

Article

Adolescent Profiles Amid Substantial Adverse Childhood Experiences: A Latent Profile Analysis on Personality, Cognitive, Behavioral, and Social Outcomes

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Abstract

Background: Adolescence is a critical period of rapid physical and psychological change, yet it is also when many health and well-being problems first emerge, often setting limits on lifelong opportunities and achievements as youth transition into adulthood. The ground-breaking adverse childhood experiences (ACEs) study has significantly shaped the development of programs and policies aimed at fostering adolescent health. Nonetheless, there has been limited exploration into the heterogeneity among individuals experiencing a high number of ACEs, such as four or more. This study employs Latent Profile Analysis (LPA) to examine the diverse outcome profiles of adolescents who have been exposed to a substantial number of ACEs. **Method:** The data were from participants who experienced at least four ACEs by age 9 in the Future of Families and Child Wellbeing Study (N = 1427; 54% male; 59% Black; 15.3% Hispanic; 2.4% other). We applied LPA using the manual three-step method within Mplus 8 to establish profiles based on six developmental indicators at age 15. These indicators included optimism, perseverance, academic performance, internalizing and externalizing behavioral competence, and social skills. The full information maximum likelihood method was used to handle missing data. **Results:** The study identified three distinct profile groups according to model fit indices and interpretability: Multidimensional Competence Group (61.0%), Low Personality and Social Competence Group (23.8%), and Low Behavioral Competence Group (15.2%). Racial and ethnic backgrounds were significant predictors of membership in these different profile groups. **Conclusions:** In a research landscape often focused on the cumulative harm of ACEs, our study underscores the heterogeneity of trauma profiles among adolescents with substantial ACE exposure. Given that adolescence is a critical stage when health and well-being challenges emerge, tailored early interventions are important to supporting a successful transition into adulthood. We advocate for the importance of comprehensive screening for social-cognitive and behavioral health difficulties in trauma-affected youth, enabling practitioners to implement timely prevention strategies and tailored interventions that foster resilience and long-term well-being.

Keywords: adverse childhood experiences; latent profile analysis; adolescent development; comprehensive screening

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1. Introduction

Adolescence marks a rapid physical and psychological development phase that co-occurs with the onset of multiple health and well-being problems [1], which often limit lifelong achievement when they transition into adulthood [2]. Research on Adverse Childhood Experiences (ACEs) underscores the profound impact that childhood maltreatment and household dysfunction have on adolescent health and well-being [3]. Most ACE studies found all negative effects on health outcomes [4]. However, a subset of studies has identified resilience among certain individuals who experience ACEs. These individuals can maintain functionality despite such adversities [5,6]. This suggests that there is heterogeneity among adolescents who have experienced ACEs, potentially leading to differential developmental outcomes. The current study adds to the literature by examining profiles of adolescents experiencing substantial ACEs to identify heterogeneity in trauma-affected adolescent development across a range of outcomes.

Using a resilience framework to explore diverse profiles of adolescents who have experienced ACEs could identify key protective factors for preventive interventions [7]. Resilience can be conceptualized either as a process or as an outcome. Based on Masten et al. [8], resilience is treated as the process by which a dynamic system adapts successfully to challenges that threaten its function, survival, or development. This process of adaptation typically operates across multiple levels of human systems, ranging from individuals to communities. This multisystemic adaptation process has the potential to mitigate the adverse effects of childhood adversity on later risk for psychopathology [8]. Masten et al.'s multisystemic perspective is further supported by Ungar et al. [9], who operationalize resilience as both individual and collective efforts to sustain well-being through the use of biological, psychological, social, and environmental protective and promotive factors and processes.

At the same time, resilience can also be viewed as an outcome that refers to the indicators of positive adaptation despite exposure to significant adversity. In this line of research, resilience theory posits that resilience is not a unidimensional construct but rather encompasses multiple facets, manifesting across various domains of adaptive functioning in the aftermath of adversity. These domains include personality [10], cognition, emotion, behavior, and social functioning [11,12]. Luthar and colleagues' research on urban adolescents found that some individuals under high stress showed significant behavioral competence but subsequently experienced emotional distress [7]. This finding underscores that resilience is "not an all-or-nothing phenomenon" [13]; thus, adolescents affected by ACEs may display negative outcomes in certain areas of their development while simultaneously flourishing in others, or vice versa.

