

Latent Profiles of Childhood Maltreatment and Their Associations with Emotional Reactivity, Alexithymia, and Emotion Regulation in Chinese College Students

Ai Xu^{1,*}, Fangfang Long^{2,*}, Mingjun Teng³, Wenpei Zhang⁴, Lulu Hou^{1,5}

¹School of Psychology, Shanghai Normal University, Shanghai, People's Republic of China; ²School of Psychology, Guizhou Normal University, Guiyang, Guizhou Province, People's Republic of China; ³School of Marxism, Shanghai University of Electric Power, Shanghai, People's Republic of China; ⁴Department of Business Administration, School of Business, Anhui University of Technology, Maanshan, Anhui Province, People's Republic of China; ⁵Lab for Educational Big Data and Policymaking (Ministry of Education), Shanghai Normal University, Shanghai, People's Republic of China

*These authors contributed equally to this work

Correspondence: Wenpei Zhang, Department of Business Administration, Anhui University of Technology, Maxiang Road 1530, Yushan District, Ma'anshan, Anhui Province, 243000, People's Republic of China, Email zwpahut@ahut.edu.cn; Lulu Hou, School of Psychology, Shanghai Normal University, Guilin Road 100, Xuhui District, Shanghai, 200234, People's Republic of China, Email hoululu2020@shnu.edu.cn

Introduction: Childhood maltreatment represents a widespread global public health issue that is closely linked to a variety of emotional symptoms, such as depression and anxiety. Considering these symptoms are often linked to common problems in emotional functioning, this study aimed to examine the patterns of childhood maltreatment and their association with three core aspects of emotional functioning: emotional reactivity, alexithymia, and emotion regulation.

Methods: In total, 945 Chinese college students (mean age: 21.53 ± 1.15 years) completed the Chinese version of the Childhood Trauma Questionnaire–Short Form, Perth Emotional Reactivity Scale, Perth Alexithymia Questionnaire, and Perth Emotion Regulation Competency Inventory.

Results: The latent profile analysis identified three optimal classes of childhood maltreatment: *low childhood maltreatment* (77.35%), *predominantly neglect* (13.02%), and *high childhood maltreatment* (9.63%) patterns fitted the data best. The regression mixed model results showed that both the *predominantly neglect* and *high childhood maltreatment* classes demonstrated comparable deficits in negative emotion regulation and alexithymia, as well as in positive emotional reactivity. However, the *predominantly neglect* class exhibited more pronounced impairments in negative emotional reactivity compared to *high childhood maltreatment* class, while the *high childhood maltreatment* class demonstrated more severe impairments in positive emotion regulation and alexithymia than the *predominantly neglect* class.

Conclusion: The present results help clarify the specific associations between distinct childhood maltreatment patterns and emotional functioning, indicating the necessity of developing targeted intervention strategies for individuals with different childhood maltreatment patterns in the future. Additionally, it offers guidance for early childhood education. Future research should employ longitudinal designs to investigate the impact of various patterns of childhood maltreatment on the developmental trajectory of emotional functioning. Additionally, it is essential to consider the sensitive periods during which childhood maltreatment influences emotional functioning.

Keywords: childhood maltreatment, emotional reactivity, alexithymia, emotion regulation

Introduction

Childhood maltreatment represents a significant global public health concern, serving as a risk factor for adverse outcomes in adult mental health, including depression and anxiety.^{1–3} Childhood maltreatment involves significant traumatic events experienced in childhood, commonly classified into five types: physical abuse, emotional abuse, sexual



abuse, physical neglect, and emotional neglect.⁴ According to the World Health Organization, nearly 75% of children aged 2–4 years are often subject to physical punishment and/or psychological violence from their parents or caregivers, and 20.0% of women and 7.7% of men globally experience sexual abuse before the age of 18 years.⁵ In a meta-analysis of Chinese college students, 64.7% reported experiencing childhood maltreatment; specifically, the percentages of students who experienced emotional neglect, physical neglect, emotional abuse, physical abuse, and sexual abuse were 60.0%, 54.9%, 36.7%, 17.4%, and 15.7%, respectively.⁶ College students are navigating the transition from adolescence to adulthood, encountering pressures that are unprecedented in their lives. This transitional phase makes it increasingly evident how childhood maltreatment can influence later outcomes. Furthermore, research focusing on children and adolescents often encounters challenges in effectively capturing the full impact of maltreatment occurred before the age of 18. In contrast to other adult age groups, college students represent an age cohort that facilitates the tracing of childhood maltreatment more effectively. Consequently, the impact of childhood maltreatment on subsequent outcomes among college students has garnered considerable attention from researchers.^{7,8}

The Patterns of Childhood Maltreatment

Studies on childhood maltreatment have primarily explored the impact of specific childhood maltreatment types on individual development. For instance, childhood physical abuse has been associated with negative mental and physical health outcomes persisting decades later,⁹ while emotional maltreatment (including emotional abuse and emotional neglect) has been associated with higher odds of mental disorders.¹⁰ These findings have provided significant empirical support for subsequent research. However, children frequently experience multiple forms of maltreatment concurrently.¹¹ For example, when individuals are subjected to physical punishment, there is a considerable likelihood that they will also experience emotional abuse. Researchers have suggested that the accumulation of different types of childhood maltreatment can result in more adverse developmental outcomes than experiencing a single form of maltreatment.¹² This underscores the need to explore childhood maltreatment's cumulative effects to better understand its broader impact on individual development.¹³ However, some researchers have noted that the cumulative approach often merely adds up the number of childhood maltreatment types, failing to account for the varying impacts and significance of each type. In other words, this approach may overlook the differential impact and weight that each type of childhood maltreatment carries. Therefore, a dimensional approach is recommended that categorizes childhood maltreatment into two dimensions: threat and deprivation, rather than treating each type of maltreatment as uniform.¹⁴ Recently, researchers have increasingly concentrated on both cumulative and dimensional perspectives, investigating the effects of various combinations of childhood maltreatment dimensions. However, selecting participants based on combinations of childhood maltreatment dimensions can reduce the practical significance of between-group differences and limit the reproducibility of findings.¹⁵ To address these limitations, more accurate and efficient methods are required to analyze childhood maltreatment patterns.

