



OPEN Self-compassion as a mediator of attachment anxiety, attachment avoidance, and complex PTSD in college students with adverse childhood experiences

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Given the significant prevalence of adverse childhood experiences (ACEs) and their detrimental impact on mental health, this study examines the relationship between attachment anxiety, attachment avoidance, and complex post-traumatic stress disorder (CPTSD) among college students with ACEs, emphasizing the mediating role of self-compassion (SC). A sample of 32,388 students from Kunming, China completed a survey including the Revised Adverse Childhood Experiences Questionnaire (ACEQ-R), the Adult Attachment Scale (AAS), the International Trauma Questionnaire (ITQ), and the Self-Compassion Scale-Short Form (SCS-SF). Among the participants, 3,896 reported at least one ACE. Data were analyzed using structural equation modeling (SEM) to explore the proposed mediation model. Results revealed that both attachment anxiety and avoidance positively influenced CPTSD symptoms while negatively affecting SC. SC negatively influenced CPTSD symptoms, acting as a significant mediator. The mediating effect of SC was stronger for disturbances in self-organization (DSO) than for post-traumatic stress disorder (PTSD) symptoms. These findings underscore the importance of fostering SC in interventions aimed at mitigating the influence of attachment anxiety and avoidance on CPTSD among college students with ACEs.

Keywords Adverse childhood experiences, Attachment anxiety, Attachment avoidance, Complex post-traumatic stress disorder, Disturbances in self-organization, Post-traumatic stress disorder

Adverse childhood experiences (ACEs) have been thoroughly documented in extensive research to have detrimental consequences on both physical and mental health outcomes¹. Research indicates that experiencing interpersonal trauma during childhood hinders a child's ability to manage emotions and establish secure, healthy attachments²⁻⁴. These impairments are partly due to the adverse effects on the development of neurobiological systems involved in emotional responses, stress reactions, and reward processing⁵. Consequently, these fundamental psychobiological functions are intricately linked to the emergence of long-term issues, particularly complex post-traumatic stress disorder (CPTSD)^{6,7}.

The WHO defined CPTSD as an independent diagnostic category in the latest edition of ICD-11⁸. This landmark decision aimed to accurately identify and treat individuals experiencing sustained and repeated trauma. The reliability and validity of CPTSD as a diagnosis have been supported by numerous studies⁹⁻¹². CPTSD shares some symptom clusters with post-traumatic stress disorder (PTSD), with additional clusters collectively referred to as disturbances in self-organization (DSO)^{9,13}. DSO encompasses affective dysregulation, negative self-concept, and disturbed relationships, which are commonly linked to individuals exposed to prolonged, repeated, or multiple traumatic experiences¹⁴ and signify a depletion of emotional, psychological, and social resources under conditions of sustained adversity¹⁵. Exposing individuals to prolonged and repeated ACEs significantly increases the likelihood of developing CPTSD symptoms¹⁶. Among Chinese college students, the prevalence of ACEs is particularly high, with studies highlighting significant exposure rates and their detrimental impact on mental health and behavior¹⁶⁻¹⁹. Given the high prevalence of ACEs, investigating the mechanisms underlying PTSD and DSO symptoms among this population is meaningful.

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According to Bowlby (1973/1982)^{20,21} and Ainsworth (1991)²², children internalize early attachment patterns with primary caregivers, forming internal working models (IWMs) of self and others that become prototypes for later relationships²³. Attachment styles in adult relationships often develop from early attachment patterns with primary caregivers, making them particularly vulnerable to disruption by ACEs²⁴. Consequently, ACEs can lead to insecure attachment styles, commonly reflected in attachment anxiety (excessive fear of abandonment), where individuals may value their partner but hold a negative self-view, or attachment avoidance (discomfort with closeness), where they maintain a positive self-view but hold a negative view of closeness with others^{25,26}. Insecure attachment styles, marked by heightened attachment anxiety and/or avoidance, are associated with difficulties in maintaining a positive self-view or perception of others, lower self-worth, emotional regulation challenges, and diminished interpersonal satisfaction and overall well-being²⁷. Studies have highlighted the importance of attachment styles for PTSD symptoms^{23,28}. For instance, one study found that attachment anxiety and avoidance significantly increased the risk of lifetime PTSD²⁹. Another study found that attachment anxiety significantly predicted the likelihood of CPTSD symptoms, while attachment avoidance did not³⁰. Additionally, research has distinguished between PTSD and DSO symptoms, finding that insecure attachment styles showed stronger associations with DSO symptoms².

