Journal of Affective Disorders 382 (2025) 282–289

Contents lists available at ScienceDirect

Journal of Affective Disorders

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

Research paper

Dimensional foundations toward a novel nosology addressing comorbidity: Preadolescent syndrome profiles

Johanna C. Walker [a,*], Alyssa J. Parker [b], Krupali R. Patel [c], Lea R. Dougherty [b], Jillian Lee Wiggins [a,c]

[a] Joint Doctoral Program in Clinical Psychology, San Diego State University/University of California, San Diego, CA, USA
[b] Department of Psychology, University of Maryland, College Park, MD, USA
[c] Department of Psychology, San Diego State University, San Diego, CA, USA

ARTICLE INFO

Keywords:
Internalizing
Externalizing
Psychopathology
Preadolescence
Risk factors

ABSTRACT

Objective: Traditional categorical systems for diagnosing psychopathological symptoms, such as the DSM-5, face limitations including high comorbidity rates and insufficient support for transdiagnostic treatment protocols. Dimensional, person-centered approaches can address these limitations by focusing on cross-cutting psychiatric symptoms.

Method: This study leverages data from the Adolescent Brain Cognitive Development℠ Study (ABCD Study®) to develop dimensional models of preadolescent psychopathology, focusing on a large, diverse sample of youths aged 9–10. We used latent profile analysis (LPA) on Child Behavior Checklist (CBCL) syndrome scales collected from an elevated symptomatology subsample to delineate subgroups for targeted interventions.

Results: Four distinct profiles emerged: "Mildly Elevated" and "Highly Elevated" (on both internalizing and externalizing), "Moderately Elevated - Rule-Breaking," and "Moderately Elevated - Internalizing & Thought Problems." These profiles differed significantly across sociodemographic, neurocognitive, and life experience characteristics. The "Highly Elevated" group showed the highest levels of risk, including greater trauma exposure and higher rates of parental psychopathology. In contrast, the "Mildly Elevated" group demonstrated lower levels of risk factors and higher fluid intelligence compared to the other groups. The two Moderately Elevated profiles were largely similar across most risk indicators, though the Internalizing & Thought Problems group had a slightly higher proportion of parents with a college education.

Conclusions: These profiles offer the beginnings of a foundation for classifying symptom co-occurrence and highlight the need for developmentally specific nosologies to improve risk detection and intervention strategies. Future research should further validate these profiles and explore their stability across developmental stages to inform targeted interventions.

1. Introduction

Person-centered research approaches in youth psychopathology have emphasized the importance of understanding individual differences and symptom patterns to enhance clinical utility (Bianchi et al., 2017; Healy et al., 2022; Muratori et al., 2021). Despite advancements in dimensional frameworks, the translation of such approaches into clinically useful nosologies remains challenging; this is partly due to the practical need for clinicians to make categorical decisions, such as initial risk triaging from primary care providers and intervention/treatment plans in mental health clinics. Developing a more accurate, empirically-based classification system rooted in person-centered, dimensional frameworks will provide a way to categorize such dimensions to identify and understand subgroups. It is necessary to develop such profiles from large, diverse samples to create nosologies that can be more generalizable and moreover, to characterize vulnerable developmental periods for timely risk-detection and intervention. Here, we leverage a large, nation-wide, population-based sample, the Adolescent Brain Cognitive Development℠ Study (ABCD Study®; Casey et al., 2018), to identify subgroup profiles based on symptom dimensions through a person-centered approach. Moreover, we focus on the pivotal period (i.e., preadolescence) immediately before adolescence, when mental health

* Corresponding author at: 6363 Alvarado Ct. Ste. 250, San Diego, CA 92120, USA.
E-mail address: jcwalker@sdsu.edu (J.C. Walker).

https://doi.org/10.1016/j.jad.2025.04.082
Received 13 November 2024; Received in revised form 11 April 2025; Accepted 18 April 2025
Available online 22 April 2025

diagnoses increase significantly (Costello et al., 2011), in order to facilitate timely intervention before youthful problems harden into entrenched psychiatric disorders in adolescence and adulthood.

Psychiatric disorders have traditionally been defined using diagnostic criteria from categorical systems such as the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013) and the International Classification of Diseases (ICD-10; World Health Organization, 1992). These systems remain the standard for diagnosing psychopathology and guiding clinical decisions. However, they have notable shortcomings, including high rates of comorbidity (Krueger and Markon, 2006) and limitations in diagnostic criteria (Lewinsohn et al., 2004). For example, the use of arbitrary cutoffs and criteria lacking empirical support means that individuals with subthreshold symptoms, who are often equally impaired and in need of treatment, may be overlooked (Haller et al., 2014; Lee et al., 2013). Moreover, there is increasing support for transdiagnostic intervention approaches, such as the Unified Protocol (Barlow et al., 2017), which address multiple disorders simultaneously. General therapeutic principles, such as motivational interviewing, behavioral activation, and exposure, are also gaining recognition for their applicability across various categorical disorders (Arkowitz et al., 2015; Pinciotti, 2023; Stein et al., 2021). For these reasons, dimensional approaches toward generating a nosology for psychopathological symptomatology have been recommended (Insel et al., 2010; Mittal and Wakschlag, 2017). Empirically-driven, person-centered frameworks prioritize understanding psychiatric symptoms as they manifest uniquely in individuals rather than fitting them into rigid diagnostic categories. By emphasizing individual variability, this approach allows for more precise and tailored interventions, improving clinical relevance and real-world applicability. A person-centered perspective also facilitates the early detection of behavioral changes and impairments that may not yet meet diagnostic thresholds but still indicate current or emerging challenges (Auerbach, 2022; Balázs et al., 2013; Carrellas et al., 2017).

Developmental sensitivity in the implementation of dimensional frameworks provides the opportunity to identify distinct psychological profiles, which may in turn be subserved by different underlying mechanisms at different ages (Cannon et al., 2002; Mittal and Wakschlag, 2017). Further, since symptom presentations and vulnerability for psychopathology may vary throughout development, it is necessary to explicitly examine these patterns during specific developmental stages with narrow age-bands. This is especially important in youth, when symptom comorbidity is particularly common and maturational change is rapid and dramatic. Although patterns of symptom presentations have been documented in early school age children (McElroy et al., 2017; Morales et al., 2021; Willner et al., 2016) and adolescence (Eastman et al., 2018; Kiye and Boysan, 2022; McElroy et al., 2017), comprehensive profiles remain unclear in preadolescence. Preadolescence serves as a key phase for identifying and understanding risks for psychopathology as it offers a final opportunity for intervention before the well-documented, significant increase in diagnoses that typically occurs in adolescence (Costello et al., 2003).