Person-centered approaches, such as latent class analysis (LCA) or latent profile analysis (LPA), offer a data-driven way to identify subgroups with similar childhood maltreatment experiences.¹⁶ Unlike predefined classifications, these methods allow patterns to emerge naturally from the data,¹⁵ potentially revealing more accurate childhood maltreatment profiles or classes. Several studies have examined the latent profiles of childhood maltreatment experienced by specific groups (eg, participants from primary care clinics or public health systems, individuals with mental health problems, or ethnic minority groups). For example, Hazen et al (2009)¹⁷ recruited 1131 youth between the ages of 12 and 18 years from publicly funded mental health and social services, and identified three profiles: “sexual + physical + emotional maltreatment” (8.7%, characterized by highest scores on each subscale), “physical + emotional maltreatment” (9.4%, characterized by high physical abuse, physical neglect, emotional abuse, emotional neglect), and “low maltreatment” (81.9%, characterized by lowest scores on each subscale). Wang et al (2023)¹⁸ assessed 1053 young adults with depression and suggested three profiles: no or low childhood trauma (62.2%, characterized by the lowest childhood maltreatment scores), moderate childhood trauma (28.9%, characterized by high emotional abuse, emotional neglect, and physical neglect), and high childhood trauma (9.3%, characterized by the highest level of all childhood maltreatments, especially physical abuse). Moreover, Niu et al (2021)¹⁹ studied 882 sexually active adolescent girls and reported four profiles: Low Maltreatment (76%, characterized by none or low maltreatment on all types, Moderate Emotional Neglect Only (15%, characterized by moderate emotional neglect, and none or low on all other types of abuse and neglect),

Severe Physical/Emotional Abuse (3%, characterized by severe physical abuse and emotional abuse, as well as moderate sexual abuse, physical neglect, and emotional neglect), and Severe Sexual Abuse (6%, characterized by severe sexual abuse, moderate physical abuse and emotional abuse, as well as none or low physical neglect and emotional neglect).

Later, researchers also used LCA to study the latent classes of childhood maltreatment in general populations, especially among college students, who have more recent access to and recall of childhood events. As an example, Chen et al (2022)²⁰ analyzed 928 college students in China and found a 3-class optimal model: Low abuse and neglect (83.08%, characterized by low incidences in all five types of childhood maltreatments), High neglect (10.67%, characterized by high incidences in emotional neglect and physical neglect), and High abuse and neglect (6.25%, characterized by high incidences in five types of childhood maltreatments). Recently, Zhang et al (2025)²¹ analyzed 2863 undergraduate students in China and identified three classes: low-maltreatment (69.3%, characterized by low incidences across all forms of maltreatment), neglect (20.4%, characterized by common occurrences of physical neglect and emotional neglect), and mixed-maltreatment (10.3%, characterized by high incidences across all maltreatment subtypes).

The above research using person-centered approaches (including LPA and LCA) provides preliminary evidence for the existing heterogeneous patterns of childhood maltreatment in general or special populations. These studies have consistently identified both low and high childhood maltreatment patterns, as well as patterns characterized by exposure to specific types of maltreatment rather than all types. However, the two studies in college student populations both converted childhood maltreatment scores into binary variables based on cutoff points and applied LCA to categorize individuals into three classes. This approach yielded only conditional probabilities for each childhood maltreatment type within each class, neglecting the severity of each childhood maltreatment type. Furthermore, grouping moderate and severe cases as “present” and minimal and low cases as “absent” lacks strong theoretical support.

The Relationship Between Childhood Maltreatment and Emotion Functioning

According to Gross’s extended process model of emotion regulation (Gross, 2015),²² emotion generation and emotion regulation are distinct but interdependent processes, forming a two-level evaluation system with four sequential stages: situation, attention, appraisal, and response. When stimuli from the external or internal environment align with an individual’s goals, emotion generation serves as the primary evaluation system, triggering emotional responses. These responses, in turn, feed back to the environment, shaping future emotional processes. However, if an emotional response conflicts with an individual’s goals, a secondary evaluation system is activated, leading to emotion regulation, which interacts with the emotion generation process to manage the inconsistency. Building on Gross’s model, Preece (2019)²³ mapped three transdiagnostic risk factors—emotional reactivity, alexithymia, and emotion regulation—onto this framework to provide a comprehensive view of emotional functioning. As illustrated in Figure 1, these components are interrelated yet distinct, corresponding to various stages in Gross’s model. Emotional reactivity, for instance, is characterized by variations in activation ease, intensity, and duration, with the ease of activation aligning with the situation stage, and intensity and duration aligning with the response stage of the primary evaluation system. Alexithymia comprises three dimensions: difficulty identifying feelings, difficulty describing feelings, and externally oriented thinking. Here, externally oriented thinking corresponds to the attention stage, while difficulty identifying feelings and difficulty describing feelings align with the appraisal stage of the secondary evaluation system. Finally, emotion regulation corresponds to the response stage of the secondary evaluation system. Therefore, information about these three constructs—emotional reactivity, alexithymia, and emotion regulation is required to fully map how people experience and process their own emotions.

Childhood maltreatment can predict a variety of emotional symptoms among college students, which can often be traced to common problems in emotional functioning.²⁴ Developmental changes in emotional functioning are believed to result from the interaction between the maturation of the neuroendocrine system and social learning opportunities, both of which are particularly sensitive to childhood maltreatment. On the one hand, parents play a crucial role in an individual’s emotional functioning, as they shape how the individual handles, responds to, describes, and regulates their emotions. However, the emotional socialization process of those who have experienced maltreatment during childhood may be impeded, leading to later emotion dysregulation.²⁵ On the other hand, the Stress Acceleration Hypothesis posits that developmental trajectories are malleable, indicating that early experiences can significantly influence the duration of childhood and the timing of the transition into adolescence. Childhood maltreatment disrupts the normal cadence of development, particularly by hastening

