The power of self-forgiveness: the dual impact of shame on creativity

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Abstract

While some studies have begun to explore the impact of negative emotions on creativity, the psychological mechanisms through which shame, as a strongly negative emotional experience, affects creativity remain unclear. Furthermore, previous research has predominantly relied on variable-centered methods, potentially masking significant individual differences in shame within populations. Therefore, this study employs an individual-centered latent profile analysis method, grounded in cognitive adjustment model theory and emotion regulation process models, to examine the mediating role of self-forgiveness across different categories of shame. The study surveyed 1023 participants (50.60% male, 49.40% female). The results revealed that latent profile analysis identified five distinct shame groups: Shame-Context Constancy Low, Shame-Context Constancy Moderate, Shame-Context Constancy High, Shame-Context Salience Low, and Shame-Context Salience High. Self-forgiveness played a suppressive mediating role in the Shame-Context Constancy High and Shame-Context Salience High groups, which, in turn, influenced creativity. This study uncovers significant heterogeneity in shame across different groups and elucidates the complex psychological mechanisms through which shame affects creativity: high levels of shame may predict better creative performance, but the lack of self-forgiveness can inhibit the creative benefits derived from shame. These findings provide valuable insights for interventions aimed at enhancing creativity among different shame subgroups.

Keywords Shame, Self-forgiveness, Creativity, Latent profile analysis

Introduction

Many studies suggest that creativity may be influenced by emotional states. Previous research has predominantly focused on positive emotions. However, studies examining the impact of negative emotions, particularly intense ones like shame, show considerable variation in their hypotheses and findings. Additionally, shame, as a complex emotional experience, exhibits significant individual differences. However, previous research on shame has predominantly used variable-centered approaches. Therefore, this study employs an individual-centered latent profile analysis (LPA) method to identify latent categories within shame and, based on this, explores its impact mechanism on creativity. Self-forgiveness can help individuals experiencing shame to proactively face their mistakes, take responsibility, and restore their sense of self-worth. This positive attitude towards one's shortcomings may lead to constructive behaviors. Hence, in the current study, we use self-forgiveness as a mediating variable to explore the psychological mechanism through which different types of shame influence creativity.

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Shame and creativity

Creativity is defined as the ability to generate new ideas, discoveries, and innovations [1], and it plays a crucial role in human social advancement [2]. As a critical human capability, creativity has drawn extensive attention from researchers. Recent studies have focused on the impact of negative emotions on creativity, with findings varying widely. For instance, George's study on creative performance among employees showed that negative emotions had a stronger positive effect on creativity, while positive emotions had a more noticeable negative effect on creativity under similar conditions [3]. In contrast, research on middle school students found that negative emotions had a significant negative impact on creativity [4–6].

Shame, as a strong negative emotion, causes individuals to experience feelings such as embarrassment and distress [7, 8]. This may suggest that shame could hinder creativity. However, the cognitive adjustment model theory argues that emotions provide crucial information about the environment [9]. Negative emotions signal problems (such as danger or unmet needs) and motivate actions to address these issues, potentially fostering creative behavior [10, 11]. Similarly, the emotion regulation process model suggests that in negative emotional states, individuals may be motivated to restore emotional balance [12, 13]. Therefore, shame could also be seen as an emotion with creative potential, a view supported by some research. For example, prior studies have shown that in organizational settings, employees who experience shame may demonstrate higher creativity when exposed to creative teams [14]. Based on this, we propose Research Hypothesis 1 (H1): shame may facilitate individual creativity.

Understanding individual differences in shame: a person-centered approach

Shame is a socially and culturally conditioned emotion, deeply connected to social life [15]. According to the bioecological model of human development, individual development is shaped by interactions between individuals and their environment, as well as between different environmental systems [16]. Studies show that self-representation and structure vary across cultures. For example, individuals in Chinese cultures often rely more on others' evaluations to maintain their self-worth [17, 18]. These theories suggest that shame can vary significantly among individuals within a group.

Traditional variable-centered research methods group individuals with similar shame scores together, assuming that they share similar behaviors. This approach overlooks the individual differences within shame. In contrast, individual-centered methods capture these differences, helping to identify both trait-oriented and situation-oriented shame within a group. This method provides a clearer understanding of how self-forgiveness mediates creativity across different shame categories. For this reason, we chose an individual-centered approach, which differentiates our study from previous research.

Self-forgiveness influences shame and creativity

Self-forgiveness is a method individuals use to cope with self-blame after realizing a mistake or failure. It is not about forgetting one's faults but about accepting oneself after experiencing the negative emotions resulting from errors. Self-forgiveness involves confronting the mistake, taking responsibility, and acknowledging one's value despite the mistake [19–21]. Therefore, self-forgiveness is essentially a positive way to handle negative emotions. Previous research has shown that individuals with higher levels of self-forgiveness are less likely to become trapped in the negative emotional state caused by their errors and are more likely to overcome shame [22]. Furthermore, studies have demonstrated that this active acceptance and forgiveness of oneself in the face of mistakes can enhance creativity [23].

