# Adaptation and validation of the Chinese versions of the childhood perceived poverty and wealth questionnaire(C-CPPWQ) and the childhood perceived unpredictability questionnaire (C-CPUQ)

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## Abstract

**Background**  Childhood subjective socioeconomic status (operational definition of harshness) and unpredictability significantly influence life history strategies and subsequent psychological and behavioral patterns. Existing research on Chinese populations has been limited by inconsistent metrics and inadequate measurement items. This study aimed to adapt and validate the Chinese versions of the Childhood Perceived Poverty and Wealth Questionnaire (C-CPPWQ) and the Childhood Perceived Unpredictability Questionnaire (C-CPUQ), addressing cultural differences and expanding measurement subjects.

**Methods**  We conducted Exploratory Factor Analysis (EFA) with 493 students and Confirmatory Factor Analysis (CFA) with 1217 students to validate the factor structures. Concurrent validity was assessed using correlations with life history strategies (Mini-K) and childhood trauma (CTQ-SF) and reliability were also evaluated.

**Results**  The C-CPPWQ's two-factor model (perceived wealth and perceived poverty) demonstrated good fit (CFI = 0.95; TLI = 0.94; SRMR = 0.05; RMSEA = 0.08) and strong internal consistency (alpha = 0.90), with significant correlations with Mini-K ($r$ = -0.28, $p$ < 0.001) and childhood trauma ($r$ = 0.29, $p$ < 0.001). The C-CPUQ's three-factor model (Unpredictability of Parenting, Unpredictability of External Environment, and Unpredictability of Daily Happening) also showed a good fit (CFI = 0.96; TLI = 0.95; SRMR = 0.04; RMSEA = 0.07) and high reliability (alpha = 0.95), with significant correlations with Mini-K ($r$ = -0.39, $p$ < 0.001) and childhood trauma ($r$ = 0.72, $p$ < 0.001).

**Conclusions**  The newly adapted 14-item C-CPPWQ and 16-item C-CPUQ for Chinese contexts exhibit satisfactory psychometric properties, making them valuable tools for researching and evaluating childhood adversity.

**Keywords**  Childhood perceived wealth and poverty, Childhood perceived unpredictability, Childhood harshness, Factor analysis, Validity, Psychometrics

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## Introduction

Adverse childhood experiences (ACEs), also referred to as early life adversity (ELA), commonly denote negative life experiences before the age of 18, encompassing various manifestations such as abuse, neglect, poverty, and dysfunctional family dynamics [1]. Since the conceptualization of ACEs, extensive research has validated the detrimental impacts of ACEs on learning, behavior, and physical and mental health throughout an individual's lifespan [2, 3]. ACEs are also highly correlated with the onset of various psychiatric disorders [4], contributing to an increased societal healthcare burden [5].

Previous studies of childhood adversity have predominantly focused on negative events experienced by children. Nonetheless, contemporary studies underline that an individual's perception and interpretation of childhood environment plays an important role in determining long-term developmental consequences [6, 7].

The Adaptive Calibration Model(ACM) [8, 9] such as life history theory [10, 11] proposed by evolutionary psychologists suggests that through the process of long-term natural selection, developmental systems have been sculpted to enable individuals, particularly during childhood and adolescence, to utilize environmental cues perceived in their surroundings to make adaptive responses to their future developmental context. Evolutionary psychologists assert that two dimensions of early experience are critical in shaping an individual's developmental trajectory and their adaptation to future environments: the harshness and unpredictability of the early environment [10, 11].

The harshness encompasses a range of factors that contribute to morbidity and mortality. Environments characterized by harshness present inherent risks, yet it is possible at times to predict and adapt to [10, 11]. In the setting of modern industrialized societies, the extent of harshness is often correlated with socioeconomic status (SES), which in turn is closely linked to morbidity and mortality rates [12].The unpredictability is characterized by random or stochastic fluctuations within the environment. In such unpredictable settings, risks become more challenging to predict and prepare for [10, 11]. This dimension of unpredictability is typically measured by chronic experiences with caregivers who are inconsistent in their actions and behaviors, frequent or unforeseen shifts in parental custody, unstable living conditions, and variability in family income.