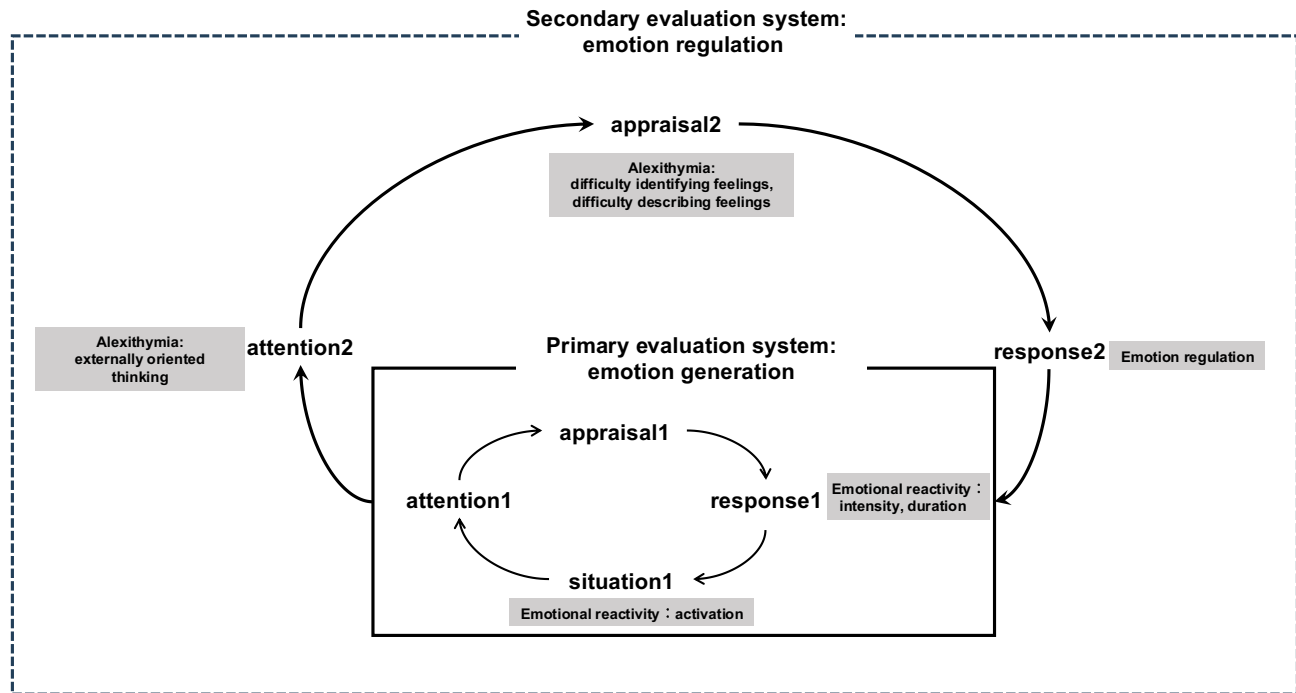


Figure 1 Gross's (2015) extended process model of emotion regulation and the mapping relationship of emotional reactivity, alexithymia, and emotion regulation constructs within this framework.

the maturation of the individual stress response system, such as the hypothalamic–pituitary–adrenal axis, while simultaneously delaying the development of other critical functions. This imbalance results in the premature maturation of the emotional circuitry, which may impede individuals' ability to effectively handle, respond to, articulate, and regulate their emotions.²⁶

Empirical research on college students has found that childhood maltreatment was associated with elevated levels of alexithymia,^{27,28} difficulties in emotion regulation²⁹ and less use of adaptive emotion regulation strategy (eg, cognitive reappraisal).³⁰ However, several gaps remain in the current literature regarding the relationships between childhood maltreatment and the aforementioned three emotional constructs: (1) Research often utilizes individual dimensions or cumulative scores of childhood maltreatment as independent variables, neglecting to examining the effects of different combination patterns; (2) Differentiation between emotions of varying valences, with many studies focusing solely on negative emotions, is lacking; and (3) Most research on emotional reactivity has concentrated on children,³¹ primarily examining the intensity of emotional reactions while overlooking the ease and duration of activating these emotional reactions.

The Current Study

In summary, although preliminary research has been conducted on the latent classes of childhood maltreatment and its relationship with emotional functioning among college students, several gaps persist in the existing literature. First, while recent studies advocate for a person-centered approach to investigate the latent classes of childhood maltreatment, prior research within the general population has predominantly employed LCA rather than LPA, thereby overlooking the severity of maltreatment. Furthermore, existing studies examining the relationship between childhood maltreatment and emotional functioning suffer from limitations lacking a sample of college students and considering less positive valence. They also primarily focus on the impacts of specific or cumulative maltreatment without considering whether different latent classes of childhood maltreatment exert varying effects on emotional functioning. To address these issues, this study aims to first employ LPA to identify potential classes of childhood maltreatment within the Chinese college student population. Subsequently, it will compare differences in emotional reactivity, alexithymia, and emotion2 regulation among

individuals in different latent profiles. The present study hypothesized that individuals exhibiting more severe childhood maltreatment would also display greater emotional dysfunction. This study holds significant implications for understanding the relationship between childhood maltreatment and emotional functioning, offering targeted intervention strategies to enhance emotional well-being for individuals with varying childhood maltreatment patterns. Furthermore, the findings of this study will serve as a foundational resource for early childhood education.

Methods

Participants

Convenience sampling was employed on 1028 college students selected from two universities in China, one in Anhui Province and the other from the Ningxia Hui Autonomous Region, and questionnaires were distributed by class. To ensure the validity of the responses, we implemented two attention-check questions that require participants to select the fourth option. After excluding students who did not answer seriously, 945 students were enrolled as the study participants, which included 257 male students and 688 female students. The participants included 117 freshmen, 369 sophomores, 364 juniors, and 95 seniors. The age of the participants ranged from 18.49 to 27.25 years (average: 21.53 ± 1.15 years).

We got connected with the teachers in charge and made sure that all participants provided their signed informed consent before participating in the test. The study protocol was approved by the research ethics committee of Shanghai Normal university (No. 2024–043). All procedures performed in this study involving human participants were conducted in accordance with the ethical standards of Shanghai Normal University and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Measures

Childhood Trauma Questionnaire – Short Form

The Chinese version of the Childhood Trauma Questionnaire – Short Form (CTQ-SF) was applied to assess the participants' childhood maltreatment experiences.^{32,33} The questionnaire included five dimensions of emotional abuse (such as “I feel that someone in my family hates me”), physical abuse (such as “I have been subjected to physical abuse”), sexual abuse (such as “Someone is trying to make me do or watch something sexual”), emotional neglect (such as “I feel loved by my family”), and physical neglect (such as “No one at home cares about my hunger”), totaling 28 items. This scale used 5-point Likert scale, ranging from 1 (never true) to 5 (very often true), with higher scores indicating higher levels of childhood maltreatment. The cutoff scores³⁴ and Cronbach's alpha coefficients when it was first translated and utilized among Chinese college students³³ as well as in this study were presented in Table 1. The scale exhibited good structural validity in this study, and the model fitting indices were as follows: $\chi^2/df = 6.61$, RMSEA = 0.08, CFI = 0.92, TLI = 0.91, SRMR = 0.06.

Perth Emotional Reactivity Scale

The Chinese version of Perth Emotional Reactivity Scale^{35,36} was applied to assess the participants' emotional reactivity. The scale consists of six subscales, each with five items: Positive-activation (P-A; such as “I tend to get happy very easily”), Positive-intensity (P-I; such as “I experience positive mood very strongly”), Positive-duration (P-D; such as “I can remain enthusiastic for quite a while”), Negative-activation (N-A; such as “I tend to get upset very easily”), Negative-intensity (N-I;

Table 1 Cut-off Scores and Reliability (Cronbach's α) of CTQ-SF

	Cut-off Scores (None/ Minimal, Low, Moderate, Severe)	Cronbach's α (Previous Study)	Cronbach's α (Current Study)
Emotional abuse	5-8, 9–12, 13–15, ≥ 16	0.63	0.78
Physical abuse	5-7, 8–9, 10–12, ≥ 13	0.71	0.95
Sexual abuse	5, 6–7, 8–12, ≥ 13	0.67	0.94
Emotional neglect	5-9, 10–14, 15–17, ≥ 18	0.55	0.85
Physical neglect	5-7, 8–9, 10–12, ≥ 13	0.51	0.73

such as “I experience the feeling of frustration very deeply”), and Negative-duration (N-D; such as “It’s hard for me to recover from frustration”). This scale used 5-point Likert scale, ranging from 1 (very unlike me) to 5 (very like me). Cronbach’s alpha-coefficients for P-A, P-I, P-D, N-A, N-I, and N-D were 0.81,0.89,0.81,0.86,0.87, and 0.85 in the study by Becerra et al (2019)³⁵ and 0.81,0.83,0.81,0.78,0.85, and 0.84 in this study, respectively. The scale exhibited good structural validity in this study, and the model fitting indices were as follows: $\chi^2/df = 4.12$, RMSEA = 0.06, CFI = 0.90, TLI = 0.89, and SRMR = 0.07.