The advent of the person-centered approach, such as Latent Profile Analysis (LPA), has revolutionized the field by allowing for the identification of distinct profiles across various developmental domains, including personality, cognitive, emotional, and social functioning [14]. This approach provides a nuanced perspective that captures the complexity of human development and has a high degree of translational value. Unlike variable-centered approaches, LPA can uncover intra-individual variations across different developmental domains [15]. Employing this methodology, Martinez-Torteya et al. analyzed a cohort of 59,712-year-olds with histories of suspected maltreatment and identified five distinct adaptation profiles: consistent resilience (12.7%), consistent maladaptation (11.6%), posttraumatic stress problems (9.2%), school maladaptation, family protection (35.8%), and low socialization skills (30.7%) [15]. Similarly, in their study of 827 children (ages 3 to 5) involved in child welfare [12], Yoon et al. identified three profiles among those who experienced maltreatment or faced non-maltreatment adversities, including low cognitive resilience (24%), low emotional and behavioral resilience (20%), and multidomain resilience (56%). In a separate analysis of a larger cohort of 4929 first graders exposed to non-maltreatment ACEs, Yoon et al. identified four distinct profiles: a small

fraction at 4% with low cognitive and executive functioning, 14% with low social and behavioral functioning, 31% with generally low average functioning, and the majority (51%) showing resilience across multiple domains [14].

This evidence underscores the need for a more detailed understanding of the impact of adverse experiences on human development. Felitti and colleagues [4] posited that the accumulation of four or more ACEs could significantly increase the risks of health and behavioral health diseases. However, few studies explored potential resilience development in individuals exposed to substantial ACEs, such as four or more ACEs. It should be noted that most of the current resilience research has focused on children involved with the child welfare system. While these studies provide valuable information for this population, the exclusive focus on child welfare involved children does not provide a comprehensive understanding of the impact of ACEs on adolescent health. In addition, research on adolescents experiencing ACEs has typically focused on singular outcomes, such as academic performance [16], mental health [17,18], suicide [19], and peer relationships [20]. Consequently, we lack a comprehensive understanding of the co-occurrence of developmental outcomes for trauma-affected adolescents.

To address this research gap, the current study uses LPA to identify diverse profiles of adolescents exposed to substantial ACEs. In this study, we defined substantial ACEs as experiencing four or more adverse childhood experiences. This threshold is based on the founding work of Felitti et al. [4], which demonstrated that the accumulation of four or more ACEs largely increases the risk of a wide range of health and behavioral health problems. We recognize that more recent scholarship has argued for expanding ACEs measures to include additional traumatic events, such as peer victimization, social isolation/exclusion, and exposure to community violence, which have also been shown to contribute to adverse physical and psychological outcomes [21]. However, the purpose of our study is to examine the potential heterogeneity among individuals who experience substantial ACEs, as originally conceptualized by Felitti and colleagues. For this reason, we limited our ACEs measures to the original ACEs items that focus on family-level adversities without expanding to peer- and community-level factors, ensuring conceptual alignment with the foundational framework while still addressing important gaps in understanding distinctive profiles for people experiencing adverse childhood experiences. The study poses two questions. First, what distinct profiles can be identified among adolescents who have encountered a substantial number of ACEs (four or more) in terms of personality, academic achievement, behavioral health, and social competencies? Second, how are demographic factors, such as the mother's age, race and ethnicity, and the child's sex, associated with these profiles? Our findings will contribute to a fuller understanding of adolescent development following substantial ACEs.

2. Methods

2.1. Data

The current study is a secondary data analysis using data from the Future of Families and Child Wellbeing Study (FFCWS), a population-based, birth cohort study that followed 4898 parents and their children born in large United States cities between 1998 and 2000. FFCWS interviewed mothers shortly after birth and conducted follow-up interviews with primary caregivers (mostly mothers) when children were about ages 1, 3, 5, 9, 15, and 22. Data collection on children started at the age of 15 (see Reichman et al. [22] for a detailed description of the sample and design). The original purpose of the FFCWS was to understand how non-marital childbearing influences child development. As a result, the FFCWS oversampled children born to unmarried mothers at a ratio of 3 to 1. This sampling strategy resulted in a racially diverse study sample characterized by socioeconomic disadvantage and parental relationship instability [22].