Conversely, if individuals refuse to forgive and accept their mistakes, they may experience intense shame and become immersed in self-loathing emotional states [24]. This may lead them to attribute the results of their behavior to internal, stable factors, causing them to avoid their own existence and resulting in lower levels of self-forgiveness [25].

Thus, while we hypothesize that shame may foster constructive behavior, this is likely dependent on whether the individual perceives their flaws or mistakes as amendable and acceptable. In other words, if an individual experiences intense shame but does not accept this emotional experience, it is likely to suppress the creativity inherent in the shame. Based on the above evidence, we propose research hypothesis 2 (H2): self-forgiveness mediates the relationship between shame and creativity.

Materials and methods

Participants and procedures

The data for this study were collected in June 2024 from a comprehensive university in China, where 1184 participants were successfully recruited. The entire survey process was conducted online using www.wjx.cn, with all participants completing the questionnaire in class under the researcher's guidance. Participants received a small gift upon survey completion, and it's important to note that the amount of compensation was disclosed only after the survey. All participants voluntarily participated in the survey and signed informed consent forms before completing the questionnaire.

To ensure data quality, we established the following exclusion criteria: (1) completion time outside the 10–20 min range, (2) half or more of the responses

identical in length to the total scale [26], and (3) failure to pass deception detection items in the survey. Finally, after excluding samples that did not meet the data analysis criteria, a total of 1023 participants (518 males and 505 females) were included in the analysis (see specific demographic data in Table 1). This study was approved by the Ethics Committee of Anhui Science and Technology University.

Measures
Shame
In this study, we utilized the Shame Scale revised by Chinese scholars in 2000 to assess participants' levels of shame(e.g.: "Do you feel ashamed of certain personal behaviors or habits?") [27].The scale consists of 25 items that measure three dimensions: personal shame (12 items), behavioral shame (9 items), and bodily shame (4 items). Each item is rated on a 4-Likert point scale (1 = strongly disagree, 2 = somewhat disagree, 3 = somewhat agree, 4 = strongly agree), with all items positively scored. The mean score across all items was computed to evaluate participants' shame levels. We did not differentiate between shame dimensions in this study but used the mean score as an overall measure of participants' shame levels, where higher scores indicate higher levels of shame. Cronbach's alpha for the scale in this study was 0.962.

Self-forgiveness
Self-forgiveness was assessed using an adapted version of the Self-Forgiveness Scale from the Heartland Forgiveness Scale (HFS) [28], based on the adaptation by Wang in 2007 [29]. This adapted scale demonstrates good reliability and validity among Chinese participants. The scale employs a 7-Likert point scale (1 = strongly disagree, 7 = strongly agree) across 12 items, with items 1–5 reverse-scored. The mean score across all items was used to evaluate individual levels of self-forgiveness, where higher scores indicate higher levels of self-forgiveness. In this study, Cronbach's alpha for the scale was 0.836.

Creativity
The Runco Ideational Behavior Scale (RIBS) was used to measure participants' tendencies toward creative behavior in daily life [30]. The RIBS is a self-report scale that accurately reflects individuals' use of innovative ideas or thoughts, and its translated version has demonstrated good reliability and validity in China [31, 32]. The scale consists of 24 items, rated on a 5-Likert point scale (1 = Never, 5 = Very Frequently), with no reverse-scored items. The mean score of all items was calculated to reflect the individual's creativity, with higher scores indicating higher levels of creativity. In our study, the Cronbach's alpha was 0.922.

Statistical analysis
In this study, data entry and organization were conducted using SPSS26.0. Descriptive statistics and Pearson correlation analyses were performed on sample data and all variables. LPA was conducted on shame using Mplus 8.3 to identify different profiles, and to examine the mediating role of self-forgiveness between shame and creativity, as well as to compare differences in mediation effects across multiple groups.

GraphPad Prism 9.5.0 software (GraphPad Software Inc.) was utilized for conducting one-way ANOVA and non-paired t-tests (two-tailed), among other parametric or non-parametric analyses. Shapiro-Wilk test was used to assess data normality, and Levene's test was used to assess homogeneity of variances. If data met assumptions of normality but variances were unequal, one-way ANOVA with Geisser-Greenhouse correction was applied. For data not meeting normality and homogeneity of variance assumptions, non-parametric Kruskal-Wallis test was used.

For post hoc multiple comparisons following ANOVA, parametric tests used Least Significant Difference, and

Table 1 Descriptive statistics

Variable		N	(%)	Variable		N	(%)
Gender	Male	518	50.60	Education	High School	26	2.54
	Female	505	49.40		Associate Degree	24	2.35
Age	18–24 years old	935	91.40		Bachelor's Degree	915	89.44
	25–30 years old	65	6.40		Master's Degree	49	4.79
	31–36 years old	5	0.50		Doctoral Degree	9	0.88
	37–42 years old	4	0.40	Grade	Freshman	706	69.00
	43 years old and above	14	1.30		Sophomore	52	5.10
Sole child status	Yes	300	29.33		Junior	153	15.00
	No	723	70.67		Senior	19	1.90
					Master's Student	33	3.20
					Ph.D. Student	9	0.90
					Non-enrolled Student	51	5.00

Table 2 Descriptive statistics and correlation analyses of variables

Variable	M	SD	Shame	Self-Forgiveness	Creativity
Shame	2.11	0.60	1		
Self-Forgiveness	4.23	0.82	-0.56**	1	
Creativity	3.24	0.48	0.14**	0.06	1

**p < 0.01

non-parametric tests used Dunn's multiple comparisons test following Kruskal-Wallis test.