Perth Alexithymia Questionnaire

The Chinese version of Perth Alexithymia Questionnaire³⁷ was used to assess the participants’ level of alexithymia. The questionnaire consists of 5 dimensions: Positive-Difficulty identifying feelings (P-DIF; such as “When I’m feeling good, I’m puzzled by those feelings”), Negative-Difficulty identifying feelings (N-DIF; such as “When I’m feeling bad, I’m puzzled by those feelings”), Positive-Difficulty describing feelings (P-DDF; such as “When I’m feeling good, I can’t talk about those feelings in much depth or detail”), Negative-Difficulty describing feelings (N-DDF; such as “When I’m feeling bad, I can’t talk about those feelings in much depth or detail”), and externally oriented thinking (EOT; such as “I tend to ignore how I feel”), with a total of 24 items. This scale used 7-point Likert scale, ranging from 1 (strongly agree) to 7 (strongly disagree). Cronbach’s alpha coefficients for P-DIF, N-DIF, P-DDF, N-DDF, and EOT were 0.87,0.88,0.90,0.91, and 0.90 in the study by Preece et al (2018)³⁷ and 0.89,0.90,0.89,0.90, and 0.89 in the present study, respectively. The scale showed good structural validity in this study, and the model fitting indices were as follows: $\chi^2/df = 8.12$, RMSEA = 0.09, CFI = 0.92, TLI = 0.90, SRMR = 0.05.

Perth Emotion Regulation Competency Inventory

The Chinese version of Perth Emotion Regulation Competency Inventory³⁸ was used to assess participants’ emotion regulation. The inventory consists of 8 dimensions: Negative-Controlling experiences (N-CE; such as “When I’m feeling bad, I’m powerless to change how I’m feeling”), Negative-Inhibiting behavior (N-IB; such as “When I’m feeling bad, I do stupid things”), Negative-Activating behavior (N-AB; such as “When I’m feeling bad, I have trouble getting anything done”), Negative-Tolerating emotions (N-TE; such as “When I’m feeling bad, I believe those feelings are unacceptable”), Positive-Controlling experiences (P-CE; such as “I don’t know what to do to create pleasant feelings in myself”), Positive-Inhibiting behavior (P-IB; such as “When I’m feeling good, my behavior becomes out of control”), Positive-Activating behavior (P-AB; such as “When I’m feeling good, I have trouble getting anything done”), and Positive-Tolerating emotions (P-TE; such as “When I’m feeling good, part of me hates those feelings”). Each dimension contains 4 items, totaling 32 items. The subscales can be combined into positive emotion regulation (P-ER) and negative emotion regulation (N-ER) composites to indicate overall levels of emotion regulation. The inventory used a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree), with higher total scores indicating greater difficulty in emotion regulation. Cronbach’s alpha coefficients for N-CE, N-IB, N-AB, N-TE, P-CE, P-IB, P-AB, and P-TE were 0.87,0.92,0.93,0.87,0.85,0.90,0.94, and 0.90 in the study by Preece et al (2018)³⁸ and 0.87,0.88,0.90,0.84,0.82,0.84,0.90, and 0.91 in the present study, respectively. The scale displayed good structural validity in this study, and the model fitting indices were as follows: $\chi^2/df = 3.91$, RMSEA = 0.06, CFI = 0.92, TLI = 0.91, SRMR = 0.07.

Instrument Translation Procedure

Since there was no Chinese version of Perth Emotional Reactivity Scale, Perth Alexithymia Questionnaire and Perth Emotion Regulation Competency Inventory before our test, we generated their Chinese version using the following procedure. Firstly, two psychology PhDs independently translated the scale into the Chinese language. Secondly, two psychology professors and two English-major graduate students reviewed and suggested revisions. Thirdly, two native English-speaking psychology students back-translated the scale into English to ensure consistency with the original scale. Finally, the final Chinese version was formed after repeated discussions and revisions.

Data Analysis

This study first used SPSS 22.0 to organize the data and conduct descriptive statistics. Then, LPA was employed to categorize participants into latent subgroups based on their experiences of childhood maltreatment, using Mplus version 8.1. One- to five-

class solutions of LPA models were evaluated and compared using various fit indices. The optimal class solution was indicated by lower values of the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and sample size-adjusted BIC (aBIC).³⁹ Additionally, significant results from the Lo–Mendell–Rubin (LMR) likelihood test and the Bootstrapped Likelihood Ratio Test (BLRT) suggested that the k class model outperformed the $k-1$ class model.⁴⁰ Entropy was used to assess classification accuracy, with Entropy >0.80 indicating over 90%, which fell within an acceptable range.^{41,42}

Subsequently, following the identification of the latent classes of childhood maltreatment experiences, tests were conducted to determine whether these classes demonstrated significant differences in scores across the dimensions of childhood maltreatment. This analysis further validated the classification using SPSS version 22.0. At this stage, given the anticipated unequal group sizes among the classes, we initially performed the Kolmogorov–Smirnov test to assess normal distribution and Levene’s test to evaluate homogeneity of variance. If the assumptions of normality and homogeneity of variances are satisfied, one-way analysis of variance (ANOVA) was utilized. Conversely, if these assumptions were not met, non-parametric testing, specifically the Kruskal–Wallis test, was employed. Then, when a statistically significant group-related difference was identified, a Bonferroni corrections p -value was reported for post-hoc tests.

