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Childhood Adversity and Adolescent Anxiety: The Role of Intolerance of Uncertainty as a Mediator

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A B S T R A C T

Objective: This study aimed to investigate the mediating role of intolerance of uncertainty (IU) in the relationship between childhood adversity and adolescent anxiety.

Methods and Materials: A descriptive correlational design was used with a sample of 392 adolescents (aged 13–18) from South Africa, selected based on the Krejcie and Morgan sample size table. Standardized instruments were employed to measure variables: the Childhood Trauma Questionnaire (CTQ) for childhood adversity, the Intolerance of Uncertainty Scale–12 (IUS-12) for IU, and the Screen for Child Anxiety Related Emotional Disorders (SCARED) for anxiety symptoms. Data were analyzed using SPSS-27 for descriptive and Pearson correlation analyses, and AMOS-21 for Structural Equation Modeling (SEM). The model fit was assessed using indices such as Chi-square, CFI, TLI, GFI, and RMSEA.

Findings: Descriptive statistics indicated moderate to high levels of childhood adversity (M = 67.42), IU (M = 34.78), and adolescent anxiety (M = 42.15). Pearson correlations revealed significant positive relationships among all variables (e.g., adversity and anxiety: $r = .52$, $p < .001$). The SEM analysis showed that IU significantly mediated the relationship between childhood adversity and adolescent anxiety. Specifically, childhood adversity predicted IU ($\beta = .48$, $p < .001$), IU predicted anxiety ($\beta = .51$, $p < .001$), and the indirect effect of adversity on anxiety through IU was also significant ($\beta = .24$, $p < .001$), supporting a partial mediation model with a good overall fit (e.g., CFI = 0.96, RMSEA = 0.058).

Conclusion: The findings highlight IU as a key cognitive mechanism linking early adverse experiences to anxiety symptoms in adolescence. Addressing IU through targeted interventions may help mitigate anxiety in adolescents with a history of childhood adversity.

Keywords: *Childhood adversity; adolescent anxiety; intolerance of uncertainty; cognitive mediation; structural equation modeling.*

1. Introduction

Adolescence is a pivotal developmental period marked by substantial biological, psychological, and social changes. During this stage, individuals face increased vulnerability to emotional disturbances, particularly anxiety disorders. Global evidence indicates that anxiety is among the most prevalent psychological disorders in adolescents, with early onset linked to chronic functional impairments across the lifespan (Dorčić et al., 2023). One factor that has drawn considerable research attention in the etiology of adolescent anxiety is childhood adversity, encompassing various forms of early trauma, abuse, neglect, or family dysfunction. Accumulating studies confirm that adverse childhood experiences (ACEs) significantly elevate the risk for anxiety-related symptoms in adolescence, both directly and indirectly through cognitive-affective pathways (Azaria & Syakarofath, 2024; Zhang et al., 2022).

The impact of childhood adversity on mental health is increasingly being conceptualized through transdiagnostic factors, particularly intolerance of uncertainty (IU). IU refers to a dispositional incapacity to tolerate the distress associated with the perception of uncertain or ambiguous situations (Ye et al., 2025). This construct is crucial in understanding how early adverse experiences potentiate later psychopathology. Childhood adversity has been found to impair cognitive emotion regulation, reduce psychological flexibility, and elevate levels of IU, which then serve as a cognitive vulnerability factor for anxiety disorders in adolescence (Jing et al., 2023; Zhang et al., 2022). Notably, empirical research has demonstrated a mediating effect of IU in the relationship between childhood trauma and anxiety symptoms, suggesting a chain of psychological processes from early adversity to later distress (Durna et al., 2022; Killingsworth et al., 2023).

The mechanisms underlying this mediation are rooted in developmental and neurocognitive frameworks. Childhood adversity alters neural circuits involved in threat detection and uncertainty processing, thereby sensitizing adolescents to future unpredictable threats (Cuesta-Zamora et al., 2023; Okayama et al., 2024). Adolescents with high IU are more likely to engage in maladaptive coping strategies such as avoidance, excessive worry, and rumination, all of which are central components of anxiety (Hong & Lee, 2024; Shipp et al., 2024). Moreover, IU not only correlates with anxiety severity but also with diagnostic onset, chronicity, and treatment resistance in anxiety disorders (Shipp et al., 2025; Ye et al., 2025). These findings underscore the importance of examining IU not merely as a correlate but as a mediator in predictive models of adolescent anxiety.

