with loadings > 0.320), partially supporting the validity of our original model choice. Thus, data indicate that most YSR items had higher loadings on the latent general psychopathology factor while moderately maintaining lower but significant loadings on the original Achenbach's eight syndromes.

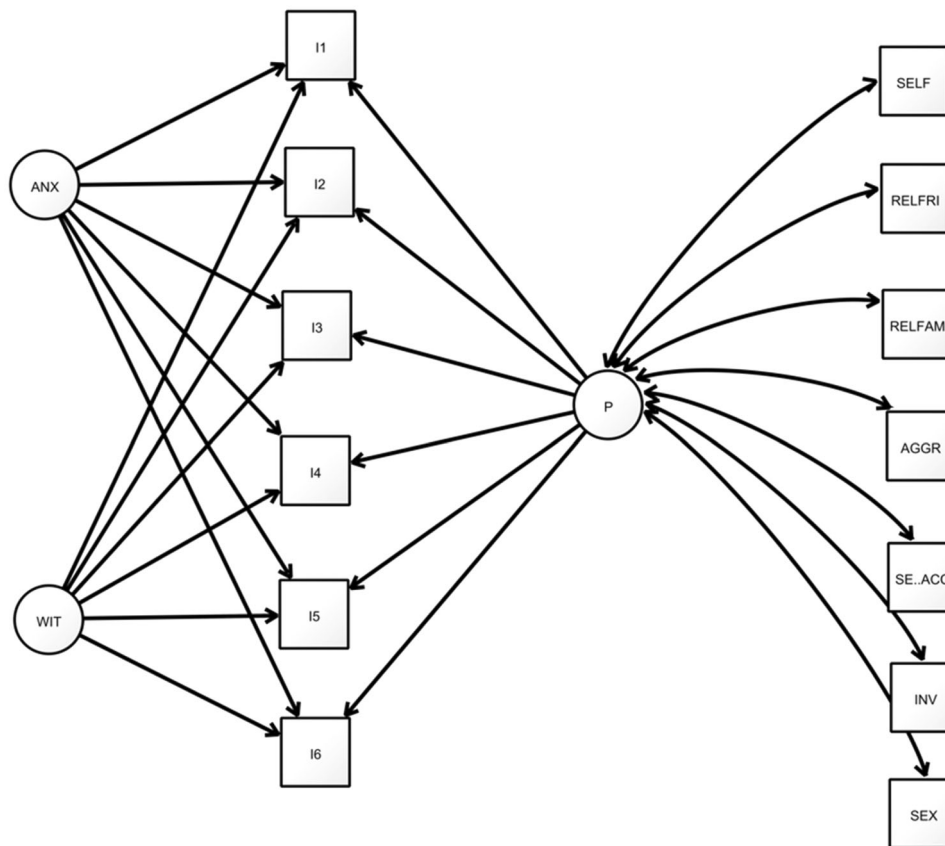


FIGURE 3 | Example of Model 3 specification of Bifactorial ESEM with Personality Dimensions as covariates. Example of bifactorial Model 3 and its covariates with personality dimensions. ANX = anxious_depressed symptoms; WIT = depressed_withdrawn symptoms; I_i = YSR Item i ; P = general factor of psychopathology; SELF = sense of self; SELFACC = Self-acceptance; INV = Investments and Goals; RELFAM = Quality of Family Relationships with the Family; RELFRI = Quality of Relationship with Friends; AGGR = aggression; SEX = sexuality. Not all the YSR scales and items are reported in the Figure.

Following the guidance of Bornovalova et al. (2020), we calculated omega hierarchical reliability (ω_h), which represents the proportion of variance in a total sum score attributable to the general factor. In our data set, ω_h was high (0.84), indicating the general factor's reliability.