The experience of childhood harshness and/or unpredictability has been associated with a variety of outcomes affecting cognition, interpersonal relationships, economic decisions, and health [13, 14, 15, 16, 17]. The Great Smoky Mountains Study, an extensive longitudinal study spanning 20 years, has indicated that material deprivation experienced during childhood and adolescence (ages 9 to 16) is predictive of the development of anxiety disorders and cannabis use disorders in adulthood (at age 26 or 30). The study further suggests that unpredictability during these formative years forecasts the onset of depression and cannabis use disorders in later adulthood [18]. Research on eating behaviors and obesity has shown that adults who experienced low socioeconomic status during childhood are more likely to be obese, even after controlling for their current socioeconomic status. The impact of low socioeconomic status on weight issues is partially attributed to the exposure to unpredictable environments in childhood [14]. Previous research has highlighted the developmental impacts of specific forms of adversity (e.g., childhood poverty, abuse, and unpredictability) [14, 18] as well as the effects of accumulating multiple adversities [4, 19]. Since adverse experiences often overlap, it is important to examine multiple adversities together and assess how different combinations influence children's developmental risks [4, 20].

Theoretical advances in ACEs research [21] have integrated life history models (harshness-unpredictability model) [11] and the dimensional model of adversity and psychopathology (threat-deprivation model, ) [20]. These models suggest that threat-based harshness, deprivation-based harshness, and environmental unpredictability each have distinct developmental impacts [21]. However, unlike the threat-deprivation model, which includes well-established tools such as the short form of the Childhood Trauma Questionnaire (CTQ-SF) [22], the definitions and measures in the harshness-unpredictability model are more diverse and inconsistent [23].

A variety of measurement tools for childhood harshness and childhood unpredictability are already in use. Childhood harshness is commonly quantified using measures of socioeconomic status (SES) during childhood, which encompass both objective and subjective assessments. Objective indicators of childhood SES include family income, parental education levels, and the socioeconomic status of the community. Subjective SES, on the other hand, refers to an individual's perception of their own socioeconomic standing [26]. A substantial body of research indicates that subjective social economic status (SES) provides a more accurate prediction of physical and mental health outcomes compared to objective SES indicators. The impact of an individual's subjective perception of wealth or poverty on their health persists even after controlling for objective economic status [24, 25]. The scale developed by Griskevicius et al. [26] has frequently been utilized to evaluate subjective socioeconomic status such as 'I felt relatively wealthy compared with other kids in my school'.

In the field of research on childhood unpredictability, Mittal et al. [15] developed three items to assess the level of exposure to unpredictability in childhood

environments and Young et al. [27] further introduced an additional five items to explore the instability and unpredictability of family life, such as " My family life was generally inconsistent and unpredictable from day-to-day". Considering the interaction effects of childhood harshness and unpredictability, Maranges et al. [28] developed two novel scales, Childhood harshness scale(CHS) and Childhood unpredictability scale(CUS). In developing these scales, Maranges not only integrated well-established items from prior studies [15, 26, 27], but also defined the childhood harshness scale, which specifically focuses on perceived wealth and poverty, clearly distinguishing it from the unpredictability scale. However, the scales originally developed are based on Western cultural contexts. Considering cultural variations, perceptions to childhood experiences may differ among Chinese individuals.