Finally, the modified BCH method was employed to predict outcome variables, specifically the subdimensions of emotional reactivity, alexithymia, and emotion regulation, based on the latent categorical variables representing childhood maltreatment experiences. This analysis was conducted using Mplus version 8.1.⁴³ It is important to note that analyzing the group-related differences across each dimension of the three constructs individually would yield as many as 23 independent analyses. To control false positive results, this study has taken three steps. Firstly, due to the nature of the questionnaire, certain dimensions can be combined, aligning with the extended model of emotion regulation. Therefore, this study has consolidated P-DIF and P-DDF into a single construct, Positive-Difficulty appraising feelings (P-DAF). Similarly, N-DIF and N-DDF have been merged into Negative-Difficulty appraising feelings (N-DAF). Furthermore, this study also summed the four subscales of positive emotion regulation (ie, P-CE, P-IB, P-AB, P-TE) into Positive-Emotion regulation (P-ER), and summed the four subscales of negative emotion regulation (ie, N-CE, N-IB, N-AB, N-TE) into Negative-Emotion regulation (N-ER). Thus, there were 11 independent analyses in the end. Among them, for emotional reactivity, P-A and N-A align with the situation stage of the primary evaluation system, while P-I, P-D, N-I, N-D align with the response stage of the primary evaluation system. For alexithymia, EOT corresponds to the attention stage of the secondary evaluation system, while P-DAF and N-DAF align with the appraisal stage of the secondary evaluation system. For emotion regulation, P-ER and N-ER correspond to the response stage of the secondary evaluation system. Secondly, for the overall tests of comparing the differences among different profiles, the present study followed the Benjamini-Hochberg procedure, which controls the false discovery rate.⁴⁴ Following this procedure, the individual p -values were arranged in ascending order. The smallest p -value was assigned a rank of $i = 1$, the next p -value a rank of $i = 2$, and so on. Each individual p -value was then compared to the threshold $(i/m) * Q$, where m represents the total number of tests and Q denotes the chosen false discovery rate, which was set at $Q = 0.05$ in accordance with standard guidelines. If $p < (i/m)*Q$, the result is regarded as significant. Finally, if there were significant overall differences among different profiles, Bonferroni correction p -values were further used to report the results of multiple comparisons. For example, if three profiles were obtained, there were three pairwise comparisons, so a p -value less than .017 (ie, $0.05/3$) was significant.

Common Method Bias Test

To mitigate common method bias, this study implemented various procedural controls regarding response styles, response statements, and aspects of anonymity and confidentiality in the questionnaire during testing. Following data collection, Harman’s one-way test⁴⁵ was conducted, which involved exploratory factor analysis of all items. The results indicated the presence of 14 factors with eigenvalues greater than 1 in the unrotated principal component analysis, with the first factor explaining only 28.1% of the variance. According to Ashford and Tsui (1991),⁴⁶ the existence of multiple factors with eigenvalues exceeding 1, combined with the first factor explaining less than 40% of the variance, suggests that common method variation is not a significant issue. The present study therefore concluded that common method bias was not a major concern in this study.

Results

Descriptive Statistics Results

Table 2 presents the mean, standard deviation, and frequencies of different levels for various dimensions of CTQ-SF. The five types of childhood maltreatment were ranked in descending order of detection rate as follows: physical neglect (36.72%), emotional neglect (35.34%), emotional abuse (27.62%), sexual abuse (20.95%), and physical abuse (14.92%). Specifically, the mean scores for each dimension were as follows: emotional neglect had the highest mean score ($M = 8.81$, $SD = 4.22$), followed by physical neglect ($M = 7.73$, $SD = 3.45$), emotional abuse ($M = 7.57$, $SD = 3.20$), physical abuse ($M = 6.32$, $SD = 3.10$), and sexual abuse ($M = 6.14$, $SD = 2.89$).

LPA results and Validation of Classification

Fit indices for one- to five-class solutions of the LPA models are presented in Table 3. The AIC and BIC values progressively decreased from the one-class solution onward. All models exhibited entropy values greater than 0.8, with the two-class model showing the highest values. However, significant LMR and BLRT p -values for the three-class model, along with a nonsignificant LMR p -value for the four-class model, indicate that the three-class model provided the best fit for the data.

The three-class solution was characterized by three distinct patterns: *predominantly neglect* (Class 1: 13.02%, with low emotional abuse, none or minimal physical abuse, low sexual abuse, moderate emotional neglect, and moderate physical neglect), *low childhood maltreatment* (Class 2: 77.35%, with none or minimal emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect), and *high childhood maltreatment* (Class 3: 9.63%, with moderate emotional abuse, severe physical abuse, severe sexual abuse, moderate emotional neglect, and severe physical neglect). The mean scores on each type of childhood maltreatment of each profile were present in Figure 2.

Given that all five dimensions of CTQ-SF across the three classes did not exhibit a normal distribution ($ps < 0.007$) and that the assumption of equal variances for these dimensions was not satisfied ($ps < 0.001$), the present study used Kruskal–Wallis tests rather than ANOVAs to compare the score differences across the childhood maltreatment

Table 2 Descriptive Statistics Results of Childhood Maltreatment (n = 945)

	M ± SD	No or Minimal (n [%])	Low (n [%])	Moderate (n [%])	Severe (n [%])
Emotional abuse	7.57 ± 3.20	684 (72.38%)	156 (16.51%)	88 (9.31%)	17 (1.80%)
Physical abuse	6.32 ± 3.10	804 (85.08%)	34 (3.60%)	20 (2.12%)	87 (9.21%)
Sexual abuse	6.14 ± 2.89	747 (79.05%)	77 (8.15%)	45 (4.76%)	76 (8.04%)
Emotional neglect	8.81 ± 4.22	611 (64.66%)	197 (20.85%)	101 (10.69%)	36 (3.81%)
Physical neglect	7.73 ± 3.45	598 (63.28%)	129 (13.65%)	86 (9.10%)	132 (13.97%)

Table 3 Model Fit Indices for One- to Five-Profile Pattern of Childhood Maltreatment of LPA

	AIC	BIC	aBIC	Entropy	LMR	BLRT
1 -class	24832.38	24,880.90	24,849.14			
2 -class	21156.59	21,234.21	21,183.40	0.99	<0.001	<0.001
3 -class	20340.19	20,446.91	20,377.04	0.96	<0.001	<0.001
4 -class	19799.89	19,935.72	19,846.79	0.96	0.19	<0.001
5 -class	19552.16	19,717.10	19,609.12	0.96	0.52	<0.001

Notes: The values in the LMR and BLRT columns are the p values related to LMR and BLRT in comparing fit between models.

Abbreviations: AIC, Akaike information criterion; BIC, Bayesian information criterion; aBIC, sample size-adjusted Bayesian information criterion; LMR, Lo-Mendell-Rubin; BLRT, Bootstrapped Likelihood Ratio Test.

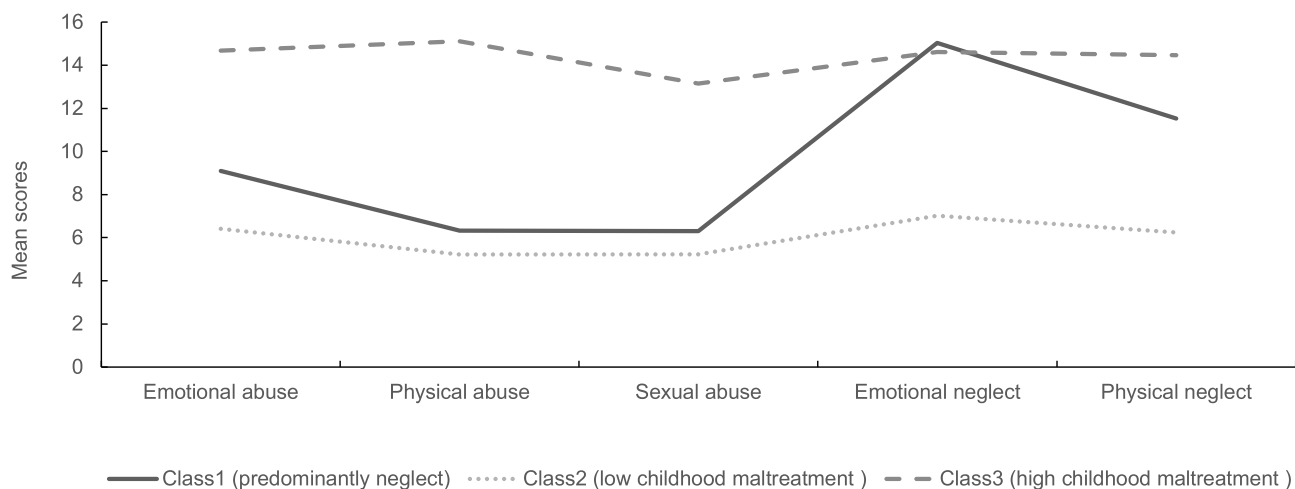


Figure 2 Latent profiles of participants based on responses to childhood maltreatment.

