

## Is Resilience a Mediating Factor in the Relationship Between Adverse Childhood Experiences and Behavioral and Emotional Problems?

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### Abstract

This study investigated whether resilience explains part of the link between exposure to adverse childhood experiences (ACEs) and the development of emotional and behavioural problems (EBPs) during adolescence. We analysed data from 2,839 Slovak adolescents aged 13–15 years (mean age 13.93; 49.6% boys) who participated in the 2018 Health Behaviour in School-aged Children survey. Mediation was examined using multivariate linear regression with 5,000 bootstrap resamples, controlling for age, sex, and family affluence. ACEs were assessed using an adapted version of the Adverse Childhood Experiences Questionnaire, EBPs were measured with the Strengths and Difficulties Questionnaire, and resilience was evaluated using the Child and Youth Resilience Measure. Higher levels of ACE exposure were associated with increased EBPs ( $B = 0.78$ ; 95% CI: 0.67–0.90), whereas greater resilience was linked to fewer EBPs ( $B = -0.73$ ; 95% CI:  $-0.79$  to  $-0.67$ ). Mediation analysis indicated that resilience significantly accounted for part of the relationship between ACEs and EBPs, with an indirect effect of  $ab = 0.25$  (95% CI: 0.18–0.32). These findings indicate that resilience contributes to the pathway through which ACEs influence emotional and behavioural difficulties. Interventions aimed at enhancing adolescents' resilience capacities may reduce the negative consequences of early adverse experiences on mental and behavioural health.

**Keywords:** Adverse childhood experiences, Resilience, Behavioral problems, Emotional problems, Adolescents

### Introduction

Adverse childhood experiences (ACEs) encompass a broad spectrum of harmful or stressful events occurring early in life, including child abuse and neglect, exposure to violence against a parent, parental substance misuse or mental illness, parental separation or divorce, and other forms of household adversity [1–3]. Exposure to such experiences has been consistently associated with the development of emotional and behavioural problems (EBPs), not only during childhood but also extending into adulthood [1, 2, 4–8]. Moreover, accumulating

evidence indicates that multiple ACEs during adolescence are linked to heightened risks of juvenile delinquency and increased involvement in criminal activities [9–11]. Certain types of ACEs have also been specifically associated with delinquent behaviour and gang affiliation, often in connection with underlying mental health disorders in adolescents [10, 12].

A key concept relevant to understanding the impact of ACEs is resilience, commonly described as a dynamic process that facilitates positive adaptation in the context of adversity [13–19]. Resilience theory emphasizes the ability of individuals to overcome severe early-life adversities by drawing on personal strengths and available resources. More specifically, resilience refers to an individual's capacity to adapt successfully when confronted with challenges that threaten healthy functioning and development. Importantly, this capacity is not solely an individual trait but is shaped by relationships and support systems beyond the individual,

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including family, peers, and broader social structures [20, 21]. A growing body of research has identified resilience as a protective factor against the emergence of EBPs [22–28] and as a contributor to positive developmental outcomes, even in the presence of significant adversity [29]. These findings suggest that resilience may play a buffering or mitigating role in the pathways linking ACEs to negative outcomes [30].

Most prior studies have examined resilience primarily as a moderating factor in the relationship between ACEs and EBPs [31–33]. However, existing evidence also points to the plausibility of resilience acting as a mediator, a role that has received comparatively little empirical attention [31, 34]. Research has shown that adolescents exposed to ACEs tend to exhibit lower levels of resilience on average [13], and diminished resilience has, in turn, been associated with increased EBPs, particularly among younger adolescents [23]. Together, these findings suggest that early experiences and caregiving environments may simultaneously function as risk and protective factors for EBPs, a pattern that mirrors previous observations in studies of adolescent criminal behaviour [9–11]. Supporting this perspective, one of the few studies explicitly examining mediation found that resilience mediated the association between family functioning and depressive symptoms among adolescents living in single-parent households [34]. Such evidence lends support to the hypothesis that resilience may serve as an intermediary mechanism linking ACEs to EBPs. Nonetheless, empirical research directly addressing this mediating role remains limited.

Against this background, the present study aimed to investigate whether resilience mediates the association between adverse childhood experiences and emotional and behavioural problems among adolescents.