Recent research has begun to delineate how different dimensions of childhood adversity may differentially relate to IU. Emotional neglect and abuse, in particular, appear to heighten an adolescent's sensitivity to uncertainty more than physical forms of maltreatment (Azaria & Syakarofath, 2024; López-Martínez et al., 2022). These emotional forms of adversity interfere with the development of secure attachment and emotion regulation, mechanisms that are vital for building resilience against uncertainty. Accordingly, adolescents with a history of such adversity tend to overestimate threat in ambiguous situations, leading to anxiety-laden interpretations of daily life events (Huntley et al., 2022; Kelek et al., 2022).

Within this conceptual framework, IU functions as a proximal vulnerability factor, mediating the distal effect of childhood adversity on anxiety. Zhang et al. (2022) confirmed that IU acts as a key intermediary between childhood trauma and anxiety, while also highlighting the role of proactive coping as a potential buffer (Zhang et al., 2022). Similarly, Killingsworth et al. (2023) found that IU mediated the association between death anxiety and health-related fears, extending its relevance across anxiety subtypes (Killingsworth et al., 2023). In another study, Durna et al. (2022) observed that IU predicted maladjustment among children undergoing stressful medical procedures, with psychological resilience partially buffering this link (Durna et al., 2022). These converging lines of evidence strengthen the hypothesis that IU is a robust transdiagnostic mediator worthy of targeted investigation.

The developmental implications of this relationship are profound. Adolescents who experience adversity often show cognitive distortions that predispose them to heightened uncertainty sensitivity. This distortion perpetuates a feedback loop where ambiguous events are viewed as threatening, resulting in excessive worry and anxiety (Cuesta-Zamora et al., 2023; Jing et al., 2023). Additionally, Barnowski et al. (2023) emphasize the importance of preparing adolescents for transitions, particularly in post-pandemic settings, where uncertainty is heightened (Barnowski et al., 2023). This aligns with findings by Nekić (2023), who showed that intolerance of uncertainty significantly predicted stress and anxiety in emerging adults, with mindfulness serving as a protective factor (Nekić, 2023). Therefore, IU is not merely a by-product of adversity, but a cognitive lens through which stressors are magnified during development.

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Given its transdiagnostic significance, IU has also been studied as a therapeutic target. Intervention studies show that reducing IU can lower anxiety symptoms across age groups. For instance, Zemestani et al. (2023) tested a culturally adapted Unified Protocol for adolescents and found significant reductions in anxiety by addressing IU through emotion regulation training and exposure to uncertainty (Zemestani et al., 2023). Moreover, psychological flexibility and cognitive reappraisal are increasingly used in therapies targeting IU, especially in youth with generalized anxiety disorder (Hong & Lee, 2024; Shipp et al., 2025). These findings are supported by López-Martínez et al. (2022), who demonstrated that IU moderates the relationship between cognitive distortions and anxiety even in adults with chronic pain, suggesting its broad applicability (López-Martínez et al., 2022).

While much of the existing research has been conducted in Western or East Asian contexts, there is a growing call for cross-cultural validation of these mechanisms. For example, Yao et al. (2023) identified IU as a mediator between social anxiety and self-injurious behavior in Chinese adolescents, moderated by self-esteem (Yao et al., 2023). Similarly, Ye et al. (2025) applied cross-lagged network analysis to reveal bidirectional relationships between IU and anxiety symptoms in a large adolescent sample, further validating its mediating role across time (Ye et al., 2025). Yet, little is known about how these dynamics unfold in African contexts, particularly South Africa, where adolescents are frequently exposed to structural violence, poverty, and familial instability. Investigating the IU pathway in such populations can enhance the global relevance of these psychological models.