2.2. Analytic Sample

The analytic sample for the study is based on a subsample of adolescents whose mother or primary caregiver completed at least one wave of data on adverse childhood experiences (ACEs) assessed at age 3, 5, or 9 and who had data available for the outcomes of interests at year 15 ($n = 3417$). We compared the demographics (i.e., mothers' age, household income, number of children in the household) between participants who remained in the study at year 15 and those without year 15 data. Results showed that participants who remained had younger mothers ($p < 0.05$) and higher household incomes ($p < 0.05$). Given our primary goal was to examine adolescent outcome profiles at age 15 following exposure to severe ACEs by age 9, we restricted the sample to adolescents who had been exposed to at least four types of ACEs by age 9 (see the Measures section for detailed description of each ACE indicator). These exclusions resulted in a final analytic sample size of 1427. Adolescents in the analytic sample were 54% male and 59% Black (see Table 1 for descriptive statistics of all study variables).

Table 1. Descriptive statistics for the analytic sample ($n = 1427$).

Variables	Min–Max	M (SD)	n (%)
Social skills	0.25–2.00	1.38 (0.32)	
Internalizing behavior competence	0.13–2.00	1.70 (0.33)	
Externalizing behavior competence	0.35–2.00	1.71 (0.28)	
Optimism	1–4	3.38 (0.50)	
Perseverance	1.25–4	3.42 (0.48)	
Academic achievement	1–4	2.76 (0.65)	
ACEs (by age 9)			
Psychological abuse			684 (47.9%)
Physical abuse			513 (35.9%)
Domestic violence			307 (21.5%)
Maternal substance abuse			884 (61.9%)
Maternal depression			654 (45.8%)
Paternal incarceration			389 (27.3%)
Parental divorce or separation			1270 (89.0%)
Neglect			546 (38.3%)
Family poverty			1362 (95.4%)
Maternal low education			583 (40.9%)
ACEs Sum	4–10	5.04 (1.15)	
Mother's age (at child's birth age)	15–43	23.49 (5.32)	
Race and ethnicity			
Black			844 (59.1%)
Hispanic			219 (15.3%)
White			330 (23.1%)
Other			34 (2.4%)
Child's sex			
Male			766 (53.7%)
Female			661 (46.3%)

Note: Table reports range and mean (standard deviations) for continuous variables, and n (%) for categorical variables.

2.3. Measures

Adverse Childhood Experiences. Following previous studies that have used FFCWS to examine ACEs [18,23], we measured ACEs using ten indicators when the focal child was ages 3, 5, and 9. We defined the adolescents experiencing substantial ACEs (i.e., the analytic sample) as those individuals who had experienced four or more types of ACEs by age 9. We defined ACEs ≥ 4 as substantial because Felitti's study indicated that four or more ACEs significantly increase the risk of detrimental outcomes [4]. However, we aim to demonstrate that there is a heterogeneity of outcomes even within this high-risk population.

Three child maltreatment indicators: psychological abuse, physical abuse, and neglect. Primary caregivers completed three five-item subscales of the Parent–Child Conflict Tactics Scale (PC-CTS) [24], a well-validated measure for assessing parents' behavior towards their children that could be viewed as maltreatment. Sample questions included how many times in the past year you have “swore or cursed at him/her” (psychological abuse), “slapped him/her on the hand, arm, or leg in the past year” (physical abuse), and “had to leave your child home alone, even when you thought some adult should be with him/her” (neglect). Caregivers' responses ranged from *never* to *more than 20 times*. Following previous research [23,25,26], we calculated children's exposure to each type of maltreatment by recoding each response using the midpoint approach [27], summing five items of each subscale, and then dummy coding respondents in the top 10th percentile to indicate severe maltreatment (1 = *exposure*; 0 = *no exposure*).