dimensions for each latent class. The mean scores of each type of childhood maltreatment and significant test results for three classes were shown in Table 4. Specifically, for emotional abuse, physical abuse, sexual abuse, and physical neglect, the *high childhood maltreatment* class had the highest scores, followed by the *predominantly neglect* class, with the *low childhood maltreatment* class scoring the lowest. Significant differences were observed among all three classes in these dimensions. By contrast, for the emotional neglect dimension, no significant difference was observed between the *predominantly neglect* and *high childhood maltreatment* classes, while both classes scored significantly higher than the *low childhood maltreatment* class.

RRM Results

As shown in Table 5, there were significant differences in emotional reactivity, alexithymia, and emotion regulation among the three latent classes of childhood maltreatment. Specifically, regarding emotional reactivity, for Negative-activation and Negative-intensity, no significant differences were observed between the *predominantly neglect* and *high childhood maltreatment* classes, nor between the *high childhood maltreatment* and *low childhood maltreatment* classes. However, the *predominantly neglect* class scored significantly higher than the *low childhood maltreatment* class. Regarding the Negative-duration, no significant difference was observed between the *predominantly neglect* and *high childhood maltreatment* classes, while both classes scored significantly higher than the *low childhood maltreatment* class. For the three subdimensions related to positive valence, there was no significant difference between the *predominantly neglect* and *high childhood maltreatment* classes, while both classes scored significantly lower than the *low childhood maltreatment* class.

Table 4 Childhood Maltreatment Scores and Significant Test Results for Three Latent Classes

	Class 1	Class 2	Class 3	χ^2 ^a	Post-Hoc Tests ^b
	M (SD)	M (SD)	M (SD)		
Emotional abuse	9.17 (3.12)	6.41 (1.74)	14.68 (2.08)	338.51***	2 < 1 < 3
Physical abuse	6.33 (1.96)	5.22 (0.77)	15.11 (1.72)	486.00***	2 < 1 < 3
Sexual abuse	6.33 (2.63)	5.24 (0.99)	13.15 (3.76)	426.85***	2 < 1 < 3
Emotional neglect	15.16 (3.73)	7.02 (2.43)	14.60 (2.33)	454.22***	2 < 1, 2 < 3
Physical neglect	11.60 (2.75)	6.24 (1.73)	14.47 (2.39)	457.51***	2 < 1 < 3

Notes: ^aThe Kruskal–Wallis tests were performed as a nonparametric analysis of variance among three groups. ^b $p < 0.05$, Bonferroni corrected. *** $p < 0.001$. Class 1 = *predominantly neglect*, Class 2 = *low childhood maltreatment*, Class 3 = *high childhood maltreatment*.

Table 5 Significant Test Results for Emotional Reactivity, Alexithymia, and Emotion Regulation on Three Latent Classes

	Class 1	Class 2	Class 3	χ^2 ^a	Post-Hoc Test ^b
	M (SE)	M (SE)	M (SE)		
Emotional reactivity					
N-A	16.61 (0.32)	15.37 (0.14)	16.09 (0.44)	12.88**	2 < 1
P-A	17.79 (0.34)	19.68 (0.12)	17.79 (0.45)	38.96***	1 < 2, 3 < 2
N-I	16.96 (0.36)	15.81 (0.17)	16.21 (0.49)	8.23*	2 < 1
N-D	15.64 (0.37)	14.25 (0.17)	15.49 (0.47)	15.25***	2 < 1, 2 < 3
P-I	17.32 (0.35)	19.17 (0.13)	17.43 (0.43)	35.28***	1 < 2, 3 < 2
P-D	17.89 (0.33)	19.80 (0.12)	17.80 (0.48)	40.75***	1 < 2, 3 < 2
Alexithymia					
EOT	29.56 (0.855)	24.45 (0.31)	32.07 (0.59)	145.05***	2 < 1 < 3
N-DAF	31.261 (0.888)	26.378 (0.370)	32.595 (0.631)	82.348***	2 < 1, 2 < 3
P-DAF	29.708 (0.838)	24.349 (0.354)	32.376 (0.600)	143.716***	2 < 1 < 3
Emotion regulation					
N-ER	61.24 (1.58)	51.45 (0.70)	64.64 (1.62)	74.01***	2 < 1, 2 < 3
P-ER	52.23 (1.57)	40.93 (0.63)	58.27 (1.72)	116.93***	2 < 1 < 3

Notes: ^aThe false discovery rate was controlled following the Benjamini-Hochberg procedure. ^b*p* < 0.05, Bonferroni corrected. **p* < 0.05, ***p* < 0.01, ****p* < 0.001. Class 1 = *predominantly neglect*, Class 2 = *low childhood maltreatment*, Class 3 = *high childhood maltreatment*.

Abbreviations: N-A, Negative-activation; P-A, Positive-activation; N-I, Negative-intensity; N-D, Negative-duration; P-I, Positive-intensity; P-D, Positive-duration; EOT, Externally orientated thinking; N-DAF, Negative-Difficulty appraising feelings; P-DAF, Positive-Difficulty appraising feelings; N-ER, Negative-Emotion regulation; P-ER, Positive-Emotion regulation.

Furthermore, regarding alexithymia, for the Negative-Difficulty appraising feelings, no significant differences were observed between the *predominantly neglect* and *high childhood maltreatment* classes; both were significantly higher than the *low childhood maltreatment* class. By contrast, for the Positive-Difficulty appraising feelings and externally oriented thinking, the *high childhood maltreatment* class scored higher than both the *predominantly neglect* and *low childhood maltreatment* classes, with the *predominantly neglect* class also scoring higher than the *low childhood maltreatment* class.

Finally, regarding emotion regulation, for the Negative-Emotion regulation, no significant differences were observed between the *predominantly neglect* and *high childhood maltreatment* classes, both of which scored significantly higher than the *low childhood maltreatment* class. For the Positive-Emotion regulation, the *high childhood maltreatment* class scored higher than both the *predominantly neglect* and *low childhood maltreatment* classes, with the *predominantly neglect* class also scoring higher than the *low childhood maltreatment* class.