## Materials and Methods

### *Procedure and sample*

The present study utilised data on resilience collected from 2,839 adolescents (mean age = 13.93 years; 49.6% male) who participated in the Slovak 2018 Health Behaviour in School-aged Children (HBSC) survey. This group represented approximately 43.0% of the total HBSC sample. A three-stage sampling strategy was applied to ensure national representativeness. In the first stage, 140 elementary schools of varying size were randomly selected from both urban and rural areas across all Slovak regions. The sampling frame was obtained

from the Slovak Institute of Information and Prognosis for Education. Of the schools invited, 77.9% agreed to participate.

In the second stage, one class per grade (fifth through ninth grade) was randomly chosen within each participating school, resulting in a sample of 8,405 adolescents aged 11–15 years (mean age = 13.43 years; 50.9% boys). In the final stage, resilience data were collected from a randomly selected subsample of adolescents aged 13–15 years, yielding the final analytical sample of 2,839 participants.

Ethical approval for the study was granted by the Ethics Committee of the Medical Faculty of P. J. Safarik University in Košice (16N/2017). Parents received information about the study through school administrators and were given the opportunity to refuse their child's participation. Adolescents took part voluntarily, and all data were collected anonymously without the provision of incentives.

### *Measures*

Emotional and behavioural problems (EBP) were assessed using the Strengths and Difficulties Questionnaire [35]. The analysis included the 20 items comprising the difficulties subscales. Response options were “not true” (0), “somewhat true” (1), and “certainly true” (2), producing a total difficulties score ranging from 0 to 40, with higher values reflecting greater levels of problems [36]. In the current sample, the internal consistency of the scale was acceptable (Cronbach's alpha = 0.73).

Adverse childhood experiences (ACE) were evaluated using the Adverse Childhood Experience Questionnaire, which consists of 11 items addressing exposure to serious life events [2, 37]. Adolescents were asked whether they had experienced events such as the death of a close family member, serious illness of themselves or someone close, parental substance misuse, repeated parental conflicts or physical violence, parental separation or divorce (including separation due to work abroad), relocation, or changing schools. Responses were recorded as “yes” or “no”. A cumulative ACE score was created by summing the number of events endorsed, which was treated as a continuous variable.

Resilience was measured with the Child and Youth Resilience Measure—12 item child version (CYRM-12), designed for adolescents aged 13 years and older (grades 7–9) [38, 39]. This instrument assesses access to individual, relational, community, and cultural resources

that support resilience. Items were rated on a three-point scale (no/sometimes/yes), yielding total scores between 12 and 36, with higher scores indicating greater resilience. The CYRM-12 demonstrated good internal reliability in this sample (Cronbach's alpha = 0.84).

Socioeconomic status was assessed using the Family Affluence Scale III (FAS III), which includes six indicators of material wealth and family resources [40]. These items addressed car ownership, having one's own bedroom, number of computers, number of bathrooms, dishwasher ownership, and frequency of family holidays abroad in the past year. A composite FAS score was calculated and transformed into a normally distributed index ranging from 0 to 1. Based on this index, participants were categorised into low (0–0.333), medium (0.334–0.666), and high (0.667–1) socioeconomic groups.

#### Statistical analyses

Analyses began with a descriptive overview of the study population. Subsequently, the relationships between adverse childhood experiences (ACEs) and emotional and behavioural problems (EBPs), as well as between resilience and EBPs, were examined using multivariate linear regression (Model 1). These analyses were then repeated with additional adjustment for age, gender, and family affluence (Model 2). To assess the potential mediating role of resilience, resilience was included in the regression model, and changes in the association between ACEs and EBPs were evaluated (Model 3).

All regression analyses were conducted using multivariate linear models based on 5,000 bootstrap resamples and were adjusted for gender, age, and family affluence. Mediation was formally tested using PROCESS macro, model 4 [41], with the same covariates included. Indirect effects were estimated using the product-of-coefficients ( $a \times b$ ) approach, and bias-corrected 95% bootstrap confidence intervals (CIs) were calculated. All statistical procedures were performed using SPSS version 20.

## Results and Discussion

**Table 2.** Results of multivariate linear regression analyses evaluating the mediating contribution of resilience to the association between the number of adverse childhood emotional and experiences and behavioural problems. Estimates are shown as regression coefficients (B) with corresponding 95% confidence intervals (CI), derived from crude and adjusted models controlling for gender, age, and family affluence, based on 5,000 bootstrapped samples (Health Behaviour in School-Aged Children study, Slovakia 2018, adolescents aged 13–15 years,  $n = 2,839$ ).

Descriptive characteristics of the participants are shown in **Table 1**. The analytical sample included 2,839 adolescents aged between 13 and 15 years, of whom 49.6% were boys ( $n = 1,408$ ).