Domestic violence exposure. The **domestic violence exposure** (1 = *exposure*) item was created based on mothers answering affirmative to either of two questions. Mothers reported whether (a) the child had ever witnessed a physical fight between the mother and the father or their current partner, and (b) whether the father or their current partner had physically hurt the mother in the child's presence.

Maternal substance abuse: alcohol and drug abuse. Following recommendations of previous research [4] and from the NIAAA [28], we constructed a binary variable to capture maternal alcohol abuse when mothers reported consuming four or more drinks in one day with options in the past 12 months including daily every day or almost every day, a few times a week, or a few times a month. A binary variable of maternal drug abuse was created based on mothers reporting the use of any of the five types of illicit drugs (e.g., sedatives and tranquilizers) or any misuse of prescription drugs (e.g., cocaine and heroin) in the past 12 months. We then created a dichotomous item to capture any exposure to maternal substance abuse (1 = *exposure*) defined as the mother reporting either alcohol abuse or drug abuse.

Maternal depression. Mothers answered 15 questions about their feelings of dysphoria or anhedonia in the past year that lasted for two weeks or more, and if these symptoms occurred every day and their duration, based on the Composite International Diagnostic Interview—Short Form (CIDI-SF) [29]. The FFCWS dataset provides a final constructed variable indicating a major depressive episode of respondents, which we used to indicate a child's exposure to maternal depression (1 = *exposure*).

Paternal incarceration. Both mothers and fathers reported whether the child's biological father had spent time in jail by age 9 (1 = *exposure*).

Parental divorce or separation. A dichotomous indicator of whether biological parents were separated or divorced was assessed at years 3, 5, and 9.

Family poverty. Family poverty was defined as 200% or below the income-to-needs ratio [30].

Maternal low education. The child was coded as having exposure to maternal low education if the mother's self-reported educational attainment was high school or less by the time the child was age 9 (1 = *exposure*).

A total of ten ACE indicators were administered to the mother/father/primary caregiver during childhood (ages 3, 5, and 9). To create a high traumatic sample for the current study, we first assigned a score of 1 to indicate exposure to a specific ACE by age 9 if the respondent reported *exposure* to that ACE in at least one of the three waves in which that ACEs data were collected. We then summed the ten ACE indicators, with a possible score ranging from 0 (*no exposure to ACEs by age 9*) to 10 (*exposure to all ten types of ACEs by age 9*). Finally, we selected the analytic sample of adolescents with a cumulative ACE score of four or above.

Profile Indicators. Six indicators, including optimism, perseverance, academic performance, internalizing and externalizing behavioral competence, and social skills, measured at the child's age of 15, were used to classify adolescent outcome profiles.

Optimism was assessed using four items drawn from the EPOCH Measure of Adolescent Well-being [31]. Adolescents reported their agreement level with each statement using a scale from 1 (strongly agree) to 4 (strongly disagree). Sample items included "I am optimistic about my future," "In uncertain times, I expect the best". Responses were reverse-coded and then averaged to create a composite score for optimism, with higher scores indicating greater optimism. The Cronbach's α for this scale was 0.59.

Perseverance was measured using four items from the perseverance subscale of the EPOCH measure. Similarly to optimism, responses were reverse-coded and created a composite score by averaging all items. Sample items included "I finish whatever I begin," and "Once I make a plan to get something done, I stick to it." The Cronbach's α for this scale was 0.69.

Academic achievement was assessed based on adolescents' most recent grade point average (GPA), calculated by averaging the grades in English, math, history, and science. The grade responses were recoded from *A–D* to *4–1* with higher scores representing better academic achievement.

Internalizing behavioral competence. Internalizing behaviors were assessed using eight items from two subscales (i.e., anxious/depressed and withdrawn) of the Child Behavior Checklist (CBCL) [32]. Primary caregivers answered questions on a 3-point Likert scale ranging from 0 (not true) to 2 (very true or often true). Items were reverse-coded and averaged to create an index score, with higher scores indicating a higher level of internalizing behavioral competence. Sample items included "child is nervous, high-strung, or tense," and "child cries a lot," and "child is unhappy, sad, or depressed." The Cronbach's α was 0.78 for internalizing behavioral competence.