In addition to Model 2, to rule out alternative interpretations, we tested a unidimensional model as a more parsimonious alternative to the Bifactorial ESEM model, but this model demonstrated poor fit indices ($\chi(df) = 17,277.807$ (6786), $p < .0001$; $\chi/df = 2.55$; CFI = 0.547; TLI = 0.539; RMSEA = 0.043 [90% CI (0.042, 0.044)], $p = 1.000$), underscoring that a single-factor solution is insufficient to explain the variance in the data. Furthermore, we applied a reference domain bifactor ESEM model using Anxiety/Depression as the reference domain to enhance the characterization of the p factor. Despite our efforts, this approach also resulted in inadequate fit indices ($\chi(df) = 13199.232$ (6683), $p < .0001$; $\chi/df = 1.98$; CFI = 0.718; TLI = 0.709; RMSEA = 0.034 [90% CI (0.033, 0.035)], $p = 1.000$), indicating that neither a unidimensional model nor a reference domain bifactor ESEM model provided a superior representation of the data. Finally, we tested a nonorthogonal bifactor ESEM model, allowing specific factors to correlate. This model's fit indices were equivalent to those of the fully orthogonal targeted rotation model, and there was no significant enhancement in the size or interpretability of the loadings on the

specific factors (see Supporting Information S1: Table S3 for model fit and factor loadings).

In Model 3, we explored the associations between personality dimensions and psychopathology (Figure 3). The fit indices showed an adequate model fit ($\chi(df) = 7825.170$ (6655), $p < 0.0001$; $\chi/df = 1.18$; CFI = 0.952; TLI = 0.944; RMSEA = 0.014 [90% CI (0.013, 0.016)], $p = 1.000$). Difficulties in Sense of Self, Self-acceptance, Investments and Goals, Relationships with Family, Aggression, and Sexuality were significantly and positively associated with the latent general factor of psychopathology (Table 2): the higher difficulties in these personality domains, the higher general psychopathology. Significant negative associations were found between the Quality of Relationships with Friends and p: the lower difficulties, the higher general psychopathology.

4 | Discussion

This study aims to address gaps in the literature regarding the p-factor in adolescence.

First, the study adopted a ESEM approach to explore the main characteristics of general psychopathology. The findings are in line with our initial hypotheses and the available literature (Southward, Cheavens, and Coccaro 2023): the items with the

TABLE 1 | Significant Item loadings of Bifactor ESEM model.