A dimensional approach to childhood psychopathological development requires examining the full spectrum of common symptoms experienced in youth. This effort had been aided by comprehensive symptom assessments such as the Child Behavioral Checklist (CBCL; Achenbach, 2001). The CBCL comprises five symptom domain factors: internalizing (e.g., anxiety, depression), externalizing (e.g., aggression, conduct problems), social, attentional, and thought problems (Achenbach, 2001). This data-driven factor approach was foundational for identifying primary dimensions of early life symptoms without a priori influences from traditional diagnostic categories. Yet, while symptom dimensions were statistically derived, many of these domains, such as internalizing and externalizing symptoms, still overlap significantly (Achenbach, 1993; McConaughy and Skiba, 1993). This is expected, due to the co-occurring nature of child psychopathology (Kessler et al., 2005). Indeed, such overlap is also informative: high internalizing and externalizing symptom co-occurrence is associated with increased symptomatology in adulthood (Althoff et al., 2010). Thus, characterizing groups based on co-occurrence (or lack of co-occurrence) of symptom dimensions may be an avenue to a new, developmentally specific nosology that will lean on the advantages of dimensional approaches yet further provide practical categories that are essential for effective decision making.

This study aims to contribute toward developing dimensional models of preadolescent psychopathology symptoms that can be translated into improved categorization of clinical diagnoses. The ABCD Study® provides an opportunity to explore these nosologies in preadolescence, as it contains a substantial sample of youths designed to mirror the population demographics of the United States. To better understand variation in symptom presentations, we identified symptom-based profiles within a high-risk subgroup from a community baseline sample to enhance clinical relevance and application. We used a data-driven, dimensional approach to minimize bias associated with a priori expectations. As an initial step in characterizing these profiles, we compared them across common risk and resilience factors—such as trauma exposure, parent mental health and substance use issues, and neurocognitive functioning—as well as sociodemographic variables (Lynch et al., 2021). This approach provided a preliminary understanding of the potential etiological and maintenance factors underlying these symptom profiles.

2. Method

2.1. Participants

The ABCD Study® is an ongoing project that includes over 11,000 children and their parents between 21 sites across the US. Participants were roughly 9–10 years old at time of the baseline assessments. This longitudinal study includes measures investigated psychological and neurobiological development from preadolescent to early adulthood. The final ABCD Study® baseline sample was estimated to approach the diversity of the US population on various socio-demographic characteristics, despite not being nationally representative (full details of recruitment and sample statistics can be found in Garavan et al., 2018). There were 11,876 participants with completed parent-rated CBCL data at baseline. In families with more than one child participant, siblings were randomly removed such that only one child per family was included in the sample to avoid interdependence within the data structure, for a total of 9848 participants.

2.2. Measures

2.2.1. Child behaviors checklist

The Child Behaviors Checklist (CBCL; age 6 to 18 form) (Achenbach and Ruffle, 2000) was used to assess a wide range of symptoms. Parents were tasked with rating the extent to which various behaviors (e.g., “argues a lot”) are characteristic of their child over the past 6 months. There are a total of 119 items that parents can rate as either: 0 (“not true”), 1 (“somewhat or sometimes true”), or 2 (“very true or often true”). The CBCL contains eight validated “narrowband” syndrome scales: *Aggressive Behavior*, *Rule-Breaking Behavior*, *Social Problems*, *Attention Problems*, *Thought Problems*, *Anxious/Depressed*, *Withdrawn/Depressed*, and *Somatic Complaints*. These syndrome scales show good psychometric properties and had high internal consistency within this sample ($\alpha = 0.88$). Additionally, they have been empirically-driven into two “broad-band categories”: the *Internalizing Domain* measuring emotional problems (*Anxious/Depressed*, *Withdrawn/Depressed*, and *Somatic Complaints)* and *Externalizing Domain* measuring behavioral problems *(Aggressive Behavior* and *Rule-Breaking Behavior)* (Achenbach, 2001). The remaining syndromes (*Social Problems*, *Attention Problems*, *Thought Problems*) are considered “mixed” scales as they have demonstrated sizable factor loadings on both broadband domains. Summed

raw scores for each syndrome scale are converted to norm-referenced *T*-scores ($M = 50$, $SD = 10$) with separate norms for males and females. Syndrome scales with T-scores ≥70 are considered "Clinically Significant" elevations and T-scores between 65 and 69 are considered. "Borderline" elevations (i.e., elevated but not in the clinical range).

2.2.2. Parent mental health / Substance use problems

Parental history of mental health problems was examined through the parent-reported ABCD Study® Family History questionnaire on emotional problems and substance use. A history of parental emotional problems was defined as a positive endorsement by either biological parent of a history of depression, nerves/nervous breakdown problems, and/or seeing a mental health professional. A history of substance use problems was defined as any endorsement of problems with alcohol or other drugs by either biological parent.

2.2.3. Trauma exposure

Trauma exposure was measured through the Kiddie Schedule for Affective Disorders and Schizophrenia (K-SADS) PTSD Module (Kaufman et al., 1997), a parent-reported checklist of seventeen traumatic events their child may have experienced or witnessed, such as abusive or life-threatening situations. Youth were considered to have a history of trauma exposure if any events were endorsed.

2.2.4. Fluid cognition

Fluid cognition, i.e., the "capacity for new learning and information processing in novel situations" (Akshoomoff et al., 2013), was measured by the Fluid Cognitive Ability Composite score from the NIH Toolbox. The Fluid Cognitive Ability score is a composite of scores from six cognitive tasks: the Dimensional Change Card Sort (DCCS) Test (Executive Function-Cognitive Flexibility), Flanker Inhibitory Control and Attention Test (Executive Function-Inhibitory Control and Sustained Attention), Picture Sequence Memory Test (Episodic Memory-Visual), List Sorting Working Memory Test (Working Memory), and Pattern Comparison Processing Speed Test.

2.3. Analytic approach

To enhance clinical relevance and applicability, we focused our primary analyses on a subsample of individuals with at least one elevated symptom score. This approach was necessary to reduce the influence of a large proportion of individuals with low or average symptoms, which could bias the model and obscure meaningful patterns. Given that the full sample was drawn from a community population, the majority of participants exhibited low symptom levels, making it difficult to identify distinct psychopathology profiles. By selecting individuals with at least one Syndrome Scale T-score ≥ 65 ($n = 2374$), we ensured that our analyses captured variability in clinically relevant symptom presentations.

There was no significant difference in age between participants in the Elevated sample and the Non-Elevated sample ($n = 5520$, $t(3, 977) = 0.384$, $p = .701$). However, the proportion of males (male = 0, female = 1) was significantly higher in the Elevated sample compared to the Non-Elevated sample ($X^2(1) = 14.995$, $p < .001$), while the proportion of participants with at least one parent holding a four-year degree (0 = No 4 Year College Degree, 1 = At least a 4 Year College Degree) was significantly higher in the Non-Elevated sample compared to the Elevated sample ($X^2(1) = 61.788$, $p < .001$). Sociodemographic information and group differences between the Elevated and Non-Elevated subsamples are presented in Table 1. Descriptive statistics of CBCL syndrome t-scores the Elevated and Non-Elevated subsamples are presented in Table 2. *t*-tests indicated that all CBCL syndrome t-scores differed significantly between the Elevated and Non-Elevated groups ($p < .001$).