This study aims to adapt and refine the Chinese version of the Childhood Perceived Poverty and Wealth Questionnaire(C-CPPWQ) and the Chinese version of the Childhood Perceived Unpredictability Questionnaire(C-CPUQ) based on the Childhood harshness scale(CHS) and Childhood unpredictability scale(CUS) [28], and to examine their psychometric properties in a Chinese cultural setting. We renamed these two instruments for the following reasons: (a) The term "harshness" in the CHS was difficult to translate and did not align well with the items. We replaced it with "poverty and wealth" to enhance cultural relevance and clarity. (b) By adding "perceived" to the new names, we highlight the subjective experiences assessed by the instruments. (c) Since the CTQ-SF is the most widely used measure for threat-based (abuse) and some deprivation-based harshness (neglect), we renamed our instruments to align with it, encouraging the combined use of the CTQ-SF, C-CPPWQ, and C-CPUQ to enhance future theoretical implications.

## Method

The current study utilized a cross-sectional design to achieve its objectives. Specifically, a comprehensive survey approach was used to adapt and validate the Chinese versions of the Childhood Perceived Poverty and Wealth Questionnaire (C-CPPWQ) and the Childhood Perceived Unpredictability Questionnaire (C-CPUQ). To ensure the study's rigor, several systematic procedures were carried out in stages: (1) translation and adaptation to form the preliminary C-CPPWQ and C-CPUQ, (2) exploratory factor analysis (EFA) to examine the underlying structure and finalize the scales, and (3) confirmatory factor analysis (CFA) and concurrent validity testing to evaluate the consistency and suitability of the identified factor structure.

### Translation and adaptation

Firstly, the 11-item Childhood Harshness Scale (CHS) and 15-item Childhood Unpredictability Scale (CUS) were translated from English to Chinese using a backward and forward translation process by two independent bilingual experts, following the parallel blind technique. Next, a comprehensive literature review identified relevant studies conducted in China, leading to the inclusion of 4 items from Wang (2017) [29] on subjective SES and 6 items from Luo [30] (directly translated from Ross) [31] on parental unpredictability into the item pool. The preliminary 15-item version of the C-CPPWQ and the 21-item version of the C-CPUQ were then reviewed by an expert panel consisting of six experts (one scale revision specialist, two family education specialists, and three clinical psychiatrists) along with the scale translators. A meticulous selection process was conducted based on the feedback provided by the panel. Subsequently, a pilot sample was used to evaluate the suitability of the preliminary scales and refine their design. This step aimed to enhance the clarity and effectiveness of the scales. After the necessary refinements were made, the scales were administered to a larger sample for further validation.

The pilot study was conducted using a convenience sample of 43 university and master's students aged from 21 to 26 (M/SD $_{age}$=23.60/2.35 years old) and 58.1% were male. This included survey completion and interviews to gather participant feedback. Based on this feedback, one item in the C-CPPWQ was removed for not being culturally relevant to perceived poverty or harshness and the only reversed item in the C-CPUQ was removed to reduce cognitive burden of participants. Finally, the preliminary 14-item version of the C-CPPWQ and the 20-item version of the C-CPUQ were administered to a larger sample for further factor analysis and validation.

### Participants

We provide details on how we determined the sample size, any data exclusions, and all measures used in the study.

#### Sample 1

Data were collected from 549 participants drawn from a technical university in Shanghai, China. Fivty-six participants (10.2%) were excluded for failing at least one of two validity questions embedded in the middle and toward the end of the survey battery as a data quality control screening (e.g., "I did not lie during this survey.," "Select the third answer option for this question"). The final study sample consisted of 493 participants aged from 17 to 26 (M/SD $_{age}$=20.30/1.85 years old) and 67.1% were male.

*Sample 2*

Data were collected from 1510 participants recruited from an online data collection platform (i.e., https://www.wjx.cn). Individuals were eligible to participate if they were undergraduate students and a Chinese. 293 participants (19.4%) were excluded for failing at least one of two validity questions embedded in the middle and toward the end of the survey battery as a data quality control screening (e.g., "I did not lie during this survey.," "Select the last answer option for this question"). The final study sample consisted of 1217 participants aged from 17 to 28 (M/SD $_{age}$=21.55/2.40 years old) and 50.2% were female.