YSR Stem	Scale	P	AGG	ANX	ATT	RUL	SOC	SOM	THO	WIT
91 (suicidal ideation)	ANX	0.710	-0.215	0.360	-0.077	0.125	-0.181	-0.085	-0.063	-0.049
18 (self-harm)	THO	0.708	-0.268	0.291	-0.048	0.251	-0.124	0.047	0.034	-0.028
103 (unhappiness, sadness)	WIT	0.663	-0.075	0.465	-0.179	-0.045	-0.119	-0.011	-0.071	0.230
52 (excessive guilt)	ANX	0.657	-0.089	0.161	0.016	-0.185	0.103	0.036	0.095	0.007
35 (feelings of inferiority)	ANX	0.654	-0.253	0.426	0.006	-0.134	-0.027	-0.066	-0.056	0.081
100 (sleep problems)	THO	0.631	-0.072	0.043	-0.104	0.130	0.025	0.213	0.106	-0.004
20 (destruction of own property)	AGG_B	0.626	0.025	-0.132	0.099	0.177	0.240	0.165	-0.066	-0.003
81 (intra-family thefts)	RUL	0.606	0.008	-0.049	-0.041	0.206	0.010	-0.158	-0.085	-0.254
33 (not loved)	ANX	0.599	-0.235	0.284	-0.144	-0.035	0.030	-0.103	0.055	0.191
13 (states of confusion)	ATT	0.590	0.040	0.406	0.048	-0.074	-0.056	0.087	-0.033	0.178
34 (feeling of persecution)	SOC	0.587	-0.075	-0.221	-0.101	0.057	0.378	-0.091	-0.067	0.175
67 (runaways)	RUL	0.573	-0.087	-0.070	-0.051	0.306	-0.024	0.092	-0.030	-0.015
12 (loneliness)	SOC	0.566	-0.111	0.422	-0.112	-0.166	-0.068	-0.121	-0.060	0.347
30 (fear of school)	ANX	0.563	-0.008	0.191	0.129	-0.114	0.010	0.195	-0.114	0.127
111 (voluntary seclusion)	WIT	0.561	-0.272	0.070	-0.072	-0.082	0.178	-0.097	-0.103	0.519
79 (language problems)	SOC	0.561	-0.128	-0.071	0.100	-0.144	0.089	0.030	0.033	0.075
85 (weird ideas)	THO	0.549	-0.114	0.010	-0.225	-0.142	-0.207	-0.146	0.445	0.044
58 (scratching)	THO	0.539	0.000	0.079	-0.085	-0.150	-0.077	-0.050	0.189	-0.165
84 (bizarre behavior)	THO	0.535	-0.124	-0.136	-0.101	-0.175	-0.045	-0.005	0.447	0.014
40 (auditory illusions/hallucinations)	THO	0.534	-0.130	-0.263	-0.273	0.025	0.147	0.074	0.231	0.031
54 (overtired)	SOM	0.533	0.020	0.218	0.223	-0.023	-0.033	0.252	0.002	0.163
110 (being of the other gender)	OTH	0.528	-0.104	-0.042	-0.187	0.057	0.172	-0.046	0.078	-0.152
102 (lack of energy)	WIT	0.527	-0.012	0.218	0.078	-0.098	-0.047	0.165	-0.024	0.206
38 (teasing victim)	SOC	0.527	-0.135	-0.016	-0.013	0.032	0.241	-0.122	-0.059	0.084
82 (extra-family theft)	RUL	0.518	0.140	-0.285	-0.109	0.378	0.144	-0.087	0.038	-0.167
65 (mutism)	WIT	0.514	-0.114	-0.087	0.000	-0.038	0.046	0.080	0.044	0.439
25 (disagreement with peers)	SOC	0.514	0.013	-0.041	-0.041	-0.034	0.156	-0.092	-0.026	0.365
48 (not liked by peers)	SOC	0.510	-0.079	0.096	-0.028	-0.119	0.179	-0.101	-0.039	0.251
87 (mood swings)	AGG_B	0.495	0.243	0.418	-0.122	-0.088	-0.318	0.264	0.089	0.241
21 (destruction of others' property)	AGG_B	0.494	0.243	-0.401	0.027	0.257	0.313	-0.002	-0.147	-0.171
47 (nightmares)	SOM	0.491	0.028	0.194	-0.014	0.017	-0.061	0.301	0.029	-0.022
56A (pain and physical problems)	SOM	0.487	-0.092	-0.126	0.015	-0.040	0.066	0.364	0.147	0.019
56D (pain and physical problems)	SOM	0.486	-0.085	-0.211	-0.027	-0.032	0.163	0.265	0.113	-0.123
14 (crying)	ANX	0.483	-0.021	0.460	-0.007	-0.207	-0.224	0.243	0.043	-0.059
71 (self-consciousness)	ANX	0.480	-0.122	0.156	0.042	-0.227	0.156	0.190	0.090	0.309

(Continues)

TABLE 1 | (Continued)