Externalizing behavioral competence. Primary caregivers were asked 20 questions from the two subscales of the CBCL [32]. Similarly to internalizing behaviors, responses were reverse coded and averaged to create a composite score for externalizing behavioral competence, with higher scores representing a higher level of externalizing behavior competence. Sample items included "child doesn't seem to feel guilty after misbehaving," "child destroys things belonging to the family or others," and "child physically attacks people." The Cronbach's α was 0.89 for externalizing behavioral competence.

Social skills. Social skills were assessed using 12 questions adapted from the Express Subscale of the Adaptive Social Behavior Inventory (ASBI) [33] and the Assertion scale of the secondary-level parent and teacher forms of the Social Skills Rating System (SSRS) [34]. Adolescents reported how true they thought each statement was for themselves on a three-point Likert scale ranging from 1 (not true) to 3 (often true). Sample questions included, "I understand others' feelings like when they are happy, sad, or mad," and "I try to comfort others when they are upset." Responses were recoded from *1–3* to *0–2* and then averaged to create an index score, with higher scores indicating higher levels of social skills. The Cronbach's α was 0.73.

Covariates. We included the following covariates to control for demographic characteristics: maternal age (in years), race and ethnicity, and child's sex.

2.4. Analytic Plan

We used Latent Profile Analysis (LPA) to model profiles based on four indicators of development conducted in Mplus Version 8 [35] using the manual three-step approach. We used both fit statistics and substantive interpretability to select the best fitting model. Fit statistics included the Akaike information criterion (AIC) [36], Bayesian information criterion (BIC) [37], sample size adjusted BIC (aBIC) [38], the Lo–Mendell–Rubin likelihood ratio test (LMR-LRT) [39], the bootstrap likelihood ratio test (BLRT) [40], and model entropy [41]. Lower values of the AIC, BIC, aBIC suggest a better fit in the LPA models. The R3Step estimation method in Mplus was used to estimate the relationship between covariates and profile membership [42]. Full information maximum likelihood was used to address missing data.

3. Results

3.1. Interpretation of Latent Profiles

Table 2 presents the model fit results for latent profile analysis models ranging from one to six latent profiles. The three-profile solution was determined to be the best fitting model based on the likelihood ratio test that indicated that adding an additional class (i.e., the four-profile model) did not improve model fit. In addition, the examination of the three-, four-, and five-profile models confirmed that the three-profile model contained interpretable profiles that were substantively meaningful and distinct from each other. Thus, we chose the three-profile model.

Table 2. Fit statistics for latent profile analysis models with one through six latent profiles.

	Classes	AIC	BIC	aBIC	LRT (<i>p</i>)	BLRT (<i>p</i>)	Entropy	Smallest Class Size (%)
Analytic sample (<i>n</i> = 1427)	Class-1	8474.693	8537.853	8499.733		--	--	
	Class-2	7629.777	7729.781	7669.424	0.0000	0.0000	0.881	250 (17.5%)
	Class-3	7341.416	7478.262	7395.669	0.0042	0.0000	0.724	217 (15.2%)
	Class-4	7135.417	7309.107	7204.278	0.2447	0.0000	0.758	47 (3.3%)
	Class-5	6967.636	7178.169	7051.103	0.0285	0.0000	0.779	32 (2.2%)
	Class-6	6849.897	7079.274	6947.971	0.7111	0.0000	0.776	29 (2.0%)

Note: AIC = Akaike information criterion; BIC = Bayesian information criterion; aBIC = sample size adjusted BIC; LRT = Likelihood ratio test; BLRT = Bootstrapped likelihood ratio test.

Table 3 shows the prevalence and the mean scores of latent profile indicators. The largest profile, the Multidimensional Competence Group (61.0%), is characterized by adolescents with optimal outcomes in social skills, competencies in managing internalizing and externalizing behaviors, optimism, perseverance, and academic performance. The next most common profile, the Low Personality and Social Competence Group (23.8%), includes adolescents who typically show the weakest personality traits and challenges with social skills; however, they showed some levels of behavioral competencies. The smallest profile, the Low Behavioral Competence Group (15.2%), is distinguished by having the highest behavioral issues yet displaying notable personality and social skills. There was no significant difference in academic achievement between the Low Behavioral Competence Group and the Low Personality & Social Competence Group. Figure 1 showed those three profiles classified by six outcomes.