Attachment styles, reflecting internalized evaluations of self and others, impact self-worth and self-evaluation, manifesting in self-compassion(SC)³¹. Insecure attachment styles can reduce SC by fostering negative self-perceptions and relational patterns³². Attachment anxiety often leads to self-criticism, hindering SC³³, and attachment avoidance involves defense mechanisms that deter vulnerability, reducing SC³⁴. According to Neff and McGehee (2010)³², individuals with attachment anxiety often exhibit doubts about their worthiness of others' care and may rely heavily on external validation, which can limit their ability to cultivate self-compassion. Similarly, those with avoidant attachment tend to downplay the importance of support in relationships, exhibit distrust in others, and struggle with self-worth, leading to a weaker foundation for self-acceptance and reduced self-compassion. Secure attachment style supports a stronger ability to engage in self-compassion. In contrast, individuals with attachment anxiety and avoidance often struggle with self-compassion due to unmet emotional needs and defensive relational strategies³⁵. Research by Gilbert (2011)³⁶ suggested that capacity for compassion is rooted in the attachment system, which shapes how individuals perceive themselves and interact with others. Secure attachment styles typically associate with a greater capacity for compassion, as individuals develop positive IWMs from nurturing relationships^{20,36}. Conversely, anxious and avoidant attachment styles can hinder this capacity. Social mentality theory suggests that humans have evolved specialized systems to manage social interactions and build relationships, which later directed toward the self. These systems, shaped by early attachment experiences, guide how individuals relate to both others and themselves³⁷. For those with insecure attachment styles, these systems may become maladaptive. Fear of SC arises when individuals associate compassion with vulnerability, rejection, or emotional pain based on past negative experiences^{36,37}. And the fear of SC, which is often seen in individuals with insecure attachment styles, is linked to self-coldness, self-criticism, and greater psychological distress^{33,38}.

Early life experiences play a crucial role in shaping attachment styles and the capacity for self-compassion. Exposure to ACEs can influence how individuals perceive and relate to themselves. Neglect by early caregivers may contribute to the development of attachment anxiety and avoidance, fostering beliefs that one is unworthy of consistent care and that others are unreliable in meeting their needs³¹. Insecure attachment styles can hinder the development of self-compassion and reinforce negative beliefs about oneself and relationships that arise from adverse relational experiences in childhood. Over time, these beliefs may become internalized, shaping an individual's self-view and interactions with the world³⁹.

Numerous studies have documented varying associations between SC and attachment styles, highlighting the varying predictive abilities of attachment anxiety and avoidance on^{33,34,40}. Joeng et al. (2017)³³ examined the mediating roles of self-compassion and fear of self-compassion in the relationship between attachment anxiety/avoidance and emotional distress, finding that self-compassion can act as a protective buffer, reducing distress, while fear of self-compassion amplifies it. Similarly, Mackintosh et al. (2018)³⁴ investigated self-compassion, attachment, and interpersonal difficulties among clinical patients with anxiety and depression, revealing that attachment anxiety and avoidance are associated with reduced self-compassion. Research also supports the idea that self-compassion serves as a vital pathway linking attachment anxiety and avoidance to psychological distress⁴⁰. Collectively, these studies underscore self-compassion's essential role in mitigating the negative impact of attachment anxiety and avoidance on mental health.