YSR Stem	Scale	P	AGG	ANX	ATT	RUL	SOC	SOM	THO	WIT
66 (repetitive acts)	THO	0.479	0.053	-0.154	0.000	-0.170	-0.018	0.081	0.352	0.023
46 (tics)	THO	0.471	0.026	-0.012	0.029	-0.193	0.105	0.130	0.103	0.031
56G (pain and physical problems)	SOM	0.468	0.000	0.054	-0.020	0.045	-0.107	0.505	-0.078	-0.020
31 (fear of doing something bad)	ANX	0.467	0.009	0.109	-0.022	-0.127	0.125	0.139	0.085	0.041
36 (frequent accidents)	SOC	0.467	-0.062	-0.015	0.098	0.112	-0.021	0.181	0.122	-0.065
24 (not eating enough)	OTH	0.463	0.096	0.161	0.148	0.087	-0.136	0.078	0.123	0.010
56C (pain and physical problems)	SOM	0.462	-0.006	0.136	-0.058	-0.065	-0.133	0.589	-0.019	-0.034
5 (anhedonia)	WIT	0.459	-0.027	0.062	-0.050	0.090	-0.009	-0.138	-0.154	0.397
4 (lack of perseverance)	ATT	0.457	0.135	0.064	0.391	0.005	-0.093	-0.037	-0.072	0.079
50 (fearfulness)	ANX	0.456	-0.012	0.327	0.117	-0.264	0.028	0.171	0.078	0.311
78 (distraction)	ATT	0.453	0.101	-0.066	0.633	0.175	-0.034	0.052	0.175	-0.027
112 (worries)	ANX	0.452	0.072	0.281	-0.035	-0.298	0.032	0.156	0.255	0.108
62 (clumsiness)	SOC	0.452	-0.047	0.044	0.158	-0.265	0.066	0.009	0.005	0.018
9 (haunting thoughts)	THO	0.452	0.126	0.181	-0.073	0.127	-0.115	0.012	0.119	-0.033
83 (hoarding behavior)	THO	0.439	-0.021	-0.139	0.061	-0.137	0.073	-0.009	0.287	-0.044
70 (visual illusions/hallucinations)	THO	0.438	-0.103	-0.358	-0.312	-0.040	0.100	0.039	0.405	0.017
10 (motor instability)	ATT	0.435	0.173	-0.088	0.300	0.101	0.071	0.012	0.048	-0.034
53 (eats too much)	OTH	0.433	0.062	0.034	0.250	-0.033	0.011	0.056	0.162	-0.084
97 (threats or physical attacks)	AGG_B	0.431	0.364	-0.369	0.025	0.312	0.188	-0.011	-0.110	-0.134
95 (tantrums)	AGG_B	0.430	0.514	0.095	-0.101	0.083	-0.130	0.066	0.025	0.096
45 (nervousness)	ANX	0.424	0.184	0.289	0.083	-0.245	-0.060	0.307	0.102	0.173
27 (jealousy)	SOC	0.423	0.133	0.282	0.007	-0.171	-0.149	-0.102	0.174	-0.157
43 (lies)	RUL	0.419	0.258	-0.148	0.089	0.150	-0.005	-0.172	-0.077	-0.047
55 (too fat)	OTH	0.401	-0.009	-0.043	0.132	-0.144	0.185	0.010	0.017	0.006
72 (pyromania)	RUL	0.399	-0.008	-0.266	-0.033	0.475	0.133	-0.120	-0.044	-0.340
51 (dizziness)	SOM	0.396	-0.036	-0.037	0.071	-0.013	0.122	0.113	0.105	-0.052
22 (disobedience at home)	AGG_B	0.389	0.280	0.071	0.324	0.312	-0.153	-0.005	0.050	0.024
42 (preference for loneliness)	WIT	0.385	-0.050	0.122	-0.218	-0.162	0.027	-0.082	0.027	0.440
32 (requirement of perfection)	ANX	0.380	0.113	0.233	-0.198	-0.152	0.007	-0.055	0.101	-0.059
28 (transgressions)	RUL	0.378	0.280	-0.123	0.330	0.482	-0.068	-0.095	0.005	-0.010
101 (skipping school)	RUL	0.377	0.099	-0.129	0.226	0.562	0.051	0.014	0.048	-0.069
68 (shouts)	AGG_B	0.372	0.408	0.116	0.049	-0.018	-0.086	0.249	-0.001	-0.153
61 (poor schoolwork)	ATT	0.369	-0.098	-0.107	0.403	0.288	0.044	-0.100	0.046	-0.127
96 (sex)	RUL	0.369	0.319	-0.098	0.010	0.325	-0.038	-0.299	0.105	-0.069
37 (fights)	AGG_B	0.367	0.202	-0.291	-0.036	0.517	0.181	0.013	0.017	-0.065
1 (overly infantile behavior)	ATT	0.364	0.268	0.028	0.291	-0.078	0.159	-0.085	-0.190	-0.021

(Continues)