Table 1
Sociodemographic information of the elevated and non-elevated samples.

	Elevated subsample	Non-elevated sample	Group differences		
	N(%)	N(%)	X^2	*df*	*p*
Sex			15.00	1	<0.001
Female	1048 (44.1 %)	3642 (48.7 %)			
Male	1326 (55.9 %)	3832 (51.3 %)			
Race + Ethnicity			28.54	6	<0.001
Asian	32 (1.3 %)	198 (2.6 %)			
Black	375 (15.8 %)	1122 (15.0 %)			
Hispanic or Latino/a/x	520 (21.9 %)	1580 (21.1 %)			
Indigenous/ Other	29 (1.2 %)	77 (1.0 %)			
White	1152 (48.5 %)	3831 (51.3 %)			
Biracial or Multiracial	257 (10.8 %	634 (8.5 %)			
Refused/Missing/ Don't Know	9 (0.4 %)	32 (0.4 %)			
Parental education			61.79	1	<0.001
No 4 Year Degree	1141 (48.1 %)	2910 (39.3 %)			
4 Year degree or Higher	1229 (51.8 %)	4557 (61.0 %)			
Missing Data	4 (0.1 %)	7(<0.1 %)			
	M(SD)	**M(SD)**	**t**	***df***	***p***
Age	9.90 (0.62)	9.91 (0.62)	0.38	9846	0.70
Pubertal Status*	1.67 (0.43)	1.61 (0.48)	2.82	9784	0.004

* Note. Pubertal status was evaluated using the Pubertal Development Scale Pubertal Development Scale (Petersen et al., 1988). Parent report of pubertal development was used, with youth report substituted when parent data were missing.

2.3.1. Latent profile analyses

We tested the existence of discrete groups with similar syndrome profiles using a Latent Profile Analysis (LPA) on the elevated subsample's syndrome scale T-scores and supplementary analyses on the full baseline ABCD Study® sample. We chose LPA because, unlike traditional variable-centered analyses, it focuses on the identification of unique profiles or subgroups within a population, each characterized by a distinct pattern of symptomatology. This enables a person-centered characterization of the interplay and co-occurrence of various symptoms, unveiling phenotypic profiles that may not be apparent through traditional categorical diagnostic frameworks.

When conducting an LPA, models of different class sizes are compared using various fit indices in order to determine the optimal number of classes (Sclove, 1987). We started the LPA by evaluating the model fit of a one-class solution and incrementally added latent classes until the best class size was identified. We comprehensively considered multiple fit indices, balancing parsimony and interpretability: we used Akaike information criterion (AIC) and the Bayesian information criterion (BIC), with lower values indicating a better fit; and bootstrap likelihood ratio test (BLRT), which assesses the goodness of fit by comparing the current class solution (k) to the prior solution with one less class ($k-1$). We also examined classification certainty through probability minimum and maximum estimates; higher estimates indicate that it is more likely that cases assigned to each class belong to that class (Jung et al., 2008). Our indices of *N* minimum and *N* maximum represented the proportion of our sample that were assigned to the smallest and largest classes, respectively, according to the most likely class membership. We examined entropy (values ranging from 0 to 1), a measure of relative accuracy and quality of participant classification, as

Table 2
Descriptive statistics of CBCL syndrome t-scores for elevated and full samples.

Syndrome	Symptoms include	Elevated subsample		Non-elevated sample	
		M(SD)	*Range*	*M*(SD)	*Range*
Aggressive Behavior	Aggressive or destructive behavior	58.48 (8.32)	50–100	51.08 (2.38)	50–64
Rule-Breaking Behavior	Violating social norms (e.g., stealing, fighting)	57.31 (7.26)	50–84	51.41 (2.65)	50–64
Social Problems	Peer relationship and social interactions	57.76 (6.86)	50–90	51.31 (2.32)	50–64
Attention Problems	Attention and concentration	60.65 (8.74)	50–97	51.95 (2.98)	50–64
Thought Problems	Abnormal of delusional thinking	60.40 (8.01)	50–84	51.87 (3.05)	50–64
Anxious/ Depressed	Anxiety and worry	59.86 (8.35)	50–100	51.59 (3.03)	50–64
Withdrawn/ Depressed	Depression, loneliness, and social isolation	59.32 (8.09)	50–94	51.70 (3.04)	50–64
Somatic Complaints	Physical symptoms (e.g., stomachs, headaches)	60.79 (7.68)	50–88	53.24 (4.18)	50–64

an indicator of model usefulness. Typically, values >0.80 represent adequate separation of identified groups. Our model's usefulness was confirmed through substantive interpretation of the profile estimates.

Profiles in the Elevated sample were characterized through post-hoc comparisons of sex assigned at birth, age, pubertal status, and socio-economic status (SES, as measured by parental education) to identify demographic descriptors for each LP. Participants were assigned to their most likely profile based on posterior probabilities, and profile memberships were used to conduct *t*-tests and chi-square analyses. To further identify potential risk factors associated with each profile, additional comparisons were conducted on parental psychopathology (i.e., mental health or substance use problems), trauma exposure history, and fluid cognitive ability. These comparisons were carried out using a traditional classify-analyze approach, which, while widely used in latent profile analysis, does not account for classification uncertainty and may introduce bias in parameter estimates (Asparouhov and Muthén, 2014). However, the selected LPA model demonstrated acceptable classification accuracy, with an entropy value of 0.85, indicating reasonably good separation between profiles and mitigating concerns about substantial misclassification. Moreover, given the exploratory nature of the current study, this approach offered a straightforward and practical means of examining initial associations between profile membership and relevant variables. It also aligns with applied clinical contexts, where individuals are often grouped into discrete categories to inform decision-making and treatment planning. Nonetheless, we acknowledge the limitations of this method and recommend that future research implement more rigorous techniques—such as the 3-step approach—to adjust for classification error and improve the robustness and generalizability of findings.

3. Results

3.1. Model fit

Model fit indices for our Elevated sample LPA are available in Table 3. AIC, BIC, BLRT *p*-values suggest improved model fit with 5 classes relative to fewer classes; however, lower entropy for the 5-class solution suggests poorer quality of participant classification compared to the 4-class solution. Additionally, low minimum probability in the 5 vs. 4 class solution favored the 4-class solution. Overall, in light of the better model separation as indicated by entropy and minimum probability, and to prioritize parsimony, we dropped consideration of the 5-class model in favor of fewer (3 or 4) classes. Because AIC and BIC favored 4 over 3 classes, and for substantive interpretation, we selected the 4-class solution.