Recent studies highlight the significant impact of SC on CPTSD. Research indicates that SC significantly influences CPTSD symptoms^{6,14}. Studies confirmed that SC is negatively related to PTSD symptomatology, particularly the avoidance cluster of symptoms⁴¹. There is tentative evidence that SC-based interventions potentially reduce PTSD symptoms⁴¹. Research on the impact of SC on DSO symptoms is relatively sparse. However, existing studies indicate that SC significantly helps reduce DSO symptoms^{6,14}. Notably, the effects of SC are more substantial on DSO than on PTSD⁶. Similar to attachment security, SC offers an inner safe haven for individuals to find refuge and recover during distress, and a secure base from which they can explore the world and connect with others⁴². Studies suggest that attachment styles can evolve later in life through corrective experiences with new attachment Fig. 4³. It can be posited that SC is one result of these corrective experiences^{42,44}. ACEs can lead to insecure attachment styles, which may play a role in the development of CPTSD symptoms. Previous research has demonstrated that both attachment anxiety and avoidance are associated with increased vulnerability to PTSD and DSO symptoms. However, the potential mediating role of SC in these relationships has not been thoroughly investigated. Multiple studies have demonstrated that SC mediates the links between attachment styles and various mental health outcomes such as mental health³¹, depression⁴⁰, anxiety³³, interpersonal difficulties³⁴, and well-being^{32,45}. These findings suggest that SC could be a crucial mechanism through which attachment styles impact psychological functioning. Importantly, these findings note that SC

may offer a more accessible focus for intervention than attempting to modify deeply ingrained attachment styles, making it a valuable area for clinical and therapeutic strategies³². This underscores the necessity and value of further investigating SC's mediating role in the relationship between attachment styles and CPTSD symptoms, contributing to the understanding and development of effective intervention approaches.

The present study develops a mediation model to examine how attachment anxiety and avoidance influence CPTSD symptoms through SC in Chinese college students with ACEs. We hypothesize that attachment anxiety and avoidance are correlated with the presence of PTSD and DSO symptoms. Additionally, we propose that SC plays a significant mediating role in the relationships between them. Furthermore, we hypothesize that the strength of this relationship is more pronounced in DSO symptoms compared to PTSD symptoms.

Methods

Procedures and participants

Data for this study were collected between September and October 2023 at universities in Kunming, China. Informed consent was obtained from all participants/legal guardians with an assent from the participant. After obtaining informed consent, students were invited to complete the survey via online platform.

A total of 32,388 students completed the questionnaires, of which 32,247 provided valid data. Among the participants, 3896 reported at least one ACE. The final sample consisted of 2326 males (59.7%) and 1570 females (40.3%), with ages ranging from 15 to 27 ($M \pm SD = 21.05 \pm 1.486$).

Measures

Revised adverse childhood experiences questionnaire (ACEQ-R)

The ACEQ-R, originally developed by the Centers for Disease Control and Prevention and later revised by multiple countries, is a widely used instrument that includes 10 questions to assess the relationship between ACEs and adult health and social outcomes, covering various aspects such as physical abuse, emotional abuse, physical neglect, and family dysfunction⁴⁶. Each question is answered with either 0 (no) or 1 (yes). The questionnaire has been translated into Chinese and validated for using among college students⁴⁷.

Adult attachment scale (AAS)

The AAS included 18 items that could measure the two dimensions of attachment anxiety and avoidance⁴⁸. Each item is measured on a 5-point Likert scale from 1 (not at all) to 5 (very much). A high score in that dimension indicated a high level of attachment anxiety or avoidance. AAS has been validated in Chinese college students⁴⁹. The Cronbach's α coefficient for attachment anxiety and avoidance in this study was 0.858 and 0.759, respectively.

International trauma questionnaire (ITQ)

The ITQ was used to measure CPTSD. The ITQ assesses PTSD through three symptom clusters (re-experiencing in the here and now, avoidance and sense of current threat) and DSO through three symptom clusters (affective dysregulation, negative self-concept, disturbances in relationships)⁵⁰. ITQ adopts a five-point Likert scoring from 0 (Not at all) to 4 (Extremely). Higher scores, obtained by summing up individual item scores, indicate more severe symptoms. The Chinese translation of ITQ has been validated in prior research, demonstrating strong psychometric properties⁵¹. In this study, the PTSD subscale had a Cronbach's α coefficient of 0.893, and the DSO subscale had a Cronbach's α coefficient of 0.891.

Self-compassion scale-short form (SCS-SF)

SC was assessed using the SCS-SF, a widely used tool for measuring individuals' SC⁵². The SCS-SF is highly correlated with its full version and has been validated for use in the Chinese college students⁵³. The scale consists of 12 items, rated on a five-point Likert scale from 1 (Almost never) to 5 (Almost always). In this study, the Cronbach's α coefficient was 0.863 for SC.