**Table 1.** Descriptive characteristics of the study population (health behaviour in school-aged children study, Slovakia 2018, adolescents aged 13–15 years,  $n = 2,839$ ).

Characteristic	Value
<b>Total n</b>	2839
<b>Gender (N, %)</b>	
Boys	1408 (49.6)
<b>Age (N, %)</b>	
13 years	957 (33.7)
14 years	1122 (39.5)
15 years	760 (26.8)
<b>FAS (N, %)</b>	
Low	828 (29.2)
Middle	858 (30.2)
High	1153 (40.6)
<b>ACE (mean, SD) - range 0–11</b>	2.42 (1.82)
<b>Resilience (mean, SD) - range 12–36</b>	29.25 (3.67)
<b>Emotional and behavioural problems (mean, SD) - range 1–35</b>	12.89 (5.53)

N- number of respondents; HBSC-study- Health Behaviour in School-Aged Children study; ACE- adverse childhood experiences; SD- standard deviation; FAS- Family affluence.

#### Behavioral and emotional problems in relation to adverse childhood resilience and experiences

**Table 2** (Model 1) presents the unadjusted regression results examining behavioural and emotional problems (EBPs) in relation to resilience and the accumulation of adverse childhood experiences (ACEs). The analyses showed that adolescents reporting a greater number of ACEs exhibited higher levels of EBPs ( $B = 0.78$ ; 95% CI: 0.67–0.90). Conversely, EBPs were less frequent among those with higher resilience scores ( $B = -0.73$ ; 95% CI:  $-0.79$  to  $-0.67$ ). The reported B values correspond to unstandardized regression coefficients obtained from linear regression analyses using 5,000 bootstrap resamples.

Predictor	Model 3	Model 2	Model 1
	B (95% CI)	B (95% CI)	B (95% CI)
Resilience	-0.69 (-0.74–-0.64)***		-0.73 (-0.79–-0.67)***
ACE	0.47 (0.38–0.57)***	0.73 (0.62–0.83)***	0.78 (0.67–0.90)***

\*\*\* $p < 0.001$ . \*\* $p < 0.01$ . \* $p < 0.05$ .

Model 1: Unadjusted (crude) model—showing the separate effects of Adverse Childhood Experiences (ACE) and resilience.

Model 2: Adjusted model—showing the effect of ACE after controlling for age, gender, and family affluence.

Model 3: Adjusted model—showing the effect of ACE after controlling for gender, age, family affluence, and resilience.

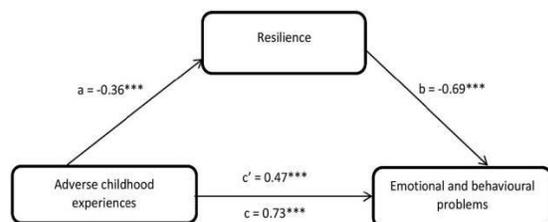
#### *Associations between adverse childhood emotional and experiences and behavioural problems after adjustment*

After accounting for potential confounding factors (age, gender, and family affluence), the relationship between adverse childhood experiences (ACEs) and emotional and behavioural problems (EBPs) remained evident (Model 2). Each additional ACE was associated with a higher EBP score ( $B = 0.73$ ; 95% CI: 0.62–0.83), indicating that the association persisted following adjustment.

#### *Resilience as a mediator of the relationship between adverse childhood emotional and experiences and behavioural problems*

Subsequent analyses examined whether resilience explained part of the association between ACEs and EBPs while controlling for gender, age, and family affluence (Model 3). Inclusion of resilience in the regression model revealed a strong inverse association with EBPs ( $B = -0.69$ ; 95% CI:  $-0.74$  to  $-0.64$ ) and led to a marked reduction in the strength of the ACE–EBP association ( $B = 0.47$ ; 95% CI: 0.37–0.57), consistent with a mediating effect.

The magnitude of this mediation was further quantified using the product-of-coefficients ( $a \times b$ ) approach, with confounders included in the model (**Figure 1**). This analysis demonstrated a significant indirect effect of ACEs on EBPs through resilience ( $ab = 0.25$ ; 95% CI: 0.18–0.32), supporting the role of resilience as a mediator.



Notes: \*\*\* $p < 0.001$ . All presented effects are unstandardized;  $a$  is the effect of ACE on resilience,  $b$  is the effect of resilience on EBP,  $c'$  is the direct effect of ACE and  $c$  is the total effect of ACE on EBP.