3.2. Description of profiles

Fig. 1 presents the average syndrome t-scores for participants in each latent profile (LP), while Table 4 provides the mean, standard deviation, and 95 % confidence interval for each profile's T-score. The largest subgroup consisted of those whose overall estimates fell below the other profiles on the majority of syndromes and remained under "sub-clinical" significance across all. Although *Somatic Complaints* was the highest syndrome scale, it was estimated similarly to the four other profiles. Thus, this subgroup was called "**Mildly Elevated**" (n = 1216 [51.22 %]). The second and third largest subgroups represented moderately elevated groups and primarily differed on Rule-Breaking Behavior and the Internalizing and Thought Problems domains. Thus, they were named "**Moderately Elevated - Rule-Breaking**" (n = 485 [20.42 %]) and "**Moderately Elevated - Internalizing & Thought Problems**" (n = 455 [19.17 %]). The final subgroup contained the highest estimates across all syndromes (with clinically elevated estimates for *Aggressive Behavior*, *Attention Problems*, and *Thought Problems*), and was thus called "**Highly Elevated**" (n = 218 [9.18 %]). The average probability of subgroup membership for each latent profile group was 0.93, 0.95, 0.89 and 0.84, respectively. This demonstrates good separation between the 4 subgroups as those assigned to each LP were highly likely to belong to that profile and not others.

3.3. Characterization of elevated profiles

3.3.1. Sociodemographics

Elevated latent profiles significantly differed by sex assigned at birth, $X^2(3, N = 2374) = 9.78$, $p = .021$ (See Fig. 2 for full characterization of profiles). Post-hoc comparisons showed the Mildly Elevated group had a lower proportion of males vs. females (52.9 % males) compared to the Highly Elevated (61.9 % males, $p = .018$) and Moderately Elevated - Rule Breaking (59.1 % males, $p = .028$) groups. Profiles also differed in pubertal development status ($F(3, 2350) = 4.60$, $p = .003$). Post-hoc comparisons revealed that the Mildly Elevated group exhibited slightly earlier pubertal development ($M = 1.64$, $SD = 0.42$) to the

Table 3
Overall model fit for classes 1 - 5 (Elevated Sample)

	AIC	BIC	Entropy	Prob. Min	Prob. Max	N Min	N Max	BLRT p-value
1 Class	132,393.01	132,485.37	1.00	1.00	1.00	1.00	1.00	
2 Classes	129,057.12	129,201.43	0.86	0.91	0.98	0.24	0.76	0.01
3 Classes	128,311.48	128,507.74	0.81	0.86	0.94	0.08	0.59	0.01
4 Classes	**127,350.12**	**127,598.33**	**0.85**	**0.84**	**0.95**	**0.09**	**0.51**	**0.01**
5 Classes	127,222.98	127,523.14	0.76	0.80	0.93	0.09	0.28	0.01

Note. Our indices of N minimum and N maximum represented the proportion of our sample that were assigned to the smallest and largest classes, respectively, according to the most likely class membership.

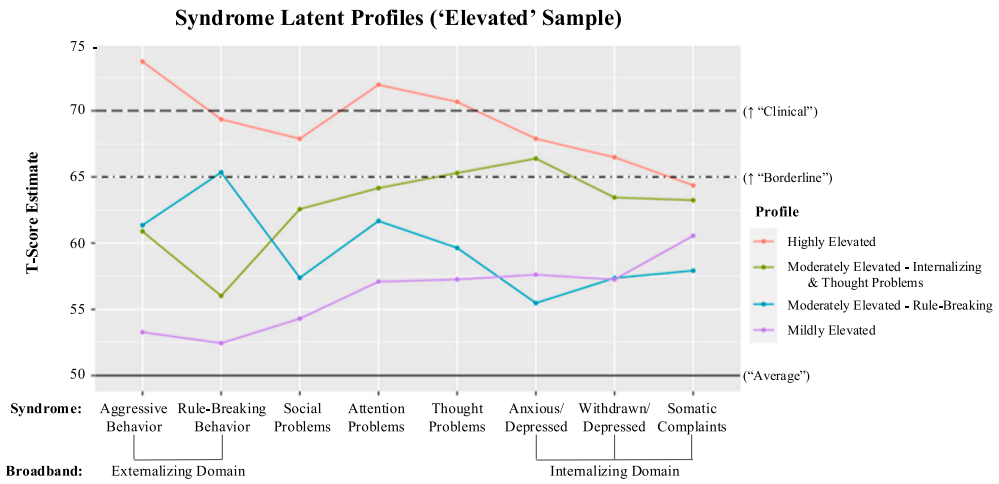

Fig. 1. CBCL T-Score Estimates for the LPA 4-Class Solution on the Elevated Sample.
Average syndrome T-scores for each latent profile in the Elevated Sample. "Mildly Elevated" (n = 1216, 51.22 %), displayed sub-clinical syndrome scores across all domains. "Moderately Elevated - Rule-Breaking" (n = 485, 20.42 %) and "Moderately Elevated - Internalizing & Thought Problems" (n = 455, 19.17 %) profiles differed primarily by elevations in Rule-Breaking Behavior and Internalizing symptoms/Thought Problems, respectively. The "Highly Elevated" group (n = 218, 9.18 %) showed clinically elevated scores in Aggressive Behavior, Attention Problems, and Thought Problems.

Table 4
T-Score estimates for 4 class solution in the elevated sample.

	Mildly Elevated (n = 1216)		ME-Rule Breaking (n = 485)		ME-Internalizing & Thought Problems (n = 455)		Highly Elevated (n = 218)	
Syndrome	M (SD)	95 % CI	M (SD)	95 % CI	M (SD)	95 % CI	M (SD)	95 % CI
Aggressive Behavior	53.2 (4.1)	[53.0, 53.4]	62.1 (6.2)	[61.6, 62.7]	61.2 (5.8)	[60.7, 61.8]	74.0 (8.0)	[73.0, 75.1]
Rule-Breaking Behavior	52.3 (2.7)	[52.2, 52.5]	65.6 (4.0)	[65.3, 66.0]	55.9 (3.9)	[55.6, 56.3]	69.4 (4.8)	[68.7, 70.0]
Social Problems	54.2 (4.1)	[53.9, 54.4]	57.1 (5.2)	[56.7, 57.6]	62.9 (5.6)	[62.4, 63.4]	68.4 (7.3)	[67.5, 69.4]
Attention Problems	57.0 (6.9)	[56.6, 57.4]	61.4 (7.3)	[60.7, 62.0]	64.1 (7.8)	[63.4, 64.8]	72.1 (9.3)	[70.9, 73.4]
Thought Problems	57.1 (6.5)	[56.8, 57.5]	59.1 (6.7)	[58.5, 59.7]	65.5 (6.8)	[64.9, 66.1]	70.9 (6.0)	[70.1, 71.7]
Anxious/ Depressed	57.5 (6.9)	[57.2, 57.9]	55.6 (5.6)	[55.1, 56.1]	66.8 (7.4)	[66.1, 67.5]	67.9 (8.7)	[66.7, 69.0]
Withdrawn/ Depressed	57.2 (7.1)	[56.8, 57.6]	57.3 (6.6)	[56.7, 57.9]	63.8 (7.6)	[63.1, 64.5]	66.3 (9.5)	[65.0, 67.6]
Somatic Complaints	60.3 (7.5)	[59.9, 60.8]	57.8 (6.5)	[57.2, 58.4]	63.4 (7.5)	[62.7, 64.1]	64.5 (8.5)	[63.3, 65.6]

Note. The profiles "Moderately Elevated–Rule Breaking" and "Moderately Elevated–Internalizing & Thought Problems" are abbreviated here as "ME–Rule Breaking" and "ME–Internalizing & Thought Problems", respectively.