Data analyses

Descriptive statistics and correlation analyses were conducted in SPSS 29.0. The structural equation model (SEM) was used in Amos 29.0 to examine the relationships between attachment anxiety, attachment avoidance, PTSD, and DSO symptoms. Bootstrap analysis with 5000 replicates was employed to determine the 95% confidence intervals for the mediating effects of SC in the SEM.

Ethical considerations

The research was performed in accordance with relevant guidelines/regulations, and approval was obtained from the ethics committee of Kunming University of Science and Technology (Approval No: KMUST-MEC-149). Informed consent was obtained from all participants with an assent from the participant. This study has been performed in accordance with the Declaration of Helsinki.

Results

Descriptive statistics and correlations

Among the 3896 college students who reported experiencing at least one ACE, our analysis revealed that the most frequently reported experience was parental separation or divorce, with 38.53% ($n = 1501$) of participants indicating exposure. Other commonly reported ACEs included domestic violence (33.50%, $n = 1305$), physical neglect (32.65%, $n = 1272$), and physical abuse (32.16%, $n = 1253$). Additionally, 22.43% ($n = 874$) of participants reported household substance abuse. Other notable ACEs included emotional neglect (18.81%, $n = 733$), having

Variables	M	SD	1	2	3	4	5
1 Attachment anxiety	2.73	0.871	1				
2 Attachment avoidance	2.65	0.535	0.570**	1			
3 Self-compassion	40.34	7.928	-0.597**	-0.572**	1		
4 PTSD	3.64	3.972	0.418**	0.392**	-0.507**	1	
5 DSO	4.73	4.586	0.536**	0.558**	-0.682**	0.589**	1

Table 1. Means, standard deviations, and correlations for study variables. ** $p < 0.01$; PTSD post-traumatic stress disorder, DSO disturbances in self-organization.