TABLE 1 | (Continued)

YSR Stem	Scale	P	AGG	ANX	ATT	RUL	SOC	SOM	THO	WIT
105 (drugs)	RUL	0.362	0.246	0.031	0.102	0.685	0.009	0.190	-0.133	-0.020
76 (reduced sleep)	THO	0.360	0.066	-0.050	-0.115	0.280	0.068	0.023	0.162	0.077
39 (bad company)	RUL	0.357	0.103	-0.110	0.092	0.542	-0.050	0.012	-0.012	0.001
8 (difficulty concentrating)	ATT	0.356	0.039	0.058	0.676	0.187	-0.057	0.054	0.024	-0.034
11 (dependent on adults)	SOC	0.354	0.074	-0.033	0.141	-0.421	0.232	-0.054	-0.061	0.043
89 (distrust)	AGG_B	0.353	0.284	0.023	-0.060	-0.115	-0.099	0.028	0.180	0.145
41 (impulsivity)	ATT	0.350	0.378	-0.040	0.234	0.129	-0.010	0.149	0.043	0.084
16 (wickedness)	AGG_B	0.350	0.420	-0.085	-0.124	0.201	0.065	-0.089	-0.178	0.082
56B (pain and physical problems)	SOM	0.339	-0.016	0.029	0.008	-0.133	0.070	0.582	0.142	0.036
29 (situational phobias)	ANX	0.335	-0.002	0.085	0.078	-0.210	0.120	0.100	0.128	0.021
56F (pain and physical problems)	SOM	0.330	0.093	0.097	-0.028	-0.033	-0.051	0.607	-0.023	-0.020
23 (disobedience at school)	AGG_B	0.328	0.234	-0.139	0.408	0.455	-0.055	-0.163	-0.029	-0.034
75 (shyness)	WIT	0.320	-0.175	0.062	0.108	-0.185	0.197	0.061	-0.037	0.627
57 (physical aggression)	AGG_B	0.313	0.301	-0.395	-0.004	0.261	0.193	-0.056	0.080	-0.121
90 (coarse language)	RUL	0.312	0.188	-0.034	0.172	0.495	-0.058	-0.162	0.018	0.016
74 (clowning around)	OTH	0.286	0.405	-0.060	0.007	0.157	-0.010	-0.302	0.179	-0.313
3 (arguments)	AGG_B	0.281	0.559	0.124	0.063	-0.013	-0.146	0.026	-0.018	0.023
19 (request for attention)	AGG_B	0.278	0.412	-0.046	0.040	-0.059	0.056	-0.283	0.148	-0.297
56E (pain and physical problems)	SOM	0.277	0.007	-0.019	-0.029	-0.075	-0.040	0.162	0.089	0.031
17 (daydreams)	ATT	0.272	0.079	0.029	0.127	-0.176	0.037	0.028	0.303	0.010
99 (tobacco)	RUL	0.265	0.115	0.172	0.087	0.698	-0.251	0.101	-0.051	-0.070
44 (onychophagia)	OTH	0.250	0.014	0.004	0.186	0.030	0.089	0.035	0.042	-0.188
94 (tease others)	AGG_B	0.248	0.495	-0.140	0.070	0.129	-0.033	-0.207	0.107	-0.180
104 (noisy)	AGG_B	0.234	0.472	-0.117	0.165	0.315	0.102	-0.069	0.032	-0.266
64 (prefers younger friends)	SOC	0.234	-0.141	-0.099	0.026	0.059	0.303	-0.105	0.057	-0.026
7 (bragging)	OTH	0.221	0.551	-0.134	-0.074	-0.017	0.149	-0.255	-0.049	-0.292
2 (alcohol)	RUL	0.212	0.287	0.244	0.048	0.405	-0.311	0.026	-0.061	-0.086
86 (stubbornness)	AGG_B	0.201	0.360	0.146	0.039	-0.066	-0.180	0.130	0.399	0.119
93 (talks too much)	OTH	0.184	0.419	0.087	0.055	-0.093	0.024	0.001	0.274	-0.314
77 (hypersomnia)	OTH	0.181	0.025	-0.085	0.136	-0.075	0.066	0.000	0.035	-0.062
80 (advocate)	ATT	0.133	0.107	0.005	-0.142	0.144	0.064	0.130	0.384	0.108
26 (lack of guilt)	RUL	0.131	0.098	-0.230	-0.015	0.185	-0.073	-0.060	0.144	0.172
109 (help)	OTH	0.131	0.145	0.032	0.119	0.052	0.309	0.145	0.615	0.070
92 (laugh)	THO	0.127	0.260	-0.006	0.131	0.179	0.085	0.023	0.557	-0.010
63 (older comrades)	RUL	0.122	0.226	0.100	-0.120	0.338	-0.145	0.086	0.183	0.126
69 (secretiveness)	WIT	0.116	-0.111	0.060	0.002	-0.086	-0.013	0.026	0.218	0.645
98 (help)	OTH	0.104	0.109	0.070	0.028	-0.007	0.276	0.078	0.528	-0.020