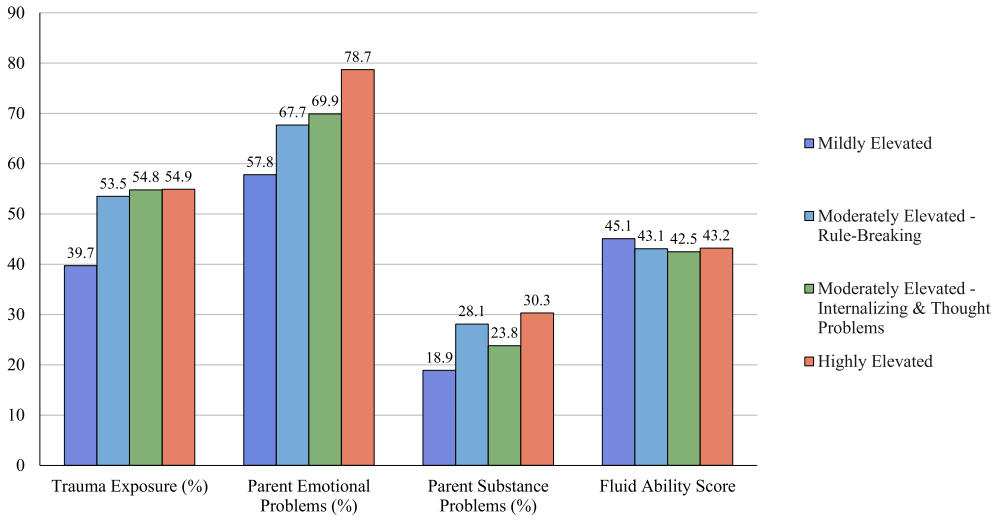

Fig. 2. Characterization of Risk Factors Across Four Latent Profiles in the Elevated Sample.
Sociodemographic and risk factors across four elevated latent profiles in preadolescents. Significant differences were found by sex and socioeconomic status, with the "Mildly Elevated" group showing fewer males (52.9 %) and higher parental education (59.6 %) than other profiles. Trauma exposure varied, with the "Highly Elevated" group highest (66.5 %) and "Mildly Elevated" lowest (39.7 %). Parent mental health issues were most prevalent in the "Highly Elevated" group (78.7 %), while substance use issues were lowest in the "Mildly Elevated" profile (19.0 %). This group also showed significantly higher fluid intelligence scores.

Highly Elevated group ($M = 1.71$, $p = .004$) and the Moderately Elevated - Rule Breaking group ($M = 1.68$, $p = .004$). Further, elevated latent profiles significantly different by SES, as measured through parental education, $X^2(3, N = 2370) = 81.65$, $p < .001$. That is, the Mildly Elevated LP had significantly more preadolescents with at least one parent with a 4-year college degree (59.6 %) than all other profiles (Highly Elevated: 33.6 %, $p < .001$; Moderately Elevated - Internalizing & Thought Problems: 51.6 %, $p = .004$; Moderately Elevated - Rule Breaking: 40.8 %, $p < .001$). Further, the Moderately Elevated - Internalizing & Thought Problems LP had significantly more preadolescents with at least one parent with a 4-year college degree than the Highly Elevated, $p < .001$, and Moderately Elevated - Rule Breaking, $p = .001$ profiles. Elevated latent profiles did not significantly differ by age, $F(3, 2370) = 0.64$, $p = .591$.

3.3.2. Trauma exposure

All elevated profiles had over 50 % of children with exposure to at least one trauma (range 53.3–66.5 %) with the exception of Mildly Elevated (39.7 %). The Highly Elevated group had the largest portion of children with at least one traumatic experience (66.5 %). Profiles significantly differed by trauma exposure, $X^2(3, N = 2309) = 75.46$, $p < .001$. Post-hoc comparisons showed all LPs significantly differed from one another ($ps < 0.01$) with the exception of the Moderately Elevated - Internalizing & Thought Problems and Moderately Elevated - Rule Breaking ($p = .74$).

3.3.3. Parent mental health / Substance use problems

Proportion of children with at least one parent with mental health problems (e.g., depression, anxiety, use of mental health treatment) was over 50 % (range 57.9–78.7 %) across all groups; with Mildly Elevated group having the lowest proportion (57.8 %) and Highly Elevated with the highest (78.7 %). Profiles significantly differed by parent mental health ($X^2(3, N = 2237) = 47.74$, $p < .001$) and substance use problems ($X^2(3, N = 2237) = 22.84$, $p < .001$). Post-hoc comparisons showed that in terms of parent mental health problems, all LPs significantly differed from one another ($ps < 0.05$) with the exception of the Moderately Elevated - Internalizing & Thought Problems and Moderately Elevated - Rule Breaking profiles ($p = .55$). With regards to the proportion of those with at least one parent with reported alcohol or substance use problems, post-hoc comparisons showed that groups only significantly differed with the Mildly Elevated group which had a significantly lower proportion (19.0 %) compared to the range of 23.8–30.3 % of the other groups.

3.3.4. Fluid intelligence

Elevated latent profiles significantly differed by Fluid Ability Composite Scores, $F(3, 2158) = 7.55$, $p < .001$. Post-hoc comparisons showed that all groups significantly differed from the Mildly Elevated group ($ps < 0.05$) which had significantly higher functioning ($M = 45.00$, $SD = 11.00$) than the rest of the elevated groups.

For completeness, additional LPA analyses were conducted with the full sample and identified three distinct profiles: “Low,” “Moderate,” and “Elevated” (for full details, see *Supplementary Material A*). Because this community sample predominantly includes individuals with average levels of psychopathology, these profiles corresponded to expected variations within a community distribution.

4. Discussion

Person-centered approaches in youth psychopathology emphasize individual differences in symptom presentation, enhancing clinical utility and intervention strategies (Bianchi et al., 2017; Healy et al., 2022; Muratori et al., 2021). Unlike rigid categorical systems, these frameworks identify meaningful symptom patterns and subgroups, offering a more nuanced understanding of early risk factors and transdiagnostic vulnerabilities. This is particularly valuable in youth, where symptom expression is heterogeneous and developmental trajectories vary. By focusing on how symptoms cluster within individuals rather than fitting them into predefined diagnoses, person-centered approaches can better capture impairments that warrant attention before full diagnostic criteria are met (Auerbach, 2022; Balázs et al., 2013; Carrellas et al., 2017). Moreover, data-driven classification methods grounded in person-centered frameworks can provide empirically supported yet clinically applicable ways to guide early identification and intervention efforts.