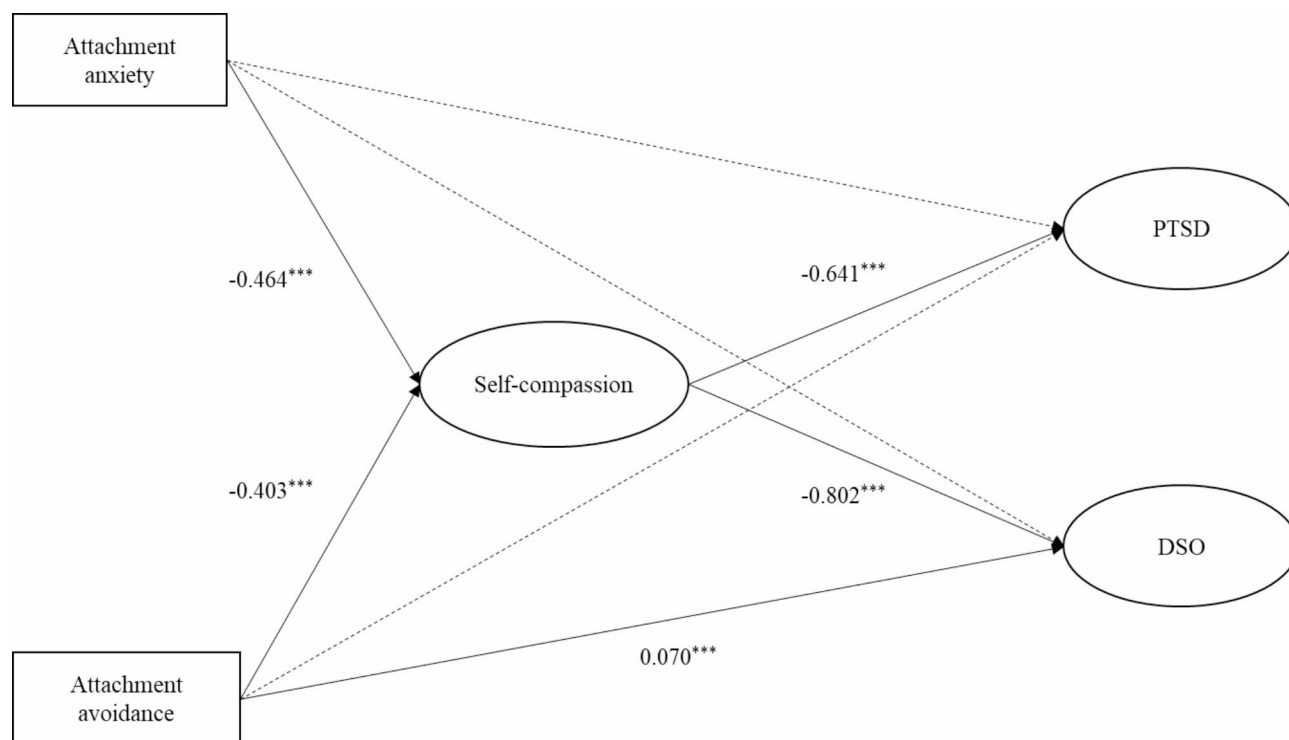


Fig. 1. The mediation model (** $p < 0.001$, PTSD = post-traumatic stress disorder, DSO disturbances in self-organization).

an incarcerated household member (17.07%, $n = 665$), and sexual assault (15.86%, $n = 618$). Less frequent ACEs in this sample were emotional abuse (12.04%, $n = 469$) and household mental illness (10.63%, $n = 414$).

Table 1 presents the descriptive statistics and correlations ($N = 3896$). In this study of college students with ACEs, the mean score for attachment anxiety was 2.73 ($SD = 0.871$), while the mean score for attachment avoidance was 2.65 ($SD = 0.535$). For comparison, a study conducted among a large sample of Chinese young adults reported mean scores of 2.43 for attachment anxiety and 2.50 for attachment avoidance⁵⁴, indicating slightly higher levels in our sample. SC in this study had a mean score of 40.34 ($SD = 7.928$), which is comparable to the reported average of approximately 39.0 in nonclinical university student populations⁵⁵. The mean scores for PTSD and DSO were 3.64 ($SD = 3.972$) and 4.73 ($SD = 4.586$), respectively. Previous research on CPTSD among nonclinical Chinese college students showed mean PTSD and DSO scores of 0.96 and 0.20⁵⁶, respectively, which are considerably lower than those found in the current study. However, in studies focusing on Chinese college students with childhood adversity, the mean scores for PTSD and DSO were 4.39 and 3.11⁵⁷, respectively. The correlation analysis revealed significant relationships among the study variables. Attachment anxiety was positively correlated with attachment avoidance, PTSD and DSO, and negatively correlated with SC. Similarly, attachment avoidance was positively correlated with PTSD and DSO, and negatively correlated with SC. SC showed a negative correlation with both PTSD and DSO. PTSD and DSO were positively correlated.

The mediation model

Figure 1 illustrates the standardized coefficients of the structural model ($N = 3896$). The fit indices indicated that the model fit the data well, with acceptable values for various indices ($\chi^2/df = 7.867$, $RMSEA = 0.030$, $GFI = 0.973$, $AGFI = 0.956$, $CFI = 0.978$, $NFI = 0.974$, $TLI = 0.969$). The model demonstrates that attachment anxiety ($\beta = -0.464$, $p < 0.001$) and avoidance ($\beta = -0.403$, $p < 0.001$) are significantly and negatively associated with SC. SC

Mediation paths	Estimate	<i>p</i>	95% CI
Attachment anxiety → Self-compassion → PTSD	0.370	<0.001	[0.335, 0.406]
Attachment anxiety → Self-compassion → DSO	0.603	<0.001	[0.555, 0.653]
Attachment avoidance → Self-compassion → PTSD	0.524	<0.001	[0.471, 0.581]
Attachment avoidance → Self-compassion → DSO	0.855	<0.001	[0.757, 0.957]

Table 2. The confidence intervals and effect sizes of the mediation model. *PTSD* post-traumatic stress disorder, *DSO* disturbances in self-organization.

significantly and negatively influences both PTSD ($\beta = -0.641, p < 0.001$) and DSO ($\beta = -0.802, p < 0.001$). The paths to DSO had higher effect size. Moreover, attachment avoidance has a small but significant direct positive effect on DSO ($\beta = 0.070, p < 0.001$). The direct paths from attachment anxiety to PTSD and DSO, as well as from attachment avoidance to PTSD, were not significant, as shown by the dotted lines in Fig. 1.