Results

Testing for common method bias

To rule out potential common method bias that could confound the interpretation of the data, Harman's single-factor test was employed in this study. All items from the scales were included in an exploratory factor analysis. The results revealed 12 factors with eigenvalues greater than 1, with the first common factor accounting for 22.77% of the variance, which is below the critical threshold of 40% [33, 34]. Therefore, there is no significant common method bias present in this study.

Descriptive statistics and correlation analyses

Table 2 presents the correlation analysis among the variables in this study. The results indicate a positive correlation between shame and creativity ($r = 0.14$, $p < 0.01$), suggesting that individuals with higher levels of shame tend to score higher in creativity. Additionally, the data show a negative correlation between shame and self-forgiveness ($r = -0.56$, $p < 0.01$), indicating that individuals with higher levels of shame tend to have lower self-forgiveness scores. Furthermore, the results show a marginally significant correlation between self-forgiveness and creativity ($r = 0.06$, $p = 0.07$).

Latent profile analysis of shame

LPA was conducted using the scores from each item of the shame scale as indicators. The number of model classes was sequentially increased from 1 to 6, and model fit indices were observed. Following recommendations from previous research [35–37], this study selected the following indices to determine the number of profiles:

(1) *Relative Fit Indices*: Including AIC (Akaike information criterion), BIC (Bayesian information criterion),

and aBIC (adjusted BIC). Lower values for AIC, BIC, and aBIC indicate better model fit.

(2) *Entropy*: Reflects the confidence of classification, with higher values being better. Entropy should be at least 0.80, indicating that classification accuracy exceeds 90% when Entropy ≥ 0.80.

(3) *Lo-Mendell-Rubin Test (LMRT) and Bootstrapped Likelihood Ratio Test (BLRT)*: These tests compare the differences between adjacent class models. Significant results from LMRT and BLRT suggest that the model with k classes is better than the model with k-1 classes, with BLRT generally outperforming LMRT.

(4) *Proportion of Each Subgroup*: Each subgroup should have a proportion not less than 5%.

Although these indices are the primary criteria for determining the number of latent profiles, the final number of profiles and their interpretation must be considered in conjunction with the actual context [38].

Table 3 provides detailed model fit indices for the different latent profiles of shame. The results indicate that as the number of classes increases from 1 to 6, the AIC, BIC, and aBIC values progressively decrease, and the Entropy values are all greater than 0.8, suggesting that the precision of all models is good. Notably, when the number of profiles is 6, the LMRT did not reach significant difference, indicating that the 5-class model fits the data better than the 6-class model. Additionally, the proportion of each class was greater than 5%. Therefore, this study determined that the 5-class model was the optimal model for categorizing shame. By examining the original items of the shame scale, we identified significant score differences and distinct meanings among the five different profiles.

As shown in Fig. 1, we found that profiles 3 and 5 exhibit similar score trends, with noticeable increases in item scores starting from Item 13 and significant decreases after Item 21. This indicates that profiles 3 and 5 have higher scores on items 13–21. In the original shame scale, items 13–21 correspond to the behavioral shame dimension, which typically describes specific situations, such as "Do you feel ashamed and worry about what others think of you when you say something inappropriate?". Therefore, we named profile 5 "Shame-Context Salience High" (SCS-H) and profile 3 "Shame-Context Salience Low" (SCS-L). Profiles 1, 2, and 4 show

Table 3 Summary of model fit information for latent profile analysis of shame

| Class	AIC	BIC	aBIC	Entropy	LMRT	BLRT	Category Proportions and Counts
1	63349.07	63595.59	63436.79	—	—	—	—
2	53898.29	54273.01	54031.62	0.96	$p < 0.001$	$p < 0.001$	660(0.65)/363(0.35)
3	50670.12	51173.03	50849.07	0.96	$p < 0.001$	$p < 0.001$	237(0.23)/512(0.50)/274(0.27)
4	49399.67	50030.77	49624.23	0.96	$p < 0.01$	$p < 0.001$	277(0.22)/264(0.26)/462(0.45)/70(0.07)
5	48725.06	49484.35	48995.23	0.95	$p < 0.05$	$p < 0.001$	222(0.22)/432(0.42)/101(0.10)/203(0.20)/65(0.06)
6	48257.04	49144.53	48572.83	0.93	$p = 0.52$	$p < 0.001$	102(0.10)/187(0.18)/363(0.35)/111(0.11)/193(0.19)/67(0.07)
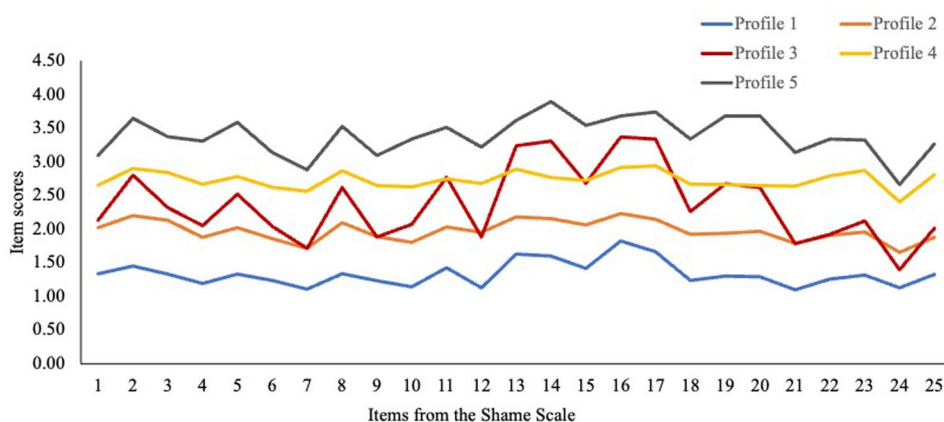
Fig. 1 Five latent profiles of shame derived from scale item scores