**Figure 1.** Conceptual model illustrating the mediating role of resilience in the relationship between adverse childhood experiences and emotional and behavioural problems, with adjustment for age, gender, and family affluence (Health Behaviour in School-Aged Children study, Slovakia 2018, adolescents aged 13–15 years,  $n = 2,839$ ).

This study set out to examine whether resilience functions as an intermediary mechanism linking adverse childhood experiences (ACEs) to emotional and behavioural problems (EBPs) in adolescents. The findings indicate that higher resilience is associated with a lower likelihood of EBPs and that resilience partly explains the relationship between ACE exposure and EBPs. To our knowledge, this study is among the first to empirically evaluate the full mediating pathway of resilience in the association between ACEs and EBPs during adolescence.

Consistent with earlier research, greater exposure to ACEs was associated with a higher prevalence of EBPs, whereas resilience showed a protective association, reducing the likelihood of such problems [23, 42, 43]. These results suggest that early life experiences and caregiving environments may simultaneously contribute to vulnerability and protection with respect to emotional and behavioural functioning, a pattern also observed in studies focusing on adolescent delinquency [9–11]. The ability to adapt positively in the face of adversity may therefore mitigate the development of EBPs. Conversely, exposure to ACEs combined with lower levels of resilience may help explain the elevated rates of EBPs observed among some adolescents.

Beyond these direct associations, the present findings provide evidence that resilience mediates the link between ACEs and EBPs, supporting earlier indications of such a mechanism [13, 14, 23] and extending them by demonstrating the complete mediation pathway. One possible explanation is that adolescents who have experienced ACEs may have reduced access to both internal resources (such as personal coping capacities)

and external supports (including family, peers, schools, neighbourhoods, and community networks) due to the emotional burden associated with these experiences. The intensity of ACE-related stress may overwhelm adolescents' adaptive capacities, limiting their ability to seek or accept support from key social environments [44, 45], thereby undermining positive adaptation. In this context, the combination of adversity and insufficient resilience resources may increase susceptibility to EBPs. Moreover, the absence of protective factors during adolescence may not only elevate EBP risk but also contribute to earlier involvement in delinquent behaviours [10, 12].

Overall, these results align with previous research emphasizing the importance of strengthening resilience and family-level protective factors as a means of reducing the negative impact of ACEs [29, 30]. Enhancing both internal resilience capacities and external support systems appears to be essential for promoting healthy emotional and behavioural development among adolescents who have been exposed to early adversity.

#### *Strengths and limitations*

The primary advantages of this research include its extensive, nationally representative sample and the application of the established Health Behaviour in School-aged Children (HBSC) protocol. Nonetheless, several limitations exist. The cross-sectional nature of the study prevents definitive conclusions regarding causation. Additionally, reliance on self-reported information from adolescents could result in issues such as underreporting of adverse childhood experiences (ACE). Although validated instruments were employed, some degree of underestimation in the prevalence of these experiences cannot be ruled out. A further constraint is the reliance on the Adverse Childhood Experiences Questionnaire (ACEQ), which omits items related to childhood abuse. Assessing this sensitive area via self-report is challenging, yet its inclusion might reveal even more pronounced impacts than those observed for the covered ACE, potentially leading to an underestimation of the true relationships. Finally, the study did not examine whether the identified associations and mediation effects vary in strength at higher levels of either the outcome (emotional and behavioural problems, EBP) or the exposure (ACE). Restricting the analysis to extreme values of the exposure or outcome generally tends to attenuate observed associations.

#### *Implications*

The results indicate that resilience serves a mediating function in the link between ACE and the development of EBP among adolescents experiencing such adversities. These findings underscore the value of supporting adolescents with ACE histories in developing and accessing both internal and external resilience resources, as these can mitigate the adverse effects of ACE on EBP. The influence of resilience on the ACE-EBP relationship may differ according to the particular type of ACE involved. Subsequent investigations should examine specific forms of ACE in connection with EBP, as well as the mediating role of resilience for individual ACE types and EBP manifestations. The outcomes also suggest that enhanced collaboration between families and educational settings—such as among classroom teachers and school psychologists—could bolster external resilience factors for adolescents displaying EBP. Further studies might explore strategies for fostering resilience during earlier developmental stages, which could help avert the emergence of EBP in adolescence. Employing a longitudinal design would be beneficial to establish causal directions in these relationships. Long-term prospective research could provide deeper insights into resilience development from childhood onward.

#### **Conclusion**

Resilience holds a significant position in the connection between ACE and EBP. The analysis revealed that resilience acts as a mediator in the relationship between ACE and EBP in adolescents.

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