As illustrated in Table 2, the 95% bootstrap confidence intervals for the mediating effects of SC between the relationships of attachment anxiety and avoidance with PTSD and DSO symptoms did not include zero among college students, indicating significance.

Discussion

This study examined the influence of attachment anxiety and avoidance on CPTSD symptoms. We found that both attachment anxiety and avoidance significantly influence the presence of PTSD and DSO symptoms through SC among college students with ACEs. SC demonstrated stronger mediating effects in the relationships between attachment anxiety and avoidance with DSO symptoms than with PTSD symptoms.

According to attachment theory, attachment styles represent internalized assessments and expectations of oneself and important others²¹. Insecure attachment styles can affect how individuals relate to themselves, influencing their self-worth and self-evaluation, which is reflected in the construct of SC⁵⁸. From the perspective of social mentality theory, individuals utilize evolved systems for interacting with others to form a relationship with themselves. Social mentalities guide individuals in establishing specific roles in their interactions with others^{37,59}. These mentalities are triggered not only in relation to others but also within the individual's own internal dynamics^{60,61}. For example, an individual might employ the same nurturing behaviors towards themselves that they would towards a loved one, fostering SC and care. This internalization process underscores the importance of self-directed compassion, where individuals apply the same empathetic and supportive attitudes towards themselves as they do towards others⁶¹. Thus, it is suggested that early attachment experiences may influence SC, which in turn correlates with mental health⁵⁸. From the perspective of childhood experiences, receiving adequate care allows a child to feel comforted and supported, leading to the internalization of positive self-perceptions and relational patterns. In contrast, ACEs can lead individuals to feel unworthy of support and perceive others as unreliable, fostering negative self-perceptions and maladaptive relational patterns⁶². Recent systematic reviews have also documented the association between ACEs and a range of mental health and relational difficulties, reinforcing the notion that childhood adversities significantly shape mental health trajectories and attachment styles^{63,64}. This suggests that early attachment experiences can have on the development of SC and subsequent mental health outcomes⁵⁶. Recurring interactions with attachment figures who were untrustworthy or insufficiently responsive during childhood may predispose individuals to attachment anxiety and avoidance, fostering self-associations characterized by insecurity and perceived unworthiness of affection^{65,66}. These findings help explain the observed impact of attachment anxiety and avoidance on SC and CPTSD among college students with ACEs.

Our findings align with prior studies that attachment anxiety and avoidance significantly influence the level of SC^{33,45,67}. Childhood experiences, including the formation of attachment to security figures, are crucial pathways for developing high levels of SC, and the relationship between SC and emotion regulation³¹. Consistent with our findings, previous studies demonstrate that attachment anxiety and avoidance have significant but varying effects on SC^{33,34,40}. Individuals experiencing attachment anxiety often develop a pessimistic self-perception, engaging in self-criticism rather than self-care^{45,68}. Their inclination to seek external validation and attention hinders their ability to rely on internal resources to foster SC³¹. Contrary to the core of SC, is the capacity to wholeheartedly embrace one's own pain or distress, care for oneself during difficult times⁶⁹, those with attachment avoidance exhibit heightened defense mechanisms that deter vulnerability⁷⁰. Consequently, those with high attachment avoidance often set strict expectations for themselves, opting to depend on their own abilities instead of seeking support from others, leading to reduced SC^{45,71,72}.

Align with existing research, our results suggesting that SC significantly influences CPTSD symptoms, serving as an adaptive resource for coping with both traumatic experiences and distressing situations^{6,14,41}. As a result, individuals with high levels of self-compassion are less likely to CPTSD symptoms in response to ACEs⁶. Individuals with high SC tend to be kind to themselves during adversity, which aids in trauma recovery and reduces PTSD symptoms^{42,73}. Our results indicate that, although SC significantly impacts both PTSD and DSO, its effect is more pronounced for DSO among college students with ACEs. This finding is consistent with prior research¹⁴, which indicates that SC may be particularly important in predicting DSO symptoms compared to PTSD symptoms, especially regarding negative self-concept. It has been argued that this negative self-concept might be more responsive to compassion focused interventions⁷⁴.