It is necessary to create nosologies from large, diverse samples, such as the ABCD Study®, to create accurate, generalizable nosologies, with regard to multiple aspects of social determinants (e.g., socioeconomic status, race/ethnicity, urban city, etc.). A further advantage of these large samples is that researchers are able to not only examine potential nosologies within an overall community group, as represented by the whole sample, but also within a considerably sized subgroup with elevated symptomatology. This combination is useful for both overall triaging of initial risk (i.e., into Low, Moderate, and Elevated) plus the more specific delineation of presentation (i.e., the subgroups) for targeted interventions. However, these large datasets are still fairly recent; as more large, diverse datasets emerge across different developmental periods (e.g., HEALthy Brain and Child Development Study; NIH HEAL Initiative, 2019), additional developmentally specific nosologies should be created.

The Elevated sample resulted in four distinct profiles of syndrome scale presentations: Mildly Elevated, Moderately Elevated - Rule-Breaking, Moderately Elevated - Internalizing & Thought Problems, and Highly Elevated. Notably, the moderately elevated groups had either a rule breaking or internalizing/thought problems type. Differentiating these groups and their mechanisms may be useful for determining interventions, as internalizing/thought problems and rule breaking likely require unique interventions and/or may result in different developmental trajectories and risk. Interestingly, the moderate group with notably higher rule breaking had less social problems than the internalizing/thought problems group. It is possible that it reflects an overarching approach or avoidance tendency related to the degree of internalizing symptoms. The aggressive behavior scale, which includes angry emotional responses, were at the same elevation in the internalizing/thought problems and externalizing group as well as most significant in the Highly Elevated group and may provide evidence of ways to intervene across all groups. Additional research clarifying and replicating these groups with youth and clinician reports is essential to gain a comprehensive understanding of these presentations of psychopathology.

The distinct profiles created in the elevated subsample differed in their sociodemographic, neurocognitive or life experience characteristics. Our findings reaffirm established risk factors for psychopathology, including socioeconomic status, trauma exposure, and parental substance use and emotional difficulties. These factors were most pronounced in the highly elevated group, which had the lowest proportion of parents with a four-year degree, the highest trauma exposure, and the most parents experiencing both substance use and emotional problems. While the mildly elevated group exhibited fewer of these risk factors compared to the highly elevated group, they were still part of the elevated sample, meaning at least one of their symptoms exceeded the subclinical threshold. This underscores the importance of early intervention to mitigate the severity of psychopathology across the board. Additionally, we observed that boys were overrepresented in the elevated sample, with the highest proportion in the highly elevated group. This could be due to a range of factors, including reporting biases (e.g., externalizing behaviors, such as rule breaking, being more noticeable in boys (van der Sluis et al., 2017)) or diagnostic criteria that may be more aligned with male-typical symptom presentations. Future studies should examine whether assessment tools and diagnostic frameworks sufficiently capture psychopathology in girls, ensuring that early intervention efforts are inclusive and effective.

Interestingly, we identified two distinct types of moderately elevated profiles—one characterized by rule-breaking behavior and the other by internalizing and thought problems. These groups were highly comparable across most risk factors, with the internalizing/thought problems group having slightly more parents with a college education. It remains unclear why some children develop rule-breaking behaviors, while others exhibit internalizing symptoms and thought problems. While future research should explore contextual and temperamental factors underlying these differences, one possibility is that greater parental education provides children with additional resources or access to coping mechanisms, potentially influencing these divergent pathways. Furthermore, fluid intelligence may serve as a compensatory mechanism, as only the mildly elevated group significantly differed in this area from the other profiles. This suggests a possible protective factor worth investigating in future intervention studies.

Additionally, our results showed greater variation in externalizing symptoms across profiles compared to internalizing symptoms, which may be due to the more observable nature of externalizing behaviors for parents. Notably, somatic complaints—including headaches, stomachaches, dizziness, and fatigue—remained relatively consistent across profiles in the elevated sample, suggesting they may serve as a transdiagnostic indicator of psychopathology in adolescents. This pattern highlights the potential value of somatic complaints in identifying broad psychological distress, regardless of specific symptom profiles. When assessing symptom presentations, starting with externalizing symptoms may provide a clearer differentiation before delving into internalizing symptoms. To improve the assessment of internalizing symptom types, a multi-informant, multi-method approach may be necessary to capture a more comprehensive picture of adolescent psychopathology.

While this study has strengths, these profiles should be taken in the context of limitations. First, while the use of parent-report measures is essential and widely relied upon during this period, there is often discordance in ratings between youth-and parent reports of psychopathology, particularly regarding internalizing symptoms. Additional research needs to incorporate multiple reporters to create more comprehensive profiles of child psychopathology. Second, while it was advantageous that this was drawn from a community sample to increase generalizability, the cutoff for the Elevated sample was determined as meeting "elevated" on any symptom domain. Further research would benefit by sampling in specific treatment seeking groups that present with clinically elevated symptoms to replicate these profiles and determine their efficacy in more clinical samples.

Future research will need to continue to examine profiles in specific developmental periods, and further explore how these profiles change over time, given that such symptom presentations are highly developmentally specified (Wiggins et al., 2023). Further, it is necessary to characterize groups to determine developmentally specific risk factors: for example, while we observed that the Rule Breaking group had a lower proportion of males than females compared to the Mildly or Highly Elevated groups, these patterns may not be constant across time. Moreover, future research must link these profiles to other behavioral, environmental, and neural factors to further understanding underlying causes or associations. This will be essential to create effective interventions prior to the development of these psychopathology patterns as well as during preadolescence to reduce risk for future development of psychopathology into the high-risk period of adolescence.

Overall, this study represents an initial step toward empirically derived developmental psychopathology profiles that may help inform a dimensionally-based nosology. While this study demonstrates general patterns in the overall community of Low, Moderate, and Elevated, it also further specifies profiles within elevated groups, which will be necessary to determine interventions and etiology after initial risk triaging. Developmentally specified, data-driven frameworks have the potential to enhance our understanding of the etiology and treatment of youth psychopathology. Although clinical decision-making often relies on categorical approaches for treatment planning, continued research is needed to determine how such frameworks can complement existing diagnostic systems and improve clinical outcomes.

Study funding

Research reported in this publication was supported by the National Institute of Mental Health under award number R01MH122487 (MPIs: Wiggins, Dougherty).

CRediT authorship contribution statement

Johanna C. Walker: Writing – original draft, Methodology, Formal analysis, Conceptualization. **Alyssa J. Parker:** Writing – original draft, Formal analysis. **Krupali R. Patel:** Writing – review & editing, Formal analysis. **Lea R. Dougherty:** Writing – review & editing, Supervision, Funding acquisition. **Jillian Lee Wiggins:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Conceptualization.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used ChatGPT (2024) in order to revise selected sentences for improved clarity. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

Declaration of competing interest

The authors have no conflicts of interest to report.