(Continues)

TABLE 1 | (Continued)

YSR Stem	Scale	P	AGG	ANX	ATT	RUL	SOC	SOM	THO	WIT
73 (work)	RUL	0.049	-0.013	-0.173	0.011	0.291	0.222	-0.013	0.270	0.062
106 (disloyal)	RUL	0.047	0.036	0.221	0.095	0.034	0.189	0.037	0.354	0.141
49 (better than others)	SOM	0.034	0.348	-0.135	-0.051	0.115	0.226	-0.191	0.196	0.036
6 (love animals)	OTH	0.022	-0.115	0.039	0.067	0.179	0.140	-0.042	0.245	0.113
108 (easy-going)	OTH	-0.160	0.176	-0.134	0.201	0.281	0.133	-0.060	0.371	-0.034
88 (isolate)	AGG_B	-0.070	0.390	0.201	0.190	0.111	-0.093	0.096	0.481	-0.226
15 (honest)	OTH	-0.057	0.096	0.012	0.164	-0.040	0.346	0.148	0.406	0.094
107 (jokes)	OTH	-0.052	0.148	-0.183	0.199	0.316	0.360	-0.135	0.336	-0.031
59 (friendly)	THO	-0.045	0.207	0.216	0.236	0.129	-0.048	0.065	0.522	-0.059
60 (novelty)	THO	-0.016	0.283	0.107	0.007	0.218	-0.098	0.045	0.618	0.055

Note: Loadings ≥ 0.32 are printed in bold.

Abbreviations: AGG_B, aggressive behavior; ANX, anxious/depressed; ATT, attention problems; OTH, items not included in any syndrome scale; P, general factor of psychopathology; RUL, rule-breaking behavior; SOC, social problems; SOM, somatic complaints; THO, thought problems; WIT, withdrawn/depressed.

TABLE 2 | Covariates of general psychopathology factor with personality dimensions.

APS-Q Scales	β_P
Sense of self	0.45***
Self-acceptance	0.17*
Investments and goals	0.34***
Aggression	0.20***
Sexuality	0.21***
Relationships with family	0.26***
Relationships with friends	-0.19**

Note: Effects are presented in a completely standardized metric.

Abbreviations: AGGR, aggression; INV, investments and goals; P, general factor of psychopathology; RELFAM, quality of family relationships with the family; RELFRI, quality of relationship with friends; SELF, sense of self; SELFACC, self-acceptance; SEX, sexuality.

highest loadings on the p-factor include indicators of negative affectivity, dysregulation, and behavioral problems. More specifically, the primary descriptors of the p-factor are items that describe negative affectivity (i.e., “I am unhappy, sad or depressed”, “I feel too guilty”, “I feel worthless or inferior”), responses to emotional dysregulation (i.e., “I deliberately try to hurt or kill myself”, “I think about killing myself”, “I destroy my own things”) and behavioral impairment (i.e., “I have trouble sleeping”, “I steal at home”). These findings align with previous research suggesting that the p-factor encapsulates transdiagnostic features indicative of general psychological maladjustment (Caspi et al. 2014).