   All participants were informed about the study objectives and received detailed information on data protection and their rights. They provided voluntary consent in accordance with the Declaration of Helsinki. The study received ethical approval from the Shanghai Mental Health Center (2023-54).

**Measures**

**Demographic information**

***The demographic questionnaire included age and gender of participants***

*The Chinese version of the Childhood Perceived Poverty and Wealth Questionnaire (C-CPPWQ)* The initial Chinese version of the Childhood Perceived Poverty and Wealth Questionnaire (C-CPPWQ) comprised 14 items:10 items translated and adapted from the Childhood Harshness Scale(GFI = 0.91, NFI = 0.93, CFI = 0.95) [28], with one CHS item excluded on pilot study and 4 from Wang's revised subjective SES scale [29]. Participants rated these items on a 7-point Likert scale from 1 ("strongly disagree") to 7 ("strongly agree"), with 7 items requiring reverse scoring. Higher scores indicate greater perceived childhood poverty. Consistent with prior studies [15, 28], participants were instructed to recall experiences from their first 10 years of life. All details are available in the supplementary materials.

***The Chinese version of the childhood perceived unpredictability questionnaire (C-CPUQ)***

The initial Chinese version of the Childhood Perceived Unpredictability Questionnaire (C-CPUQ) included 20 items: 14 items translated and adapted from the Childhood Unpredictability Scale(GFI = 0.88, NFI = 0.94, CFI = 0.95) [28] with one CUS item excluded on pilot study and 6 from Ross's study [31], adapted for cultural relevance based on prior researches on eating problems in China [30]. Participants rated these items on a 7-point Likert scale from 1 ("strongly disagree") to 7 ("strongly agree"), with one item requiring reverse scoring. Higher scores indicate greater perceived childhood unpredictability. As with previous studies [15, 28], participants

were instructed to reflect on experiences from their first 10 years of life. Additional details are provided in the supplementary materials.

***The Mini-K***

The Mini-K, a 20-item short form of the Arizona Life History Battery [32], measures life history strategies using a 7-point Likert scale from 1 ("strongly disagree") to 7 ("strongly agree"), with items such as "I avoid taking risks" and "I often make plans in advance." The Chinese version [33] comprises 19 items, omitting one related to religiosity. Higher scores indicate a slower life history strategy. In this sample, the Cronbach's alpha for the scale was 0.92.

***The childhood trauma questionnaire-short form (CTQ-SF)***

The Childhood Trauma Questionnaire-short form (CTQ-SF) [22] is a widely used instrument for assessing adverse childhood experiences. The Chinese version of the CTQ-SF [34] evaluates the level of childhood trauma experienced by individuals, encompassing five dimensions: physical neglect, physical abuse, emotional neglect, emotional abuse, and sexual abuse. It consists of 28 items, including 25 clinical items and 3 validity items, scored on a scale from 1 ("never") to 5 ("always"), where higher scores indicate more severe childhood trauma. In this study, the internal consistency coefficients for the total score and the five dimensions of the CTQ-SF were 0.69, 0.93, 0.82, 0.86, 0.93, and 0.90 respectively.

**Statistical analyses**

We used SPSS 24.0 to conduct EFA and concurrent validity. And we used R version 3.6.3 and associated packages: lavaan, semPlot, semTools and psych to conduct CFA and reliability analysis.

***Factor analysis***

Exploratory factor analysis (EFA) was conducted using Sample 1 to assess the data's structure. Suitability for EFA was confirmed using Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin (KMO) values [35]. Factors were extracted using principal component analysis and rotated with the Promax method, as it is appropriate when the underlying factors are expected to be correlated [36]. Factors were identified based on criteria of eigenvalues greater than 1 and visual inspection of the scree plot. A baseline factor loading of 0.3 was set to eliminate significant cross-loadings [35], with only items exhibiting loadings above 0.4 [28] and cross-loadings below 0.3 retained.