Moreover, the role of digital and informational stressors is increasingly relevant in the adolescent context. As Jungmann and Dessauer (2024) observed, adolescents often turn to the internet for health-related information, which may exacerbate IU and anxiety when not mediated by critical evaluation skills (Jungmann & Dessauer, 2024). In such environments, IU may amplify cyberchondria and uncertainty-driven worry, especially in youth already burdened by adverse childhood experiences. The influence of modern stressors was further highlighted by Zhao et al. (2023), who demonstrated how IU contributes to job-seeking anxiety in emerging adults through its interaction with perceived control and future planning (Zhao et al., 2023).

Thus, the current study is motivated by the pressing need to examine how childhood adversity contributes to adolescent anxiety via intolerance of uncertainty, particularly in underrepresented cultural contexts like South Africa.

2. Methods and Materials

2.1. Study Design and Participants

This study employed a descriptive correlational design to investigate the relationship between childhood adversity, intolerance of uncertainty, and adolescent anxiety. The participants included 392 adolescents (aged 13 to 18 years) from various schools in South Africa, selected using stratified random sampling to ensure demographic diversity in terms of age, gender, and socioeconomic background. The sample size was determined based on the Krejcie and Morgan (1970) sample size table, which recommends a sample of 384 for a population of 100,000 or more, ensuring the adequacy of the current sample for statistical analyses. Written informed consent was obtained from both the adolescents and their legal guardians, and ethical approval for the study was granted by the institutional review board.

2.2. Measures

2.2.1. Anxiety

To assess adolescent anxiety, the Screen for Child Anxiety Related Emotional Disorders (SCARED) developed by Birmaher et al. (1997) is recommended. This self-report questionnaire includes 41 items and is designed to screen for various anxiety disorders in children and adolescents aged 8 to 18. It comprises five subscales: Panic/Somatic Symptoms, Generalized Anxiety Disorder, Separation Anxiety, Social Phobia, and School Phobia. Respondents rate how true each statement is for them using a 3-point Likert scale (0 = Not true or hardly ever true, 1 = Somewhat true or sometimes true, 2 = Very true or often true), with higher scores indicating greater levels of anxiety. The SCARED has demonstrated strong internal consistency ($\alpha > .70$) across subscales, and both construct and convergent validity have been supported in multiple clinical and non-clinical studies.

2.2.2. Childhood Adversity

Childhood adversity can be effectively measured using the Childhood Trauma Questionnaire (CTQ) developed by Bernstein et al. (1994). The CTQ is a widely used retrospective self-report inventory that assesses experiences of abuse and neglect during childhood and adolescence. It

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consists of 28 items distributed across five subscales: Emotional Abuse, Physical Abuse, Sexual Abuse, Emotional Neglect, and Physical Neglect. Items are rated on a 5-point Likert scale ranging from 1 (Never True) to 5 (Very Often True), with higher scores reflecting greater exposure to adverse experiences. The CTQ has been validated in both clinical and community populations, showing high internal consistency (Cronbach's α ranging from .79 to .94) and good test–retest reliability. Its construct and criterion validity have also been well established across diverse cultural contexts.

2.2.3. Intolerance of Uncertainty

To assess intolerance of uncertainty, the Intolerance of Uncertainty Scale–12 (IUS-12) developed by Carleton, Norton, and Asmundson (2007) is a reliable and efficient measure. This shortened version of the original IUS contains 12 items and evaluates an individual's tendency to react negatively to uncertain situations. It includes two subscales: Prospective Anxiety (concerns about future events) and Inhibitory Anxiety (difficulty taking action under uncertainty). Responses are given on a 5-point Likert scale ranging from 1 (Not at all characteristic of me) to 5 (Entirely characteristic of me), with higher scores indicating greater intolerance of uncertainty. The IUS-12 has been shown to possess excellent internal consistency (α > .85) and strong convergent and discriminant validity in adolescent and adult samples, making it appropriate for developmental research on anxiety.

2.3. Data Analysis

Data were analyzed using SPSS version 27 and AMOS version 21. Descriptive statistics were calculated for all variables, including means, standard deviations, frequencies, and percentages. To examine the direct relationships between childhood adversity, intolerance of uncertainty, and adolescent anxiety, Pearson correlation coefficients were computed. Furthermore, Structural Equation Modeling (SEM) was conducted using AMOS-21 to test the mediating role of intolerance of uncertainty in the relationship between childhood adversity and adolescent anxiety. The significance of indirect effects was tested using bootstrapping procedures with 5,000 resamples and 95% confidence intervals.