consistent trends but differ significantly in their overall score levels without displaying context salience effects. Consequently, we named profile 1 "Shame-Context Constancy Low" (SCC-L), profile 2 "Shame-Context Constancy Moderate" (SCC-M), and profile 4 "Shame-Context Constancy High" (SCC-H). Figure 2 further illustrates the distribution of scores across the 25 items of the shame scale for each group.

Differences in self-forgiveness and creativity across different types of shame

Following the results of the latent profile analysis of shame, this study employed one-way ANOVA to further compare differences in self-forgiveness and creativity across different types of shame. As shown in Table 4, self-forgiveness scores exhibited significant differences among the different types of shame ($H = 295.20$, $p < 0.001$). Post hoc tests revealed significant differences between all groups, and Fig. 3(a) provides a detailed visual representation of these comparisons.

Additionally, results indicated significant differences in creativity scores among the different types of shame ($H = 36.90$, $p < 0.001$). Post hoc comparisons showed that except for the comparisons between SCC-L and SCC-M ($p = 0.74$), SCC-L and SCC-H ($p > 0.99$), SCC-L and SCS-L ($p > 0.99$), SCC-M and SCS-L ($p > 0.99$), and SCC-H and SCS-L ($p > 0.99$), all other group comparisons exhibited significant differences (see Table 4). Figure 3(b) further illustrates the detailed visual results of these comparisons.

The mediation effect of self-forgiveness

Previous research has confirmed that due to a significant reduction in oversight from both schools and families, Chinese university students rapidly develop independent social and psychological maturity during their college years [39]. Therefore, students from different academic years might exhibit differences in psychological and behavioral aspects. Additionally, the age distribution of participants in our study was not uniform. It is also noteworthy that previous studies have indicated potential gender differences in creativity; thus, despite the nearly equal gender ratio in our study, we included gender as a covariate [40]. Another study suggested that family structure and size might influence individual creativity [41].

Therefore, we used independent samples T-tests or ANOVA to examine the potential confounding effects of these variables on the dependent variable. The results showed that creativity scores exhibited significant gender differences ($T = 2.24$, $p < 0.05$) and significant differences across different age groups ($F = 5.59$, $p < 0.001$). Additionally, creativity varied significantly among only children ($T = 2.24$, $p < 0.05$), educational levels ($F = 4.44$, $p < 0.05$), and academic years ($F = 3.30$, $p < 0.05$). Given these findings, we included gender, age, only child status, educational level, and academic year as covariates in our data analysis. We used the bias-corrected non-parametric percentile bootstrap method with 5000 bootstrap samples and a 95% bias-corrected confidence interval (CI) to examine the mediation effects. If the CI does not include zero, the effect is considered statistically significant.

Since the independent variable is categorical, we selected SCC-L, the group with the lowest shame scores, as the reference baseline and used dummy coding to generate four dummy variables. The mediator variable was self-forgiveness, and the dependent variable was creativity [42]. The mediation effects of self-forgiveness between different types of shame and creativity are shown in Tabley 5.