SC mediates the relationship between attachment anxiety, attachment avoidance, and CPTSD. SC, similar to attachment security, provides an inner safe base where individuals can seek refuge and recover during times

of distress, connect with others to recover²¹. Individuals with higher attachment anxiety or avoidance tend to have lower levels of SC, which increases their vulnerability to CPTSD symptoms. Our findings suggest that the influence of attachment anxiety and avoidance on CPTSD is largely mediated by SC. Our findings indicate that the pathway from attachment anxiety and avoidance through SC to DSO symptoms exhibited a stronger effect size than the pathway to PTSD symptoms. This aligns with previous research highlighting differences in symptom manifestation and underlying mechanisms between PTSD and DSO. Specifically, PTSD symptoms are more closely associated with emotions such as fear and anxiety⁷⁵. In contrast, DSO is often linked to prolonged and repeated adverse experiences¹³. Additionally, research exploring distinct contributing factors for PTSD and DSO has found that interpersonal trauma during childhood and a tendency toward insecure attachment have a more pronounced impact on DSO compared to PTSD^{2,76}. The results also reveal a minor direct effect of attachment avoidance on DSO, aligning with prior research indicating that avoidant attachment consistent with relational dysregulation in DSO².

Although attachment anxiety and avoidance influence CPTSD through SC, some studies suggest that SC can also act as a buffer, reducing the negative impact of attachment insecurities on psychological outcomes by promoting adaptive coping mechanisms and emotional resilience³¹. It serves as a protective factor against the impact of traumatic stress by helping individuals better utilize social support, thereby buffering the adverse effects of traumatic experiences⁷⁷. Insecure attachment styles have been shown to be associated with lower compassion, potentially increasing vulnerability to mental health challenges⁷⁸. SC, which reflects a caring and compassionate attitude toward oneself, can serve as a protective mechanism, enabling individuals with insecure attachment styles to better cope with the emotional effects of ACEs. Clinical applications suggest that enhancing SC and attachment security may be instrumental in improving psychological well-being for those with insecure attachment styles. Attachment-Based Compassion Therapy (ABCT)⁷⁹ is one such intervention that integrates attachment theory with compassion practices. Evidence indicates that ABCT can effectively increase secure attachment and SC, while decreasing psychological distress⁸⁰. Additionally, interventions like secure attachment priming⁷¹ and SC priming⁸¹ have shown promise in making SC exercises more approachable for individuals with attachment anxiety or avoidance⁸². Our study, along with these previous researches, highlights the value of attachment-focused interventions and suggests that fostering SC within this framework can enhance the social and emotional resilience needed to overcome the long-term effects of ACEs. Our findings specifically confirmed the mediating role of SC in the relationships between attachment anxiety, attachment avoidance, and both PTSD and DSO symptoms, highlighting SC's importance in alleviating CPTSD symptoms and supporting its therapeutic potential. In a therapeutic context, for self-compassion to be effective in treating complex PTSD, it should be integrated within a comprehensive, interpersonal, and attachment-based framework that takes early experiences into account⁴². For individuals with attachment anxiety, therapeutic work on SC can gradually foster a sense of self-soothing, a crucial skill that anxious individuals may lack due to dependence on others for emotional reassurance⁴². In these cases, therapists can use SC-based interventions to help individuals recognize and attend to their own needs with compassion, reinforcing instances where they have effectively responded to their needs. Over time, this approach may empower individuals to rely less on external validation and more on self-support. For individuals with attachment avoidance, early experiences often lead to a mistrust of both self and others in times of distress. They may benefit from SC as a means of addressing deep-seated feelings of shame and worthlessness, which are common in CPTSD and often rooted in ACEs⁸³. SC-based therapy is inherently attachment-oriented, as it taps into foundational experiences of care, love, and validation that may have been absent in early life. This approach can help individuals gradually build an internal secure base, thereby enhancing their resilience against the effects of trauma^{84,85}.