3. Findings and Results

Of the total 392 participants, 219 (55.9%) were female and 173 (44.1%) were male. The participants' ages ranged from 13 to 18 years, with 63 adolescents (16.1%) aged 13, 84 (21.4%) aged 14, 79 (20.2%) aged 15, 71 (18.1%) aged 16, 54 (13.8%) aged 17, and 41 (10.5%) aged 18. Regarding socioeconomic status, 124 participants (31.6%) reported a low-income background, 183 (46.7%) reported middle-income, and 85 (21.7%) reported high-income households. All participants were attending secondary school at the time of the study.

Table 1

Descriptive Statistics for Study Variables (N = 392)

Variable	M	SD
Childhood Adversity	67.42	15.36
Intolerance of Uncertainty	34.78	7.91
Adolescent Anxiety	42.15	9.64

Table 1 presents the means and standard deviations for the primary study variables. The mean score for childhood adversity was 67.42 (SD = 15.36), indicating moderate to high exposure levels across the sample. The mean score for intolerance of uncertainty was 34.78 (SD = 7.91), suggesting relatively high levels of cognitive rigidity. Adolescent anxiety had a mean of 42.15 (SD = 9.64), showing elevated anxiety symptoms among participants.

Prior to conducting inferential analyses, the assumptions for Pearson correlation and SEM were tested. Normality was examined through skewness and kurtosis values, all of which fell within the acceptable range of -1 to +1 (e.g., skewness for adolescent anxiety = 0.42, kurtosis = -0.35). Linearity was confirmed through scatterplots showing linear patterns between variables. Multicollinearity was assessed using variance inflation factor (VIF), with all values below 2 (e.g., VIF for childhood adversity = 1.37), indicating no multicollinearity concerns. The absence of outliers was verified using Mahalanobis distance (maximum value = 17.34, below the critical value of 18.47 for $p < .001$ with 3 predictors). Additionally, homoscedasticity was visually checked using residual plots, which showed no funneling patterns, thus supporting the use of SEM and Pearson correlation analyses.

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Table 2

Pearson Correlations Among Study Variables

Variable	1	2	3
1. Childhood Adversity	—		
2. Intolerance of Uncertainty	.48** (p < .001)	—	
3. Adolescent Anxiety	.52** (p < .001)	.59** (p < .001)	—

As shown in Table 2, all variables were significantly correlated. Childhood adversity was positively correlated with intolerance of uncertainty ($r = .48$, $p < .001$) and adolescent anxiety ($r = .52$, $p < .001$). A strong correlation was also observed between intolerance of uncertainty and adolescent anxiety ($r = .59$, $p < .001$). These findings support the hypothesized associations among the constructs.

Table 3

Goodness-of-Fit Indices for the Structural Equation Model

Fit Index	Value	Threshold for Good Fit
χ^2	112.34	—
df	48	—
χ^2/df	2.34	< 3.00
GFI	0.95	> 0.90
AGFI	0.91	> 0.90
CFI	0.96	> 0.95
TLI	0.94	> 0.90
RMSEA	0.058	< 0.08

Table 3 displays the fit indices for the structural equation model. The model demonstrated a good fit to the data, with a χ^2/df ratio of 2.34, which is below the recommended threshold of 3. Fit indices were satisfactory: GFI = 0.95, AGFI = 0.91, CFI = 0.96, and TLI = 0.94, all indicating a strong model fit. The RMSEA value was 0.058, further confirming an acceptable level of model error.