Specifically, using SCC-L as the reference, the 95% CI of the relative total effects for SCC-M, SCC-H, and SCS-L included 0, except for SCS-H. When considering self-forgiveness, the relative direct effects of SCC-M and SCS-L were not significant, but the relative direct effects of SCC-H and SCS-H were significant. The bootstrap test for the mediation effect indicated that the 95% CI for
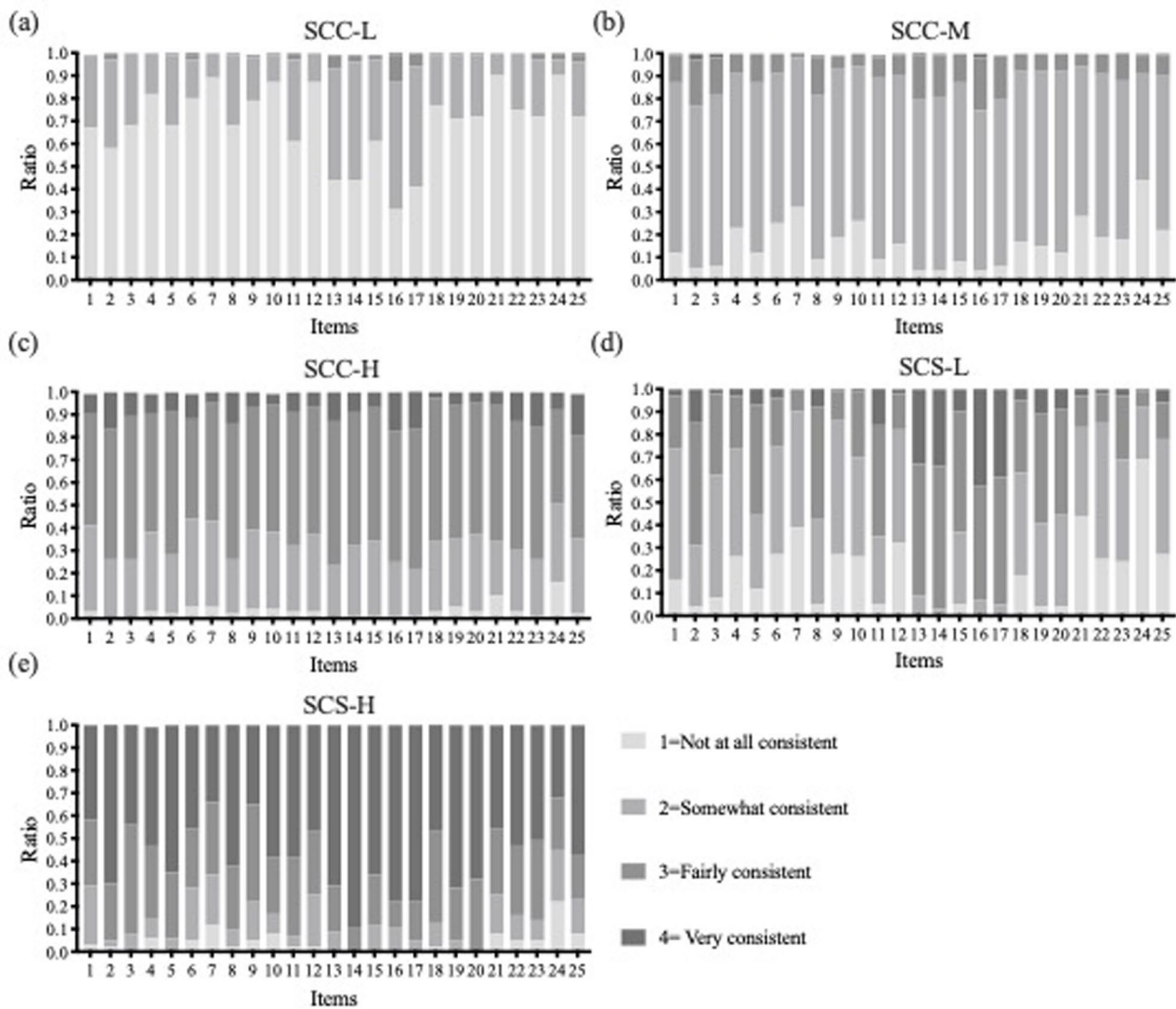
Fig. 2 Distribution of responses to 25 scale items across different shame groups

Table 4 Comparison of Self-Forgiveness and creativity across different shame groups

Variable	Group					Post hoc comparisons
	① SCC-L (*N*=222 *M*=1.33)	②SCC-M (*N*=432 *M*=1.97)	③SCC-H (*N*=203 *M*=2.73)	④SCS-L (*N*=101 *M*=2.38)	⑤SCS-H (*N*=65 *M*=3.38)	
Self-forgiveness	4.92 *H*=295.2, *p*<0.001	4.26	3.81	4.05	3.25	① >②, ① >③, ① >④, ① > ⑤ ②>③, ②>④,②>⑤ ③<④, ③>⑤ ④>⑤
Creativity	3.23 *H*=36.90, *p*<0.001	3.18	3.27	3.22	3.59	① <⑤, ②<③,②< ⑤ ③< ⑤,④< ⑤

SCC-M, SCC-H, SCS-L, and SCS-H did not include 0, indicating that, relative to SCC-L, self-forgiveness mediated the relationship between shame and creativity in all four types (SCC-M, SCC-H, SCS-L, and SCS-H). Figure 4 provides a detailed depiction of the coefficients within the model.