Acknowledgements

We would like to thank Jeremy Purcell, Jason Smith, and Conner Swineford for their help with data management. We would also like to thank the participants in the ABCD Study.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jad.2025.04.082.

References

Achenbach, T.M., 1993. Taxonomy and comorbidity of conduct problems: evidence from empirically based approaches. Dev. Psychopathol. 5 (1–2), 51–64. https://doi.org/10.1017/S0954579400004259.

Achenbach, T.M., 2001. Manual for ASEBA School-age Forms & Profiles. University of Vermont, Research Center for Children, Youth & Families. https://cir.nii.ac.jp/crid/1571698599245104896.

Achenbach, T.M., Ruffle, T.M., 2000. The child behavior checklist and related forms for assessing behavioral/emotional problems and competencies. Pediatr. Rev. 21 (1).

Akshoomoff, N., Beaumont, J.L., Bauer, P.J., Dikmen, S., Gershon, R., Mungas, D., Slotkin, J., Tulsky, D., Weintraub, S., Zelazzo, P., Heaton, R.K., 2013. NIH toolbox cognitive function battery (CFB): composite scores of crystallized, fluid, and overall cognition. Monogr. Soc. Res. Child Dev. 78 (4), 119. https://doi.org/10.1111/mono.12038.

Althoff, R.R., Verhulst, F., Rettew, D.C., Hudziak, J.J., van der Ende, J., 2010. Adult outcomes of childhood dysregulation: a 14-year follow-up study. J. Am. Acad. Child Adolesc. Psychiatry 49 (11), 1105–1116.e1. https://doi.org/10.1016/j.jaac.2010.08.006.

American Psychiatric Association. (2013). Diagnostic and Statistical Manual of Mental Disorders: DSM-5™, 5th ed (pp. xliv, 947). American Psychiatric Publishing, Inc. doi:https://doi.org/10.1176/appi.books.9780890425596.

Arkowitz, H., Miller, W.R., Rollnick, S., 2015. Motivational interviewing in the treatment of psychological problems. Guilford Publications.

Asparouhov, T., Muthén, B., 2014. Auxiliary variables in mixture modeling: three-step approaches using Mplus. Struct. Equ. Model. Multidiscip. J. 21 (3), 329–341. https://doi.org/10.1080/10705511.2014.915181.

Auerbach, R.P., 2022. RDoC and the developmental origins of psychiatric disorders: how did we get here and where are we going? J. Child Psychol. Psychiatry 63 (4), 377–380. https://doi.org/10.1111/jcpp.13582.

Balázs, J., Miklósi, M., Keresztény, Á., Hoven, C.W., Carli, V., Wasserman, C., Apter, A., Bobes, J., Brunner, R., Cosman, D., Cotter, P., Haring, C., Iosue, M., Kaess, M.,

Kahn, J.-P., Keeley, H., Marusic, D., Postuvan, V., Resch, F., Wasserman, D., 2013. Adolescent subthreshold-depression and anxiety: psychopathology, functional impairment and increased suicide risk. J. Child Psychol. Psychiatry 54 (6), 670–677. https://doi.org/10.1111/jcpp.12016.

Barlow, D.H., Farchione, T.J., Bullis, J.R., Gallagher, M.W., Murray-Latin, H., Sauer-Zavala, S., Bentley, K.H., Thompson-Hollands, J., Conklin, L.R., Boswell, J.F., Ametaj, A., Carl, J.R., Boettcher, H.T., Cassiello-Robbins, C., 2017. The unified protocol for Transdiagnostic treatment of emotional disorders compared with diagnosis-specific protocols for anxiety disorders: a randomized clinical trial. JAMA Psychiatry 74 (9), 875–884. https://doi.org/10.1001/jamapsychiatry.2017.2164.

Bianchi, V., Brambilla, P., Garzitto, M., Colombo, P., Fornasari, L., Bellina, M., Bonivento, C., Tesei, A., Piccin, S., Conte, S., Perna, G., Frigerio, A., Castiglioni, I., Fabbro, F., Molteni, M., Nobile, M., 2017. Latent classes of emotional and behavioural problems in epidemiological and referred samples and their relations to DSM-IV diagnoses. Eur. Child Adolesc. Psychiatry 26 (5), 549–557. https://doi.org/10.1007/s00787-016-0918-2.

Cannon, M., Caspi, A., Moffitt, T.E., Harrington, H., Taylor, A., Murray, R.M., Poulton, R., 2002. Evidence for early-childhood, Pan-developmental impairment specific to schizophreniform disorder: results from a longitudinal birth cohort. Arch. Gen. Psychiatry 59 (5), 449–456. https://doi.org/10.1001/archpsyc.59.5.449.

Carrellas, N.W., Biederman, J., Uchida, M., 2017. How prevalent and morbid are subthreshold manifestations of major depression in adolescents? A literature review. J. Affect. Disord. 210, 166–173. https://doi.org/10.1016/j.jad.2016.12.037.

Casey, B.J., Cannonier, T., Conley, M.I., Cohen, A.O., Barch, D.M., Heitzeg, M.M., Soules, M.E., Teslovich, T., Dellarco, D.V., Garavan, H., Orr, C.A., Wager, T.D., Banich, M.T., Speer, N.K., Sutherland, M.T., Riedel, M.C., Dick, A.S., Bjork, J.M., Thomas, K.M., Dale, A.M., 2018. The adolescent brain cognitive development (ABCD) study: imaging acquisition across 21 sites. Dev. Cogn. Neurosci. 32, 43–54. https://doi.org/10.1016/j.dcn.2018.03.001.

Costello, E.J., Mustillo, S., Erkanli, A., Keeler, G., Angold, A., 2003. Prevalence and development of psychiatric disorders in childhood and adolescence. Arch. Gen. Psychiatry 60 (8), 837–844. https://doi.org/10.1001/archpsyc.60.8.837.

Costello, E.J., Copeland, W., Angold, A., 2011. Trends in psychopathology across the adolescent years: what changes when children become adolescents, and when adolescents become adults? J. Child Psychol. Psychiatry 52 (10), 1015–1025. https://doi.org/10.1111/j.1469-7610.2011.02446.x.

Eastman, M., Foshee, V., Ennett, S., Sotres-Alvarez, D., Reyes, H.L.M., Faris, R., North, K., 2018. Profiles of internalizing and externalizing symptoms associated with bullying victimization. J. Adolesc. 65, 101–110. https://doi.org/10.1016/j.adolescence.2018.03.007.

Garavan, H., Bartsch, H., Conway, K., Decastro, A., Goldstein, R.Z., Heeringa, S., Jernigan, T., Potter, A., Thompson, W., Zahs, D., 2018. Recruiting the ABCD sample: design considerations and procedures. Dev. Cogn. Neurosci. 32, 16–22. https://doi.org/10.1016/j.dcn.2018.04.004.