Thus, on one side, the items that loaded highest in our study reflect the interplay between emotional dysregulation and behavioral impairment where impulsive responses to negative emotions, such as suicidal thoughts and destructive behaviors, are among the most prominent indicators of the p-factor: adolescents struggling with intense negative affectivity might respond with impulsive actions, manifesting as externalizing symptoms like self-harm or aggressive behavior, which in turn contribute to overall functional impairment.

On the other side, though, p shows a double-edged nature: adolescents might experience a more internalizing side of negative affectivity instead of acting out their difficulties.

Indeed, negative affectivity seems to encapsulate not only adolescents' low mood but also feelings that are associated in the literature with narcissistic vulnerability (i.e., feelings of guilt and/or inferiority). These findings suggest that, above and beyond other psychopathological symptoms, adolescents' cries for help might manifest not only at a behavioral level as impulsive actions but also as their feelings of inadequacy. This is in line with recent previous findings that showed that impairment in self-esteem (i.e., narcissistic vulnerability) is associated with general psychopathology (Benzi et al. 2023).

These findings depict the transdiagnostic nature of the p-factor, encapsulating both externalizing and internalizing solutions and providing a multidimensional description of how general psychopathology might manifest.

Second, the study tested the associations between the p-factor and emerging personality dimensions, emphasizing impairments in self and interpersonal functioning (Benzi et al. 2024; Sharp and Wall 2018). Our initial hypothesis was partially confirmed. Indeed, greater difficulties in self- and interpersonal dimensions of personality were associated with higher general psychopathology as measured using the p-factor. More self-related impairment in adolescents' sense of self, self-acceptance, and self-direction was associated with higher p. Similarly, interpersonal-related impairment in adolescents' relationships with their family, experience of sexuality, and emotion regulation (i.e., aggression) was associated with higher p. This is in line with previous contributions that suggested that self and interpersonal-related personality functioning are associated with general psychopathology (Benzi et al. 2024; Sharp 2020; Sharp and Wall 2018).

Interestingly, data highlighted an inverse, albeit small, association between the quality of relationships with friends and p. This finding might suggest that adolescents experiencing higher levels of general psychopathology might tend to rely more

heavily on their friendships, consistent with the critical role of peer groups during adolescence (Coyle et al. 2022; Cuadros and Berger 2016). Indeed, we can reflect further on these associations by focusing on the self-reported nature of the data collection. For example, we might consider that adolescents who reported higher general psychopathology (i.e., behavioral and emotional dysregulation but also feelings of inadequacy) might have also reported a higher investment in their relationships with their peers (e.g., “With my best friend, I share every intimate aspect of my life”), beyond the “adaptive” quality of the relationship itself.

All in all, these associations help further understand the nature of p. In line with recent contributions from Kerber and colleagues, personality functioning might be central to capturing transdiagnostic elements of psychopathology, as difficulties in identity and interpersonal functioning significantly predict both internalizing and externalizing symptoms over time (Kerber et al. 2024). This notion is further supported by Zavlis and Fonagy (2024), who emphasized interpersonal dysfunction as a core aspect of personality pathology. These are in line with our findings that higher levels of self- and interpersonal impairment are associated with increased general psychopathology. These emerging personality dimensions, including difficulties in self-concept and relational dynamics, seem to cut across traditional diagnostic boundaries, reinforcing the idea that the p-factor encapsulates broader vulnerability to mental health issues.