Subsequently, we examined whether there were significant differences in the mediation effect of self-forgiveness among different types of shame. As shown in Table 6, using SCC-L as the reference type, the mediation effects in SCC-M, SCC-H, SCS-L, and SCS-H differed significantly. Based on the indirect path coefficients in Table 5,
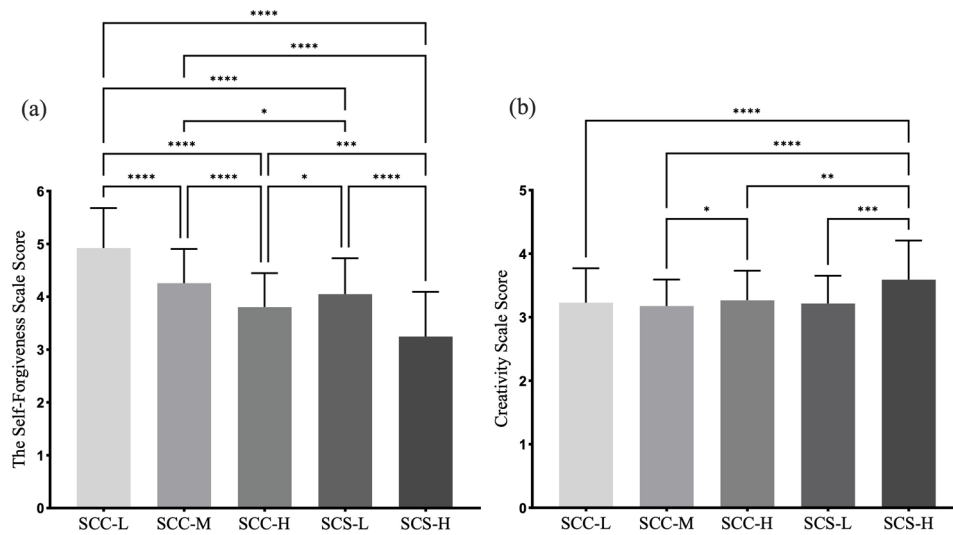
Fig. 3 Scores of self-forgiveness and creativity differ significantly across different shame Groups

Table 5 Direct and indirect effects of different shame groups on creativity

Path Way	Estimate	SE	95%CI	
			LLCI	ULCI
Total effect				
SCC-M	-0.05	0.04	-0.12	0.03
SCC-H	0.03	0.05	-0.05	0.12
SCS-L	-0.01	0.06	-0.12	0.11
SCS-H	0.35	0.07	0.22	0.48
Direct effect				
SCC-M	0.01	0.04	-0.07	0.09
SCC-H	0.14	0.05	0.04	0.24
SCS-L	0.07	0.06	-0.04	0.19
SCS-H	0.51	0.07	0.36	0.66
Total indirect effect				
SCC-M→Self-Forgiveness→Creativity	-0.06	0.02	-0.10	-0.03
SCC-H→Self-Forgiveness→Creativity	-0.10	0.03	-0.16	-0.04
SCS-L→Self-Forgiveness→Creativity	-0.08	0.02	-0.13	-0.03
SCS-H→Self-Forgiveness→Creativity	-0.16	0.05	-0.25	-0.66

we found that the relative mediation effect was the largest for SCS-H, followed by SCC-H and SCS-L, ranking second and third, respectively. The relative mediation effect was the lowest for SCC-M.

Discussion

Five potential profiles of shame

Latent profile analysis of shame scores from the shame inventory revealed five distinct profiles. These profiles showed significant differences in their score patterns across the items. Further analysis indicated that profiles 3 and 5 were particularly sensitive to situations involving the presence of others and others' perceptions of the self. Consequently, profiles 3 and 5 were more reactive to "public exposure" scenarios than profiles 1, 2, and 4. Thus, profiles 1, 2, and 4 were labeled as SCC-L, SCC-M,

and SCC-H, respectively, while profiles 3 and 5 were designated as SCS-L and SCS-H. The Shame-Context Constancy groups consistently experience similar levels of shame in both public and private settings, while the Shame-Context Salience groups report heightened shame in situations where others evaluate or scrutinize them.

The results of the latent profile analysis are consistent with prior research. Studies suggest that shame can function as an "externalizing" emotion, arising when negative events occur in the presence of others, triggering feelings of shame [43]. Moreover, shame can also have a self-oriented dimension, where individuals interpret negative events as reflections of personal inadequacy or immorality, leading to self-condemnation. This form of persistent, chronic shame becomes internalized as part of one's identity, manifesting as profound feelings of inferiority, inadequacy, or defectiveness [44].

The first corresponds to our Shame-Context Salience groups, which show significantly heightened shame intensity in contexts involving others' evaluation and scrutiny. The second aligns with our Shame-Context Constancy groups, where shame is internalized as a stable, enduring presence. Kaufman characterized such individuals as having a "shame-bound personality" or an "identity based on shame" [45].