Table 3. (A): Unstandardized mean scores on latent profile indicators across latent profiles. (B): Standardized mean scores on latent profile indicators across latent profiles.

A				
	Low Personality & Social Competence (n = 340, 23.8%)	Low Behavioral Competence (n = 217, 15.2%)	Multidimensional Competence (n = 871, 61.0%)	Tests of Significance
	M	M	M	
Social skills	1.17	1.30	1.48	1 < 2 < 3
Internalizing behavior competency	1.74	1.12	1.82	2 < 1 < 3
Externalizing behavior competency	1.73	1.31	1.81	2 < 1 < 3
Optimism	2.97	3.28	3.57	1 < 2 < 3
Perseverance	3.02	3.31	3.60	1 < 2 < 3
Academic achievement	2.54	2.52	2.89	1 = 2; 1 < 3; 2 < 3;
B				
	M	M	M	
Social skills	3.97	4.40	5.00	1 < 2 < 3
Internalizing behavior competency	7.93	5.12	8.31	2 < 1 < 3
Externalizing behavior competency	7.98	5.88	8.12	2 < 1 < 3
Optimism	6.88	7.60	8.28	1 < 2 < 3
Perseverance	7.19	7.88	8.55	1 < 2 < 3
Academic achievement	4.04	4.00	4.59	1 = 2; 1 < 3; 2 < 3;

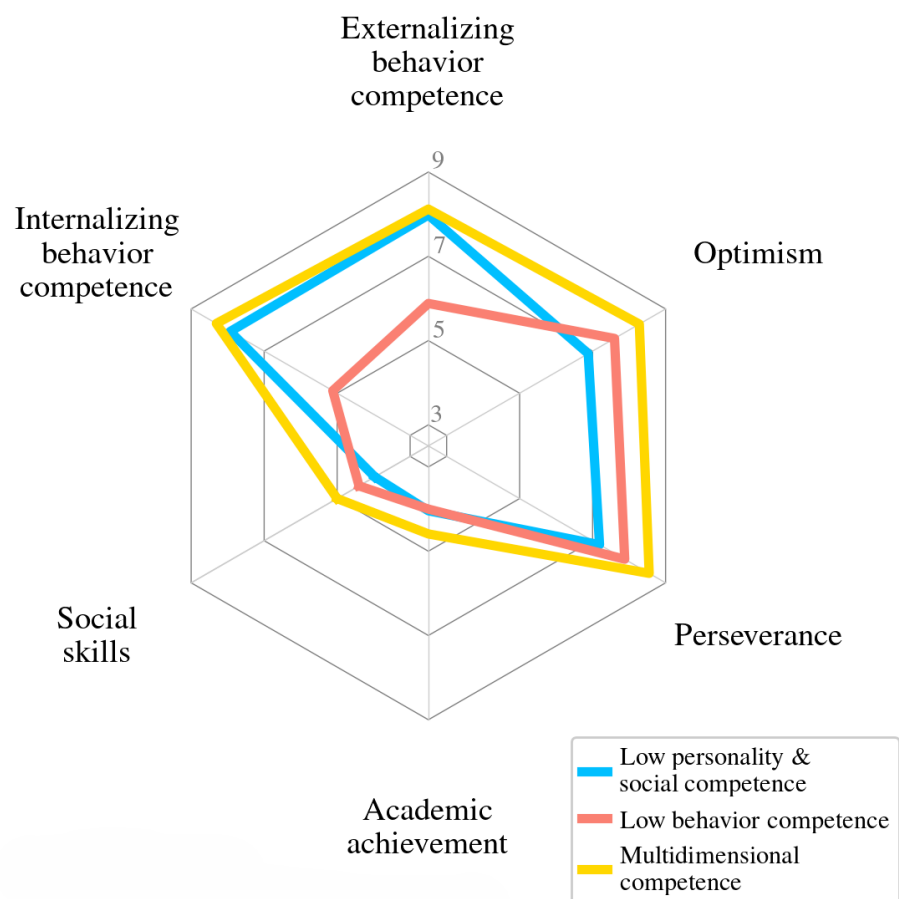


Figure 1. Three profiles classified by six indicators.