Our study makes original contributions by exploring the relationships between attachment styles, SC, and CPTSD symptoms in college students with ACEs. Specifically, we developed a mediation model to examine how SC links attachment anxiety and avoidance with CPTSD symptoms, demonstrating a stronger mediating effect on DSO symptoms compared to PTSD symptoms. This approach enriches the existing literature, positioning SC not only as a mediating factor but also as a potential therapeutic target to mitigate the effects of attachment insecurities that stem from ACEs. Our findings show that SC has a more substantial impact on DSO symptoms, underscoring its role in self-regulation, self-concept, and relational difficulties. By identifying SC as an accessible target for intervention, our research suggests that fostering SC may offer a more adaptable focus in therapeutic settings than altering entrenched attachment styles. Clinical applications, such as ABCT and SC priming, could promote resilience and reduce psychological distress in individuals with insecure attachment styles. The study's implications for both theory and practice are significant, as our findings support attachment theory and social mentality theory, illustrating how insecure attachment styles, shaped by early adversity, can diminish SC, and elevate vulnerability to CPTSD symptoms. By clarifying the differential influence of attachment anxiety and avoidance on DSO and PTSD symptoms, this study suggests that integrating SC-focused interventions within an attachment-based therapeutic framework could effectively address CPTSD symptoms in individuals with ACEs. Our study highlights the importance of SC as a protective mechanism, opening new directions for interventions aimed at enhancing mental health outcomes in college students with ACEs.

Limitations

Several limitations should be acknowledged. First, this study adopted a retrospective method to measure the ACEs which may result in biased information in college students. Second, this study relied on only self-report scale to assess CPTSD symptoms. Future studies might collect multiple-informant reported data to measure CPTSD more accurately in college students. Third, while we selected a mediating model to explore SC as a pathway through which attachment anxiety and avoidance might impact CPTSD, this approach may limit certain interpretations. Specifically, SC could plausibly act as a moderating factor, buffering the negative effects of ACEs on mental health. Examining SC as a moderator might have provided additional insights into its

potential protective role, particularly in individuals with ACEs. Additionally, we did not differentiate among specific categories of ACEs in our analyses, which could have provided a more nuanced understanding of how different types of adversity uniquely impact attachment styles, self-compassion, and CPTSD symptoms. Future research could examine these categories separately to yield more tailored insights. Fourth, the cross-sectional design limits the ability to draw causal conclusions. While we examined SC as a mediator in this model, evidence suggests a bidirectional relationship between attachment styles and SC⁶⁷, or even a causal relationship opposite to our hypothesis⁸⁶, which could potentially alter the dynamics of this model. Studies implies that SC may co-develop with attachment styles, where both influence each other over time rather than following a unidirectional pathway^{87,88}. The directionality of these relationships cannot be definitively established without longitudinal data. Given these considerations, future longitudinal studies could provide a more comprehensive understanding of the reciprocal influences between attachment styles and SC. Lastly, these findings are based on college students, and therefore it may not be possible to generalize these to other samples.

Conclusions

This study examined the significant mediating role of SC in the relationship between attachment anxiety, attachment avoidance, and CPTSD symptoms among college students with ACEs. Our findings indicate that insecure attachment styles are linked to higher levels of CPTSD symptoms, with SC serving as a significant mediator. Higher SC levels are associated with reduced PTSD and DSO symptoms, particularly the latter. These results emphasize the importance of fostering SC to mitigate the negative mental health outcomes associated with insecure attachment styles in college students with ACEs. Future research should explore longitudinal designs and diverse populations to further understand these relationships and enhance interventions.

Data availability

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

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Author contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Y.P. The first draft of the manuscript was written by Y.P. and all authors commented on previous versions of the manuscript. Z.I. provided critical edits. All authors discussed the results and contributed to the final manuscript. All authors read and approved the final manuscript.

Declarations

Competing interests

The authors declare no competing interests.

Ethics declarations

We confirm that the research was performed in accordance with relevant guidelines/regulations, and approval was obtained from the ethics committee of Kunming University of Science and Technology (Approval No: KMUST-MEC-149). Informed consent was obtained from all participants with an assent from the participant. This study has been performed in accordance with the Declaration of Helsinki.

Additional information

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