Differences in self-forgiveness across different types of shame

Our analysis reveals a significant negative correlation between shame scores and self-forgiveness. Further variance analysis shows significant differences in self-forgiveness across the five groups. However, these differences are not linked to the specificity of shame contexts. Instead, groups with higher average shame scores tend
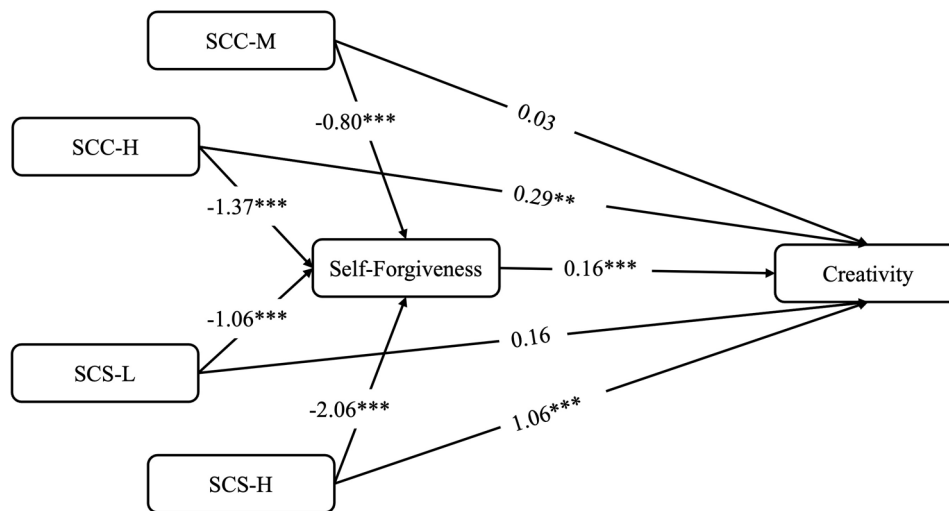
Fig. 4 Theoretical research model with path coefficients. Regression coefficients obtained in Mplus with gender, age, grade, education level, and only-child status as covariates

Table 6 Comparative analysis of mediation effects across different shame groups

Comparison of Mediation Effects	Estimate	95%CI	
		LLCI	ULCI
SCC-M vs. SCC-H	0.04	0.02	0.07
SCC-M vs. SCS-L	0.02	0.01	0.04
SCC-M vs. SCS-H	0.10	0.05	0.15
SCS-L vs. SCC-H	0.02	0.01	0.05
SCS-L vs. SCS-H	0.08	0.04	0.12
SCC-H vs. SCS-H	0.05	0.03	0.09

to have lower self-forgiveness scores. This finding is consistent with previous research, which suggests that self-forgiveness acts as a moral mediator, helping individuals restore their self-image after perceived mistakes or failures [22]. Nevertheless, individuals experiencing shame often engage in self-blame and self-scrutiny, which creates a cognitive pattern devoid of self-empathy, understanding, and acceptance, thus hindering self-forgiveness [46]. Additionally, because shame is a distressing negative emotion, it triggers avoidance and self-concealment, further diminishing self-forgiveness.

Differences in creativity across different types of shame

The correlational analysis revealed a significant positive relationship between shame scores and creativity. In addition, the variance analysis showed differences in creativity levels among the various shame groups. However, these differences were not dependent on the specificity of shame contexts. For example, there were no significant differences between the groups with high shame-context constancy and those with low shame-context salience, indicating that groups sensitive to shame contexts did not necessarily exhibit higher creativity. This finding aligns with previous research, which suggests that individuals

experiencing shame may engage in proactive behaviors to alleviate the negative emotions, ultimately enhancing constructive behavior [23]. Similarly, functionalist theories propose that the behaviors triggered by shame-related emotions could be beneficial to individuals [17, 47]. Together, these findings highlight the potential for creativity within experiences of shame. Future research will further examine the mediating mechanisms through which shame influences creativity.

The mediating effect of self-forgiveness in different types of shame

Previous research has linked shame to individual creativity, but the findings have been inconsistent [47–49]. The mechanisms through which shame affects creativity remain unclear. Thus, this study explored the mediating effect of self-forgiveness in the relationship between different categories of shame and creativity. The results indicated that shame, specifically SCC-H and SCS-H, positively predicted creativity, supporting our H1. Self-forgiveness served as a mediator across all five categories of shame, which is consistent with our H2. Specifically, relative to SCC-L, self-forgiveness played a suppressive mediating role (concealing effect) in both SCC-H and SCS-H, while it functioned as a full mediator in SCC-M and SCS-L. In summary, our findings suggest that while shame may stimulate creativity, the lack of self-forgiveness limits the transformation of shame into creativity, weakening the positive effect of shame on creativity. To effectively convert shame into creativity, individuals need higher levels of self-forgiveness.

Self-forgiveness plays a suppressive role in the relationship between shame and creativity, which is a relatively unique situation in mediation effect analysis [50, 51]. According to Brown's Shame Resilience Theory, shame's

power stems from unexpressed feelings, which can lead to negative thoughts and behaviors if avoided [52]. In contrast, self-forgiveness involves confronting and accepting these emotions [53], potentially influencing how shame affects creativity. In other words, although individuals may tend to restore their self-image through creative behavior in the experience of shame, if they are unable to forgive themselves, they will remain in a prolonged negative emotional state. This emotional burden can potentially impair their creative performance.

To explore how self-forgiveness mediates the relationship between shame and creativity across different shame groups, we tested the differences in mediation effects within each group. The results showed significant differences in mediation effects between the four groups, with SCC-L as the reference group. Specifically, higher levels of shame were associated with stronger mediating effects of self-forgiveness on creativity. This suggests that individuals with higher shame may struggle more with self-forgiveness, weakening the positive effect of shame on creativity. While no significant differences were found between the shame-context salience and shame-context constancy groups in terms of mediation effects, it remains possible that context sensitivity could influence how self-forgiveness mediates the relationship between shame and creativity.