   Confirmatory factor analysis (CFA) was conducted on the Pearson correlation matrix using the Maximum Likelihood (ML) estimation method with Sample 2 to test the factor structure established by the exploratory factor analysis (EFA).

The model fit was deemed satisfactory if it met the following criteria: Comparative Fit Index (CFI), Normed Fit Index (NFI), Goodness-of-Fit Index (GFI) and Tucker-Lewis Index (TLI) > 0.9; Root Mean Square Error of Approximation (RMSEA) < 0.08; and Standardized Root Mean Square Residual (SRMR) < 0.08. Achieving these fit indices and significant loadings of all items on their designated factors indicates strong structural validity of the model [37].

### Reliability
Internal consistency was evaluated for Sample 2 ($n = 1217$), using Cronbach's alpha and McDonald's omega, with a threshold of 0.7 for acceptable reliability.

### Concurrent validity
Concurrent validity for Sample 2 ($n = 1217$) was assessed by analyzing correlations among scores from the C-CPPWQ, C-CPUQ, CTQ-SF and Mini-K.

## Results
### Exploratory factor analysis of C-CPPWQ
We performed exploratory factor analysis (EFA) on the 14 items of the Childhood Perceived Poverty and Wealth

**Table 1** Items and factor loadings for 2 factors of the childhood perceived poverty and wealth questionnaire

| Item | Poverty | Wealth |
|---|---|---|
| 12 My parents have a high social status in the area | **0.893** | −0.077 |
| 9 I grew up in a relatively wealthy neighborhood | **0.848** | 0.011 |
| 13 My life is better off than my companions | **0.838** | −0.045 |
| 8 I felt relatively wealthy compared with other kids in my school | **0.829** | −0.059 |
| 11 My family has more than enough money to meet all needs | **0.818** | 0.043 |
| 14 I grew up in an affluent and stable neighborhood | **0.810** | 0.039 |
| 10 My family usually had enough money for things when I was growing up | **0.673** | 0.121 |
| 1 Despite how much my parents worked, my family rarely had enough money for luxury items | 0.047 | **0.836** |
| 6 We had to try to save money when shopping for anything | −0.019 | **0.814** |
| 3 Growing up, I rarely got spoiled because money was so tight | −0.035 | **0.813** |
| 2 My family rarely had enough money to go out for a nice dinner | 0.008 | **0.812** |
| 5 I felt uncomfortable asking my parents for money because money was tight | 0.039 | **0.808** |
| 4 My family was strained financially | 0.137 | **0.792** |
| 7 I never had the newest style of shoes or clothes | −0.126 | **0.776** |

Factor loadings of each item on the assumed main factor and other factors are reported. Values are in bold if factor loadings are equal to or above 0.40

Questionnaire (C-CPPWQ) using SPSS 24.0. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.93, and Bartlett's test of sphericity was significant ($\chi^2$(91) = 4735.16, $p < 0.001$), indicating suitability for EFA. The scree plot and eigenvalue criteria identified two factors explaining 66.91% of the variance. Given the correlation between these factors [36], Promax rotation was applied. Post-rotation, factor loadings ranged from 0.67 to 0.89(see Table 1), with no significant cross-loadings. Factor 1 (items 1–7) represented "Perceived Poverty" and factor 2 (items 8–14), termed "Perceived Wealth", required reverse scoring for measures of childhood poverty or harshness, the final Chinese version could be seen in supplementary materials.

### Confirmatory factor analysis of C-CPPWQ
To validate the factor structure from exploratory factor analysis (EFA) conducted on Sample 1, confirmatory factor analysis (CFA) was performed using Sample 2. The results demonstrated a strong model fit: CFI = 0.95; TLI = 0.94; GFI = 0.93, NFI = 0.95, SRMR = 0.05; RMSEA = 0.08. All standardized factor loadings were significant ($p < 0.001$), as shown in Fig. 1.