Table 4

Total, Direct, and Indirect Effects Among Study Variables

Path	b	S.E.	β	p
Childhood Adversity → IU (Direct)	0.41	0.07	.48	<.001
IU → Adolescent Anxiety (Direct)	0.62	0.09	.51	<.001
Childhood Adversity → Adolescent Anxiety (Direct)	0.38	0.08	.36	<.001
Childhood Adversity → Adolescent Anxiety (Indirect via IU)	0.25	0.06	.24	<.001
Childhood Adversity → Adolescent Anxiety (Total)	0.63	0.09	.60	<.001

Table 4 summarizes the path coefficients in the structural model. The direct path from childhood adversity to IU was significant ($b = 0.41$, $\beta = .48$, $p < .001$), as was the path from IU to adolescent anxiety ($b = 0.62$, $\beta = .51$, $p < .001$). The direct effect of childhood adversity on adolescent anxiety remained significant ($b = 0.38$, $\beta = .36$, $p < .001$), indicating partial mediation. The indirect effect of childhood adversity on adolescent anxiety through IU was also significant ($b = 0.25$, $\beta = .24$, $p < .001$), and the total effect was robust ($b = 0.63$, $\beta = .60$, $p < .001$), supporting the hypothesized mediation model.

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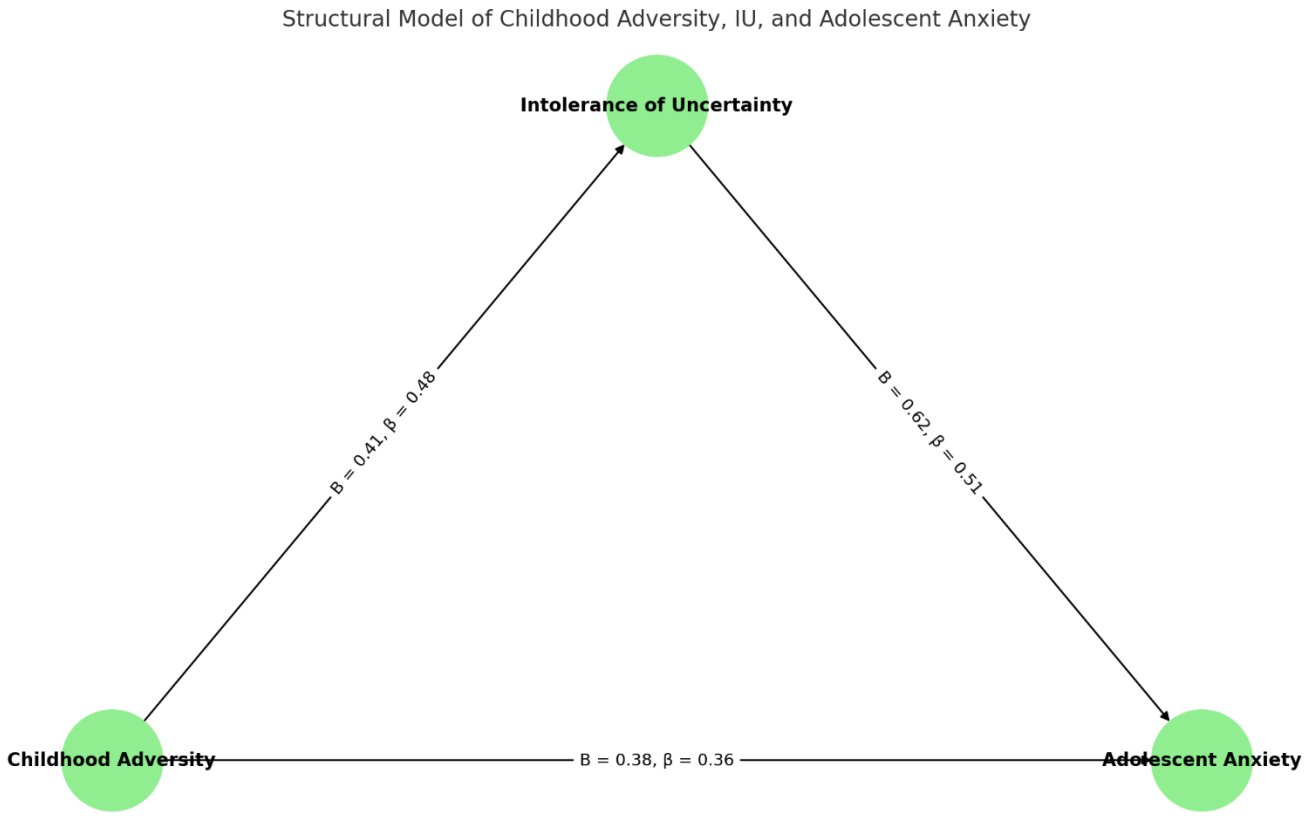
Figure 1