3.2. Latent Profiles and Demographic Factors

Table 4 presents the results of demographic characteristics predicting the latent profiles, using the *Multidimensional Competence* profile as the reference group. Adolescents with mothers identifying as Black compared to White, were less likely to be in the *Low Behavioral competence and Low Personality & Social Competence* groups. Hispanic adolescents had a lower likelihood of being in the *Low Personality & Social Competence* group. There were no other significant differences between groups based on mother's age or the adolescent's gender.

Table 4. Demographic characteristics predicting latent profiles.

	Low Personality & Social Competence	Low Behavioral Competence
	OR [95% CI]	OR [95% CI]
Mother's age	1.03 [1.00, 1.06] [†]	0.99 [0.96, 1.02]
Race and ethnicity (ref: White)		
Black	0.57 [0.33, 0.97] [*]	0.41 [0.26, 0.63] ^{***}
Hispanic	0.95 [0.53, 1.71]	0.43 [0.25, 0.74] ^{**}
Other race	0.84 [0.24, 2.88]	0.65 [0.22, 1.94]
Adolescent's gender (ref: male)		
Female	0.95 [0.44, 1.29]	1.05 [0.74, 1.48]

Note: OR = odds ratios; CI = confidence intervals. Ref = reference group. Multidimensional competence is the reference profile. [†] $p = 0.09$; ^{*} $p < 0.05$; ^{**} $p < 0.01$; ^{***} $p < 0.001$.

4. Discussion and Implications

This exploratory study advances ACE research by addressing a gap in the literature that has largely centered on the negative outcomes associated with ACEs, while neglecting the diverse outcomes following exposure to substantial ACEs. By employing an innovative statistical approach, we identified three distinctive profiles among adolescents who experienced four or more ACEs. These three profiles include low personality and social competence, low behavioral competence, and multidimensional competence. Our findings indicate that within this sample, Black adolescents were less likely to be characterized by low personality and social competence or low behavioral competence, than by the multidimensional competence profile, in comparison to White adolescents. Similarly, Hispanic adolescents were less likely to fall into the low behavioral competence category.

Our research supports the notion that resilience is a multidimensional construct [13]. First, the distinctive profile of the multidimensional competence identified in this study is in line with existing literature on children in the child welfare system and those enduring various types of ACEs [12,14,15,42], suggesting that some adolescents can function despite significant ACEs exposure. Secondly, the identified low personality and social competence profile parallels findings from Martinez-Torteya and colleagues' study on child victims of suspected maltreatment [15]. Their study identified a prominent profile characterized by diminished socialization skills, such as compromised interpersonal relationships, leisure, and community engagement skills, without presenting clinically significant behavioral or emotional difficulties. We speculate that most ACEs, particularly child maltreatment and exposure to intimate partner violence against mother figures, can severely impact a child's self-esteem, confidence, and trust in others [43]. Finally, unlike Yoon et al.'s study [14] that identified a low social and behavioral functioning group, we found a unique profile of low behavioral competence. This difference could be attributed to the age difference in the studied samples. Yoon et al. [14] focused on middle childhood, while our study explored ACE profiles during adolescence when behavioral health challenges become more pronounced.

Interestingly, among the sample of adolescents with significant exposure to ACEs, Black and Hispanic adolescents were more likely to be in the multidimensional competence profile compared to their White counterparts. The differences suggest the potential presence of culturally embedded protective factors that may mitigate the adverse impacts of ACEs on the development of these adolescents. According to the literature, religiosity/spirituality [44] and family connectedness [45] may serve as protective factors among Black and Hispanic children and adolescents, thereby contributing to competence despite the challenges posed by ACEs.