Heightened sensitivity to context and external evaluations often reflects greater external self-awareness, which can lead to stronger negative self-perceptions and lower levels of self-forgiveness [54]. On the other hand, Garnefski et al. suggest that self-directed cognitive assessments are linked to more negative strategies, while assessments influenced by others involve both negative and positive strategies [55]. This indicates that shame-context salience groups, more sensitive to external evaluations, may be more likely to engage in cognitive reappraisal of self-perceptions. Future studies should explore individual differences in shame susceptibility to context with refined research designs to better understand how these differences affect self-forgiveness and creativity.

Implications limitations and future directions

Psychology has extensively studied emotions, with shame often considered one of the most painful emotions. Shame can be understood as an internalized emotion, in which individuals harbor negative views about their own existence and attributes, referred to as internal shame [46, 56]. In contrast, external shame arises from individuals' perceptions of how others view them. It is typically linked to public contexts and behaviors, often occurring when individuals feel negatively judged by others in social situations [57].

Our study employed LPA to identify potential categories among participants, revealing that shame is present in both public and private contexts, with significant individual differences. Specifically, some individuals maintain relatively stable levels of shame across contexts, while others are more sensitive to public situations, with increased concerns about others' judgments exacerbating their feelings of shame. Additionally, the mechanisms through which shame influences creativity have garnered considerable attention. Both the Chinese cultural concept of "knowing shame and then acting bravely" and the cognitive adjustment model theory suggest that shame has the potential to motivate individuals toward positive action, change, and constructive behavior. Our findings are consistent with these conclusions. More importantly, our research indicates that self-forgiveness diminishes the potential for shame to be translated into creativity. While shame induces pain, it also offers an opportunity for individuals to exhibit creativity. However, if individuals fail to confront their failures and problems, and cannot accept or empathize with themselves, shame cannot be transformed into inspiration or creativity. Furthermore, the test of the differences in mediation effects within the self-forgiveness groups indicates that individuals who find it more difficult to forgive themselves are more likely to have their ability to transform shame into creativity suppressed. This suggests that the lack of self-forgiveness acts as a barrier to effectively utilizing shame as a source of creative expression. The more challenging it is for individuals to engage in self-forgiveness, the less likely they are to experience the positive impact of shame on their creative performance.

Given that previous research on shame has predominantly employed a variable-centered approach, which overlooks the complexity of human emotions, this study adopts an individual-centered method to offer a novel perspective on the individual differences in the experience and expression of shame. Secondly, examining the mediating effect of self-forgiveness provides a dual perspective on the complex emotion of shame: both an opportunity and a challenge. Shame can inspire creativity, but if individuals, struggling with low self-worth, fail to accept their flaws and offer themselves empathy and psychological support, remaining instead in the pain of the emotion, the potential for transforming shame into creative action may be impaired.

However, this study has several limitations. First, the cross-sectional design limits the ability to establish causal relationships. Second, sensitivity to context within the two latent categories could not be further analyzed as either an independent or control variable. Lastly, as shame is influenced by cultural factors, and since the participants were primarily Chinese university students, the study may have limited ecological validity. Future research could address these limitations by employing experimental designs and exploring the generalizability

of these findings across different cultural and demographic contexts.

Conclusion

Traditional research has predominantly relied on variable-centered approaches to examine the characteristics of shame, which often overlooks potential individual differences within groups, particularly in the context of such a complex emotion. To address this limitation, this study employed an individual-centered LPA method, identifying five distinct shame groups: SCC-L, SCC-M, SCC-H, SCS-L, and SCS-H. Our findings revealed significant differences in self-forgiveness and creativity across these shame groups, though these differences were not contingent upon shame-context sensitivity. Shame may stimulate creative thinking as a response to inner emotional conflict, with self-forgiveness serving as a key mechanism in this process. Without self-forgiveness, individuals may become more closed off and repressed, thereby limiting their creative potential. Additionally, significant differences in the mediating effects of self-forgiveness were observed across the groups, with the SCS-H group exhibiting the most pronounced mediating effect. Collectively, these results underscore the heterogeneous nature of shame within the population and highlight the importance of targeted interventions in self-forgiveness for different shame groups to foster the constructive transformation of shame into creativity.

Abbreviations

AIC	Akaike Information Criterion
aBIC	adjusted BIC
BIC	Bayesian Information Criterion
CI	Confidence Interval
HFS	Heartland Forgiveness Scale
LMRT	Lo-Mendell-Rubin Test
LPA	Latent Profile Analysis
RIBS	The Runco Ideational Behavior Scale
SCC-L	Shame-Context Constancy Low
SCC-M	Shame-Context Constancy Moderate
SCC-H	Shame-Context Constancy High
SCS-L	Shame-Context Salience Low
SCS-H	Shame-Context Salience High

Data availability
All data generated or analysed during this study are included in this published article.

Declarations

Ethics approval and consent to participate
All participants in this study provided their informed consent to participate. The study protocol was reviewed and approved by the Ethics Committee of Anhui Science and Technology University, ensuring compliance with ethical standards and the protection of participants' rights and well-being.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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