Structural Model of The Study



4. Discussion and Conclusion

The present study aimed to investigate the mediating role of intolerance of uncertainty (IU) in the relationship between childhood adversity and adolescent anxiety among South African youth. The results confirmed the hypotheses: childhood adversity had a significant positive correlation with adolescent anxiety; childhood adversity was significantly associated with higher levels of intolerance of uncertainty; and IU, in turn, was strongly related to anxiety symptoms. Structural Equation Modeling revealed a significant indirect effect of childhood adversity on anxiety through IU, indicating that IU partially mediates this relationship.

These findings reinforce the growing body of literature suggesting that adverse childhood experiences do not solely result in immediate emotional dysregulation but also lay a cognitive foundation for the development of anxiety disorders later in life by increasing adolescents' vulnerability to uncertainty. This result aligns with the theoretical proposition that children exposed to neglect, abuse, or instability may develop a cognitive style that overemphasizes potential threats and ambiguity (Azaria & Syakarofath, 2024). Consistent with previous models, the current study shows that IU operates as a critical mechanism linking past trauma to present emotional dysfunction, suggesting that IU may act as a cognitive "scar" from early adversity (Zhang et al., 2022).

The positive correlation between childhood adversity and adolescent anxiety aligns with prior research conducted across cultures. Zhang et al. (2022) previously demonstrated that adolescents with histories of trauma report higher anxiety levels, particularly when IU and coping mechanisms are included as mediating and moderating factors (Zhang et al., 2022). The present findings extend this work by validating the association within a South African adolescent sample, suggesting that the mechanism holds across differing cultural and socioeconomic settings. These results further corroborate the findings by Dorčić et al. (2023), who reported heightened anxiety levels among adolescents during periods of stress and transition, particularly when previous adversity was present (Dorčić et al., 2023).

Furthermore, this study supports earlier findings that IU is not only a significant predictor of anxiety but also a robust

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mediator in the pathway from early trauma to psychological distress. Previous studies have highlighted IU's contribution to a variety of anxiety-related outcomes. For instance, Ye et al. (2025) showed that the relationship between IU and generalized anxiety is bidirectional and stable across time in adolescents, underscoring its role as both an antecedent and perpetuating factor in anxiety (Ye et al., 2025). Similarly, Cuesta-Zamora et al. (2023) demonstrated that IU, in combination with anxiety, predicted maladaptive behaviors such as compulsive exercise, revealing its broad applicability in adolescent populations (Cuesta-Zamora et al., 2023).

Our results also echo findings from Killingsworth et al. (2023), who showed that IU mediates the relationship between existential anxiety and health concerns in older adults, highlighting IU's transdiagnostic potential (Killingsworth et al., 2023). Although the populations differ, the present study aligns in demonstrating how intolerance of ambiguity and cognitive rigidity contribute to distress, particularly when early life adversity has shaped one's emotional development. Furthermore, Hong and Lee (2024) emphasized that IU mediates the effect of socially prescribed perfectionism on social anxiety, indicating that the mechanism may operate in response to both internal and external developmental pressures (Hong & Lee, 2024).

IU has also been associated with negative emotion regulation strategies and reduced psychological flexibility, particularly among youth with traumatic histories. This is in line with the findings of Okayama et al. (2024), who reported that IU and reduced flexibility predict anxiety outcomes across the lifespan, suggesting early cognitive rigidity contributes to enduring vulnerability (Okayama et al., 2024). In addition, our study echoes the conclusions of Durna et al. (2022), who found that psychological resilience could moderate the relationship between IU and maladjustment, highlighting the value of targeting IU to improve emotional outcomes among adolescents (Durna et al., 2022).