Discussion

This study aimed to identify latent subgroups among Chinese college students based on their childhood maltreatment scores using LPA, and further systematically examine differences in emotional reactivity, alexithymia, and emotion regulation across these subgroups. Three distinct profiles were selected, namely *predominantly neglect*, *low childhood maltreatment*, and *high childhood maltreatment*, each varying in terms of emotional reactivity, alexithymia, and emotion regulation.

The Prevalence of Childhood Maltreatment Among College Students

The five types of childhood maltreatment were ranked in descending order of detection rate as follows: physical neglect, emotional neglect, emotional abuse, sexual abuse, and physical abuse. Compared with previous studies and meta-analysis involving Chinese college student samples,^{6,47,48} the proportion of sexual abuse in this study was notably higher, while the detection rates of other types of childhood maltreatment were lower. For example, the meta-analysis conducted by Fu et al (2018) reported prevalence rates of physical abuse, emotional abuse, sexual abuse, physical neglect, and emotional

neglect at 17.4%, 36.7%, 15.7%, 54.9%, and 60.0%, respectively.⁶ The relatively high detection rate of sexual abuse in this study may be attributed to the higher proportion of female participants (72.80%), as women were more likely to experience sexual abuse during childhood than men.⁴⁹ In conclusion, neglect remained the most common form of maltreatment, which is consistent with existing literature.⁴

The Latent Classes of Childhood Maltreatment

Furthermore, this study used LPA and found that the three-class model—*predominantly neglect*, *low childhood maltreatment*, and *high childhood maltreatment*—provided the best fit for the data. This finding is consistent with previous studies on Chinese college students,^{20,21} suggesting that this may reflect stable patterns in Chinese college students. Additionally, this study further detailed the severity of each childhood maltreatment type within classes through LPA, complementing earlier studies that used LCA.^{20,21} Furthermore, based on the results of LPA, the present study found that the number of people in the *predominantly neglect* class was greater than that in the *high childhood maltreatment* class, indicating that in practice, there is indeed a group of college students who experience neglect without concurrent abuse. Simultaneously, notable discrepancies exist between the findings of this study and those of previous research.^{17–19} This phenomenon may be attributed to the unique and complex patterns of childhood maltreatment experiences exhibited by specific groups with mental health issues. For instance, given the strong correlation between emotional abuse and depression,⁵⁰ the manifestations of emotional abuse are more pronounced in those with depression compared to the general population. Consequently, young adults with depression were classified by not only no or low childhood trauma and high childhood trauma classes, but also a moderate childhood trauma, which was characterized by high emotional abuse, emotional neglect, and physical neglect.¹⁸

Associations Between Childhood Maltreatment Patterns and Emotional Functioning

The RMM results both the *predominantly neglect* and *high childhood maltreatment* classes were associated with impairment of emotional functioning, though the impairment differed by the emotional processes and valences. Specifically, for negative valence, the *predominantly neglect* class exhibited more pronounced deficits during the emotion generation process compared to those in the *high childhood maltreatment* classes. However, during the emotion regulation process, both classes demonstrated similar deficits. For positive valence, individuals in both the *predominantly neglect* and *high childhood maltreatment* classes displayed comparable deficits in the emotion generation process, but the *high maltreatment* class faced more severe deficits during the emotion regulation process.

Firstly, taking into account both alexithymia and emotion regulation, it is interesting that in the secondary evaluation system (ie, emotion regulation process), especially in the appraisal and response stages, there is a clear distinction in valence. Specifically, no significant differences were observed in the negative valence aspects of alexithymia and emotion regulation between the *predominantly neglect* and *high childhood maltreatment* classes. This finding does not fully align with the Dimensional Model of Adversity and Psychopathology theory proposed by McLaughlin et al (2014),⁵¹ which distinguishes childhood maltreatment into threat and deprivation experiences. According to this model, threat experiences are actual or perceived and harm a person's physical integrity, including sexual abuse, physical abuse, emotional abuse, and other forms of violence. They disrupt fear and emotion-learning processes. On the other hand, deprivation represents a lack of expected input from the environment, such as physical neglect and emotional neglect. It primarily impacts brain regions involved in cognitive functions (eg, working memory). However, no significant difference was observed in the negative emotion functioning between individuals with only deprivation experiences (ie, *predominantly neglect* class) and those with both threat and deprivation experiences (ie, *high childhood maltreatment* class). Thus, deprivation experiences may also influence emotional systems. By contrast, regarding alexithymia and emotion regulation of positive valence, individuals who experience more childhood maltreatment (ie, the *high childhood maltreatment* class) tend to perform worse than those who only experience neglect (ie, the *predominantly neglect* class). This was consistent with the cumulative risk theory⁵² and underscores the importance of examining emotions with different valences separately.^{53–56}

Secondly, in terms of emotional reactivity, the *predominantly neglect* class exhibited more easily activated and higher intensity to negative emotions than the *low childhood maltreatment* class. By contrast, the *low childhood maltreatment* class demonstrated significantly stronger reactions to positive emotions and shorter durations to negative emotions than

both the *predominantly neglect* and *high childhood maltreatment* classes. These findings agree with the results of prior research on emotional reactivity, which suggests that individuals with high levels of childhood maltreatment tend to exhibit increased responses to daily negative events⁵⁷ and reduced responses to positive emotions.⁵⁸ However, in this study, no significant difference was observed in Negative-activation and Negative-intensity between the *low childhood maltreatment* and *high childhood maltreatment* classes. Those in the *low childhood maltreatment* class may experience a greater sense of emotional security, potentially based on “fact-relative security”,⁵⁹ leading to a calmer disposition and reduced reactivity to negative emotions. By contrast, individuals in the *high childhood maltreatment* class may have pre-existing negative emotional beliefs,⁶⁰ resulting in lower activation and intensity of negative emotion. However, as childhood maltreatment experiences are associated with elevated levels of rumination,⁶¹ negative emotions in the *high childhood maltreatment* class tend to persist longer. Thus, while no significant differences were observed between the *high childhood maltreatment* and *low childhood maltreatment* classes in terms of Negative-activation and Negative-intensity, while the *high childhood maltreatment* class scored higher on Negative-duration than the *low childhood maltreatment* class. In summary, as mentioned earlier, according to the emotion extension model proposed by Gross (2015),²² in the primary evaluation system (ie, emotion generation process), for negative situations, the *predominantly neglect* class demonstrated a greater likelihood of noticing negative stimuli during the situation stage and exhibited both higher intensity and longer duration in the response stage. In contrast, the *high childhood maltreatment* class primarily displayed an extended duration in the response stage. On the contrary, for positive situations, both *predominantly neglect* and *high childhood maltreatment* classes showed similar impairments in the situation and response stages, namely, exhibited a reduced tendency to notice positive stimuli, demonstrated weaker responses to such stimuli, and experienced a shorter duration of positive emotions.