The current study has limitations that should be acknowledged. First, the nature of secondary data analysis posed some limitations. First, the FFCWS lacked an explicit measure for childhood sexual abuse; thus, our analysis did not include this critical ACE. As such, interpretations of findings should be made with this in mind. In terms of other ACEs, since we constructed proxy variables using PC-CTS, they may not capture the same information as outlined in the original ACEs scale [4], especially emotional neglect. Second, the reliance on maternal reporting for the child's ACEs may result in underreporting due to social desirability bias. Third, our findings may be subject to sampling bias, as the final sample with 15-year follow-up data had higher family incomes and younger mothers compared to participants who were excluded due to missing follow-up data. Lastly, the generalizability of our results is potentially limited, as the study sample was a birth cohort from the early 2000s, and the majority of them were born to unmarried parents in urban settings.

Despite the limitations, our study has several strengths in terms of trauma and resilience theory development, practice, and future research. In the current ACEs field that is largely dominated by discussions of the detrimental effects of ACEs, our research stands out by illustrating the heterogeneity of health and developmental profiles among adolescents who have endured a substantial number of ACEs. Utilizing a resilience framework, often applied in child maltreatment research, we extended the research focus to include adolescents from a much more general background and supported the idea that resilience is not a unidimensional outcome [7]. Our study sample presented a broader life stage with a more extensive set of outcome measures, such as personality and social skills. The insights from our study enrich the understanding of the complex aftermath of ACEs and offer valuable contributions to both interventions and future research.

As for practice, we advocate for a strength-based, trauma-informed approach to enhance adolescent health. Adolescence represents a critically transitional period when adolescents are navigating increasing autonomy, identity formation, and preparation for adulthood. For disadvantaged youth with elevated ACEs, this stage of transition may heighten vulnerability, as they encounter academic pressures, shifting peer networks, and expectations around future educational or vocational pathways. When evaluating adolescents' trauma histories, practitioners are encouraged to adopt a broader perspective rather than focusing exclusively on the negative effects of ACEs. Adolescents with trauma histories can exhibit a spectrum of profiles, including difficulties with internalizing and externalizing behaviors, while demonstrating certain levels of competencies in social skills, optimism, and perseverance, or vice versa. Further, some adolescents may still function well after traumatic experiences. On the other hand, caution is warranted in utilizing a single outcome to evaluate adolescents and prematurely label them as resilient based on a single indicator. Our research indicates that while adolescents may exhibit favorable outcomes in certain aspects, they may concurrently display challenges in others. A comprehensive screening of social-cognitive and behavioral development is needed for the trauma-affected population to provide targeted prevention and interventions.

Further, it will be helpful to build a multidisciplinary team that includes school counselors, academic advisors, and family therapists to exchange information and collaborate

in supporting adolescents affected by ACEs who present with different resilience profiles. Our findings suggest that, although adolescence is a developmental period in which peers and the school environment may exert increasing influence, experiences within the family context continue to shape personality, behavior, and psychological as well as social development.

Trauma-informed school programs can benefit from the work of this multidisciplinary team. Drawing on resilience profiles, such teams could design tailored interventions that align with adolescents' specific strengths and challenges. For instance, youth who exhibit externalizing difficulties but showing strong social skills may benefit from emotionally focused therapy that enhance emotion regulation, combined with peer-based mentoring programs that reinforce prosocial competencies. Likewise, adolescents who demonstrate perseverance despite internalizing symptoms may respond well to Acceptance and Commitment therapy, which helps individuals understand their feelings while simultaneously supporting existing strengths.

For future research, given that our investigation only explored demographic variables that distinguish adolescents with differing profiles, it will be meaningful to identify additional factors that can predict different profile groups. These predictors can inform tailored intervention strategies to foster resilience for adolescents who experience substantial ACEs. Future research could also consider moving beyond the original ACE framework that focuses on family-level trauma to incorporate broader dimensions of adversity, such as peer bully, community violence, and discrimination. Studying the profiles of adolescents experiencing additional forms of trauma will provide more insights of risk and resilience in trauma-affected adolescents. Finally, based on a life-span developmental perspective, it is worthwhile to explore how these distinct profiles identified at adolescence would evolve across life stages if the data were available. Examining whether profiles remain stable or shift over time could inform when and how interventions are most effective for trauma-affected people at different life stages.

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