This study's findings should be considered considering certain limitations. First, the cross-sectional nature of the study design did not allow for any causal inferences about the relationships between the p-factor and emerging personality dimensions. Longitudinal studies are needed to explore these associations over time. Second, self-report measures might introduce bias due to social desirability or inaccurate self-perception. Future research should consider using multi-informant approaches to gather a more comprehensive understanding of adolescents' psychopathology. Third, this study excluded adolescents with neurodevelopmental disabilities (NDDs), including intellectual impairments. Research suggests that NDDs are often associated with a higher risk of behaviors such as emotional dysregulation and impulsivity, which are crucial components of general psychopathology (Caspi et al. 2014). Similar to the findings of Murray and colleagues (2016), we acknowledge this limitation in interpreting the p-factor characteristics, especially given the relevance of this factor in understanding more severe or complex presentations of psychopathology, including rarer conditions. Fourth, the results should be replicated in culturally diverse samples: indeed, what constitutes a transdiagnostic expression of individual difficulties might vary across cultures (Petot, Petot, and Chahed 2023). Finally, although we explored and ruled out alternative explanations by testing different models—including a unidimensional model, a bifactor ESEM model using the reference domain approach, and a non-orthogonal bifactor ESEM model—our findings underscore the complexity of modeling adolescent psychopathology. Despite our approach, we acknowledge the need to replicate this study across different adolescent samples using varying ESEM methodologies (Eid et al. 2017; Romano et al. 2023; Lorenzo-Seva and Ferrando 2019). Such replication is essential to confirm our results' generalizability and further refine the

measurement and the nature of the general p factor and its associated specific factors. Future research should continue to explore alternative modeling strategies to ensure the reliability and validity of these constructs across different contexts.

Overall, the study's findings underscore the multifaceted nature of the p-factor, integrating both self-related and interpersonal dimensions of emerging personality and providing further evidence of recent dimensional models of emerging psychopathology (Sharp 2020; Sharp and Wall 2018). Interpreting the loadings and the nature of the items ensured a robust and nuanced understanding of the p-factor, providing insights into understanding the characteristics of general psychopathology in adolescence. The findings suggest that the p-factor encapsulates overlapping internalizing and externalizing features that might help in understanding not only the developmental trajectories of adolescents' psychopathology but also highlighting the specific manifestations of adolescents' crises and distress. Future research should continue to build on these findings, exploring whether, in different phases of adolescence, the p-factor might entail different nuances, thus providing a developmentally sound contribution to dimensional models such as the HITOP model (Hyland et al. 2022; Ruggero et al. 2019; Widiger et al. 2019). Moreover, future studies should examine the interplay of these dimensions over time to better understand their role in the development and persistence of mental health problems (Benzi et al. 2024; Brislin et al. 2023; Choate et al. 2023; Patalay et al. 2015).

Lastly, this study has important clinical implications. Identifying key descriptors of the p-factor can help to inform the development of targeted assessment tools and interventions. For example, attention should be paid not only to behavioral difficulties, emotional dysregulation, and functional impairment but also to adolescents' individual experiences of guilt and inadequacy, as they might serve as transdiagnostic indicators of psychopathological risk. Indeed, clinicians should use these insights to identify at-risk adolescents better, design interventions that address behavioral problems, and investigate adolescents' feelings of vulnerability. Indeed, considering the dual nature of the p-factor, interventions should be adaptable to address both ends of the spectrum, whether that involves managing impulsive, aggressive behaviors or supporting adolescents grappling with feelings of inadequacy and emotional isolation. Finally, the findings on emerging personality dimensions offer additional insights into how impairments in self and interpersonal functioning are intertwined with general psychopathology. Adolescents with higher levels of p-factor-related distress might struggle with the development of a cohesive sense of self and with difficulties in accepting adolescence's typical turmoil. These vulnerabilities can manifest as internalizing symptoms, such as self-criticism and guilt, or/and externalizing symptoms, like aggression or interpersonal conflict. These findings call for a tailored approach that, while assessing both external behaviors and internal emotional states of adolescents, also focuses on fostering a stable sense of identity and self-esteem while accounting for interpersonal relationships and their nuances. In line with the literature (Chanen and McCutcheon 2013; Kerber et al. 2024), early interventions that focus on improving self-acceptance, emotional regulation, and interpersonal relationships might prevent the escalation of general psychopathology into fully engrained mental health disorders.

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Ethics Statement

The Ethical Committee of the University of Milano-Bicocca approved all materials and procedures.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The datasets generated during and/or analysed during the current study are available from the corresponding author upon reasonable request.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.