### Exploratory factor analysis of C-CPUQ
We conducted exploratory factor analysis (EFA) on the 20 items of the Childhood Perceived Unpredictability Questionnaire (C-CPUQ) using SPSS 24.0. The Kaiser-Meyer-Olkin (KMO) measure was 0.93, and Bartlett's test of sphericity was significant ($\chi^2$(190) = 5878.87, $p < 0.001$), confirming the data's suitability for EFA. Four items from the Childhood Unpredictability Scale were excluded due to factor loadings below 0.4 or cross-loadings above 0.3, retaining 16 items. Subsequent EFA identified three factors from the scree plot and eigenvalue criteria, explaining 65.31% of the variance. After rotation, item loadings ranged from 0.44 to 0.91 with no significant cross-loadings (see Table 2). Factor 1 included 7 items related to "Unpredictability of Parenting," factor 2 comprised 5 items describing "Unpredictability of External Environment," and factor 3 consisted of 4 items capturing "Unpredictability of Daily Happening." No items required reverse scoring. The final English and Chinese version and the removed items are available in the supplementary materials.

### Confirmatory factor analysis of C-CPUQ
To validate the factor structure from exploratory factor analysis (EFA) conducted on Sample 1, confirmatory factor analysis (CFA) was performed using Sample 2. The results demonstrated a strong model fit: CFI = 0.96; TLI = 0.95; GFI = 0.92, NFI = 0.95, SRMR = 0.04; RMSEA = 0.07. All standardized factor loadings were significant ($p < 0.001$), as shown in Fig. 2.
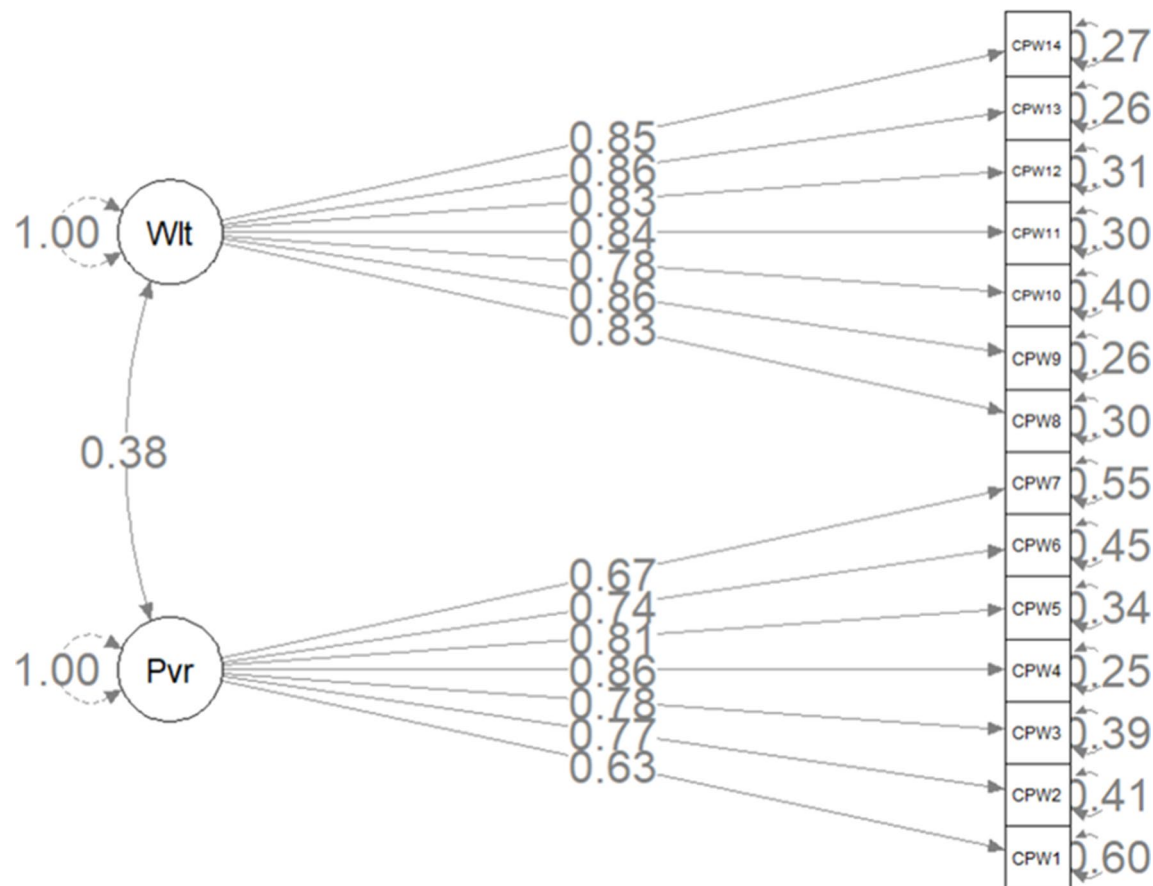
**Fig. 1** C-CPPWQ's Path diagram from the CFA. Note: Wlt = Perceived wealth, Pvr = Perceived poverty