Haller, H., Cramer, H., Lauche, R., Gass, F., Dobos, G.J., 2014. The prevalence and burden of subthreshold generalized anxiety disorder: a systematic review. BMC Psychiatry 14 (1), 128. https://doi.org/10.1186/1471-244X-14-128.

HEALthy Brain and Child Development Study | NIH HEAL Initiative, 2019. https://heal.nih.gov/research/infants-and-children/healthy-brain.

Healy, C., Brannigan, R., Dooley, N., Staines, L., Keeley, H., Whelan, R., Clarke, M., Zammit, S., Kelleher, I., Cannon, M., 2022. Person-centered trajectories of psychopathology from early childhood to late adolescence. JAMA Netw. Open 5 (5), e229601. https://doi.org/10.1001/jamanetworkopen.2022.9601.

Insel, T., Cuthbert, B., Garvey, M., Heinssen, R., Pine, D.S., Quinn, K., Sanislow, C., Wang, P., 2010. Research domain criteria (RDoC): toward a new classification framework for research on mental disorders. Am. J. Psychiatry 167 (7), 748–751. https://doi.org/10.1176/appi.ajp.2010.09091379.

Jung, T., Wickrama, K., a. S., 2008. An introduction to latent class growth analysis and growth mixture modeling. Soc. Personal. Psychol. Compass 2 (1), 302–317. https://doi.org/10.1111/j.1751-9004.2007.00054.x.

Kaufman, J., Birmaher, B., Brent, D., Rao, U., Flynn, C., Moreci, P., Williamson, D., Ryan, N., 1997. Schedule for affective disorders and schizophrenia for school-age children-present and lifetime version (K-SADS-PL): initial reliability and validity data. J. Am. Acad. Child Adolesc. Psychiatry 36 (7), 980–988. https://doi.org/10.1097/00004583-199707000-00021.

Kessler, R.C., Berglund, P., Demler, O., Jin, R., Merikangas, K.R., Walters, E.E., 2005. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. Arch. Gen. Psychiatry 62 (6), 593–602. https://doi.org/10.1001/archpsyc.62.6.593.

Kiye, S., Boysan, M., 2022. Relationships between character strengths, internalising and externalising problems among adolescents: a latent class analysis. Br. J. Guid. Couns. 50. https://doi.org/10.1080/03069885.2021.1872768.

Krueger, R.F., Markon, K.E., 2006. Reinterpreting comorbidity: a model-based approach to understanding and classifying psychopathology. Annu. Rev. Clin. Psychol. 2 (1), 111–133. https://doi.org/10.1146/annurev.clinpsy.2.022305.095213.

Lee, M.J., Hasche, L.K., Choi, S., Proctor, E.K., Morrow-Howell, N., 2013. Comparison of major depressive disorder and subthreshold depression among older adults in community long-term care. Aging Ment. Health 17 (4), 461–469. https://doi.org/10.1080/13607863.2012.747079.

Lewinsohn, P.M., Shankman, S.A., Gau, J.M., Klein, D.N., 2004. The prevalence and co-morbidity of subthreshold psychiatric conditions. Psychol. Med. 34 (4), 613–622. https://doi.org/10.1017/S0033291703001466.

Lynch, S.J., Sunderland, M., Newton, N.C., Chapman, C., 2021. A systematic review of transdiagnostic risk and protective factors for general and specific psychopathology in young people. Clin. Psychol. Rev. 87, 102036. https://doi.org/10.1016/j.cpr.2021.102036.

McConaughy, S.H., Skiba, R.J., 1993. Comorbidity of externalizing and internalizing problems. Sch. Psychol. Rev. 22 (3), 421. https://doi.org/10.1080/02796015.1993.12085664.

McElroy, E., Shevlin, M., Murphy, J., 2017. Internalizing and externalizing disorders in childhood and adolescence: a latent transition analysis using ALSPAC data. Compr. Psychiatry 75, 75–84. https://doi.org/10.1016/J.COMPPSYCH.2017.03.003.

Mittal, V.A., Wakschlag, L.S., 2017. Research domain criteria (RDoC) grows up: strengthening neurodevelopmental investigation within the RDoC framework. J. Affect. Disord. 216, 30–35. https://doi.org/10.1016/j.jad.2016.12.011.

Morales, A., Rodríguez-Menchón, M., Tomczyk, S., Fernández-Martínez, I., Orgilés, M., Espada, J.P., 2021. Internalizing and externalizing symptoms in Spanish children aged 6-8: results of a latent profile analysis. J. Affect. Disord. 279, 617–623. https://doi.org/10.1016/j.jad.2020.10.066.

Muratori, P., Paciello, M., Castro, E., Levantini, V., Masi, G., Milone, A., Senese, V.P., Pisano, S., Catone, G., 2021. At-risk early adolescents profiles in the community: a cluster analysis using the strengths and difficulties questionnaire. Psychiatry Res. 305, 114209. https://doi.org/10.1016/j.psychres.2021.114209.

Petersen, A.C., Crockett, L., Richards, M., Boxer, A., 1988. A self-report measure of pubertal status: Reliability, validity, and initial norms. J. Youth Adolesc. 17 (2), 117–133. https://doi.org/10.1007/BF01537962.

Pinciotti, C.M., 2023. Adapting and integrating exposure therapies for obsessive–compulsive disorder and posttraumatic stress disorder: translating research into clinical implementation. Clin. Psychol. Sci. Pract. 30 (2), 190–203. https://doi.org/10.1037/cps0000143.

Sclove, S.L., 1987. Application of model-selection criteria to some problems in multivariate analysis. Psychometrika 52 (3), 333–343. https://doi.org/10.1007/BF02294360.

Stein, A.T., Carl, E., Cuijpers, P., Karyotaki, E., Smits, J.A.J., 2021. Looking beyond depression: a meta-analysis of the effect of behavioral activation on depression, anxiety, and activation. Psychol. Med. 51 (9), 1491–1504. https://doi.org/10.1017/S0033291720000239.

van der Sluis, S., Polderman, T.J.C., Neale, M.C., Verhulst, F.C., Posthuma, D., Dieleman, G.C., 2017. Sex differences and gender-invariance of mother-reported childhood problem behavior. Int. J. Methods Psychiatr. Res. 26 (3), e1498. https://doi.org/10.1002/mpr.1498.

Wiggins, J.L., Roy, A.K., Wakschlag, L.S., 2023. MAPping affective dimensions of behavior: methodologic and pragmatic advancement of the multidimensional assessment profiles scales. Int. J. Methods Psychiatr. Res. 32 (S1), e1990. https://doi.org/10.1002/mpr.1990.

Willner, C.J., Gatzke-Kopp, L.M., Bray, B.C., 2016. The dynamics of internalizing and externalizing comorbidity across the early school years. Dev. Psychopathol. 28 (4pt1), 1033–1052. https://doi.org/10.1017/S0954579416000687.

World Health Organization, 1992. The ICD-10 Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines. World Health Organization.