Thirdly, in terms of alexithymia, the *predominantly neglect* and *high childhood maltreatment* classes scored similarly in Negative-Difficulty appraising feelings, and scored significantly higher than the *low childhood maltreatment* class. For Positive-Difficulty appraising feelings and externally orientated thinking, the *high childhood maltreatment* class scored higher than both the *predominantly neglect* and *low childhood maltreatment* classes, with the *predominantly neglect* class also scoring higher than the *low childhood maltreatment* class. Studies have shown that individuals with childhood maltreatment experiences tend to have more pronounced alexithymia,^{62,63} greater difficulties in describing and identifying emotions,^{64,65} and an increased tendency toward externally oriented thinking.⁶⁶ Additionally, children with childhood maltreatment experiences have been found to be less accurate in identifying emotions than their peers without childhood maltreatment.⁶⁷ This relationship may stem from alexithymia acting as a defense mechanism: individuals with childhood maltreatment may unconsciously use alexithymia to reduce emotional distress by focusing on external realities rather than internal emotions.⁶⁸

Finally, regarding emotion regulation, no significant differences in Negative-Emotion regulation were observed between the *predominantly neglect* and *high childhood maltreatment* classes, with both classes scoring significantly higher than the *low childhood maltreatment* class. For Positive-Emotion regulation, the *high childhood maltreatment* class scored higher than both the *predominantly neglect* and *low childhood maltreatment* classes, with the *predominantly neglect* class also scoring higher than the *low childhood maltreatment* class. These results align with prior research showing that adults with childhood maltreatment experiences face greater difficulties in emotion regulation.⁶⁹ Emotion regulation skills are often acquired through parental emotional socialization,^{70,71} where parents provide children with role models for emotion regulation and related training. For children who have experienced childhood maltreatment, the process may be disrupted, leading to more difficulties in emotion regulation in adulthood.

Implications and Limitations

This study systematically analyzes differences in three core aspects of emotional functioning among individuals with varying childhood maltreatment experiences, enhancing understanding of the relationship between childhood maltreatment and emotional outcomes. It offers insights into targeted intervention strategies for young adults based on specific childhood maltreatment patterns. For individuals predominantly experiencing neglect, particularly emotional neglect, during childhood without encountering abuse, interventions should prioritize on restoring negative emotion reactivity. Conversely, for those who have endured both neglect and abuse, intervention should address improving their ability in appraising and regulating positive emotions. At the same time, both of them should receive interventions to improve positive emotional reactivity and

enhance negative emotional appraisal and regulation abilities. Furthermore, these findings provide a crucial foundation for early childhood education. This developmental phase is critical for fostering emotional functioning, which has significant implications for individuals' emotional well-being in adulthood. Therefore, caregivers must comprehend the long-term impacts of childhood experiences on individual development and actively seek to improve their parenting practices. Concurrently, communities and relevant institutions should enhance their outreach and educational initiatives on this matter, offering professional guidance to support family education during early childhood.

This study has several limitations to address in future research. First, the sample included only college students (young, well-educated, with more females); future research should use representative adult samples with balanced sex ratios to validate conclusions. Second, this study relied on self-reports, which may introduce recall bias, and only covered five major childhood maltreatment types, potentially overlooking other childhood maltreatment experienced in school or community settings, so future studies should expand maltreatment assessment. Third, emotional functioning was measured via self-report scales. In future research, experimental and experience sampling methods could provide richer insights by examining behavioral, neurophysiological characteristics, and daily emotional patterns among individuals with varying childhood maltreatment experiences. Fourth, socioeconomic data were not collected, despite its association with the profiles of childhood maltreatment.²¹ Future research should investigate the relationship between childhood maltreatment classifications and emotional functioning while controlling socio-economic status. Fifth, the study did not assess the duration, timing, and frequency of childhood maltreatment, factors that have been demonstrated to affect adult outcomes and functioning.^{72–74} Future research should take these influences into account. Finally, the cross-sectional research design limits the examination of the developmental trajectory of emotional functioning. Future research should further adopt longitudinal design to examine whether different patterns of childhood maltreatment have different developmental trajectories of emotional functioning.

Conclusion

The current study identified three optimal classes of childhood maltreatment fitted the data best among college students, and these profiles differ in emotional functioning. Specifically, both the *predominantly neglect* and *high childhood maltreatment* classes were associated with impairment of emotional functioning, though the impairment differed by the emotional processes and valences. These findings offer valuable insights for mental health education and clinical interventions tailored to college students, while also establishing a foundation for early childhood family education. Notably, a significant portion of the population exhibits patterns of *predominantly neglect*, yet the impact of this pattern—particularly on negative emotional reactivity—has been largely overlooked for a long time.

Abbreviations

AIC, Akaike information criterion; aBIC, sample size-adjusted Bayesian information criterion; ANOVA, analysis of variance; BIC, Bayesian information criterion; BLRT, Bootstrapped Likelihood Ratio Test; CTQ-SF, Childhood Trauma Questionnaire-Short Form; EOT, Externally orientated thinking; LCA, latent class analysis; LMR, Lo-Mendell-Rubin; LPA, latent profile analysis; N-A, Negative-activation; N-AB, Negative-Activating behavior; N-CE, Negative-Controlling experiences; N-D, Negative-duration; N-DAF, Negative-Difficulty appraising feelings; N-DDF, Negative-Difficulty describing feelings; N-DIF, Negative-Difficulty identifying feelings; N-ER, Negative-Emotion regulation; N-I, Negative-intensity; N-IB, Negative-Inhibiting behavior; N-TE, Negative-Tolerating emotions; P-A, Positive-activation; P-AB, Positive-Activating behavior; P-CE, Positive-Controlling experiences; P-D, Positive-duration; P-DAF, Positive-Difficulty appraising feelings; P-DDF, Positive-Difficulty describing feelings; P-DIF, Positive-Difficulty identifying feelings; P-ER, Positive-Emotion regulation; P-I, Positive-intensity; PIB, Positive-Inhibiting behavior; P-TE, Positive-Tolerating emotions.

Data Sharing Statement

The data that support the findings of this study are available from the corresponding authors upon reasonable request after completing a formal data sharing agreement.

Ethics Approval and Informed Consent

The study protocol was approved by the research ethics committee of Shanghai Normal University (No. 2024-043). All procedures performed in this study involving human participants were in accordance with the ethical standards of Shanghai Normal University and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Before participating in the first test, all participants signed an informed consent form.

Acknowledgments

We thanked the volunteers of this study and the funding that supported the project.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Funding

This study was supported by the Chenguang Program of Shanghai Education Development Foundation and Shanghai Municipal Education Commission [grant number 22CGA52], the University Outstanding Youth Foundation of Anhui Province [grant number 2022AH030040], and the Philosophy and the Social Sciences Planned Project of Anhui Province [grant number AHSKQ2021D16].

Disclosure

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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