Another important point is the potential for cultural and contextual moderators in the relationship among adversity, IU, and anxiety. Yao et al. (2023) found that IU mediated the relationship between social anxiety and self-injurious behavior in Chinese adolescents, particularly when self-esteem was low, indicating how individual differences can shape the path from uncertainty to distress (Yao et al., 2023). Similarly, Nekić (2023) reported that IU significantly predicted stress and anxiety in emerging adults, with mindfulness practices serving a protective function (Nekić, 2023). These findings suggest that contextual and psychological buffers, such as self-worth or mindfulness, may moderate the strength of the mediation effect found in the current study.

The findings also support Shipp et al. (2024, 2025), who found that IU in adolescents is closely linked to maladaptive cognitive processes such as worry, avoidance, and metacognitive beliefs, all of which contribute to generalized anxiety disorder symptomatology (Shipp et al., 2024, 2025). This reinforces the role of IU as a core feature in cognitive-behavioral models of anxiety and supports its inclusion in preventive and therapeutic interventions. Relatedly, Huntley et al. (2022) identified IU and dysfunctional metacognitions as key predictors of test anxiety in adolescents, further emphasizing its relevance in real-life adolescent challenges (Huntley et al., 2022).

On a developmental level, adolescence is characterized by heightened sensitivity to uncertainty due to ongoing neurological and social changes. Jungmann and Dessauer (2024) noted that adolescents increasingly rely on digital environments for self-regulation, often leading to information overload and increased IU in health-related contexts (Jungmann & Dessauer, 2024). This aligns with findings from Zhao et al. (2023), who reported that IU is associated with job-seeking anxiety in emerging adults, suggesting that exposure to ambiguous digital information environments can exacerbate uncertainty intolerance (Zhao et al., 2023). Therefore, adolescence represents a critical window during which IU may crystallize and influence long-term mental health trajectories.

Lastly, the role of IU as a therapeutic target is supported by intervention research. Zemestani et al. (2023) demonstrated that adolescents undergoing a culturally adapted Unified Protocol intervention targeting IU experienced significant reductions in anxiety symptoms (Zemestani et al., 2023). This aligns with broader cognitive-behavioral literature emphasizing the benefits of teaching youth to tolerate ambiguity and reduce threat-related cognitions. Furthermore, Barnowski et al. (2023) emphasized the importance of psychological readiness in post-pandemic re-entry, underscoring the need to cultivate adaptive uncertainty responses in adolescents (Barnowski et al., 2023).

5. Limitations & Suggestions

Despite the valuable findings, this study is not without limitations. First, the cross-sectional design precludes causal inferences. While the mediation model is theoretically

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grounded and supported by literature, temporal dynamics cannot be confirmed without longitudinal data. Second, data were collected using self-report instruments, which may be subject to social desirability bias or recall inaccuracies—especially concerning childhood adversity. Third, while the sample was drawn from diverse schools in South Africa, generalizability to other regions, cultures, or rural populations may be limited. Fourth, the study did not account for potential moderating variables such as gender, coping styles, or resilience, which could provide a more nuanced understanding of the mechanisms at play.

Future studies should adopt longitudinal or experimental designs to assess the causal direction between IU and anxiety, as well as the evolving role of adversity across developmental stages. Investigations could incorporate neurobiological or psychophysiological measures to deepen our understanding of how IU manifests cognitively and biologically in adolescents. Moreover, future research could examine protective factors such as mindfulness, family cohesion, or self-esteem to identify moderators that buffer the adversity-IU-anxiety pathway. Cross-cultural replications with larger samples would help determine the universality versus cultural specificity of these mechanisms. It is also recommended to explore the role of digital media consumption and information overload in shaping IU among adolescents today.

The findings of this study highlight the need for early screening of childhood adversity and IU in school and clinical settings. Practitioners should consider integrating IU-targeted interventions—such as emotion regulation training, uncertainty exposure, and cognitive restructuring—into existing mental health programs for youth. Educators and mental health professionals may also benefit from psychoeducation programs aimed at enhancing adolescents' tolerance of ambiguity and reducing avoidance behaviors. Schools could incorporate curriculum components that help students manage uncertainty adaptively, thus strengthening their emotional resilience and reducing anxiety risks. Tailoring these interventions to culturally relevant experiences and stressors would further enhance their effectiveness in diverse adolescent populations.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contributed to this article.

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