### Reliability

The internal consistency of the C-CPPWQ for Sample 2($n$ = 1217) was assessed with Cronbach's alpha (0.90) and McDonald's Omega (0.94) across all items. Similarly, for the C-CPUQ, Cronbach's alpha was 0.95 and McDonald's Omega was 0.96. The internal consistency measures for all components, detailed in Table 3, exceeded the 0.7 threshold, confirming the questionnaires' reliability.

### Concurrent validity

The concurrent validity of the Childhood Perceived Poverty and Wealth Questionnaire (C-CPPWQ) and Childhood Perceived Unpredictability Questionnaire (C-CPUQ) was assessed for Sample 2($n$ = 1217) using Pearson correlation coefficients (see Table 4). C-CPPWQ scores were positively correlated with C-CPUQ and childhood trauma scores, and negatively correlated with Mini-K scores. Similarly, C-CPUQ scores also showed positive correlations with childhood trauma and negative correlations with Mini-K. These findings support the satisfactory concurrent validity of the Chinese versions of C-CPPWQ and C-CPUQ.

### Discussion

Life history models (e.g., harshness-unpredictability model) [11] have previously been explored in ACEs research in China [38, 39]. However, the variation in operational definitions and measurement tools across studies has made it challenging to directly compare results. This inconsistency hinders the ability to explore connections that could provide a deeper understanding of the complex interplay within childhood environments. The primary aim of this study was to adapt and validate instruments specifically tailored for the Chinese population to assess Childhood Perceived Poverty and Childhood Perceived Unpredictability. This process was based on the theoretical framework of an existing, well-established English version(Childhood Harshness Scale and Childhood Unpredictability Scale) [28], refined by a review of relevant Chinese literature, feedback from an expert panel and pilot study, and a series of rigorous statistical analyses.

Two refined Chinese-version measures with clear structures have been developed: The Childhood Perceived Poverty and Wealth Questionnaire (C-CPPWQ) consists of 14 items designed to measure two components—perceived poverty and perceived wealth—aimed

**Table 2** Items and factor loadings for 3 factors of the childhood perceived unpredictability questionnaire

| Item | Parents | Environment | Daily happen |
|---|---|---|---|
| 13 Whether my parents punish me when I act up depends on their mood | **0.918** | −0.083 | −0.072 |
| 12 The rules my parents set change all the time | **0.868** | −0.044 | −0.044 |
| 16 My parents often fail to do the things they promised me | **0.833** | 0.125 | −0.135 |
| 11 My parent's behavior in a given situation depends on his/her emotions | **0.806** | −0.206 | 0.140 |
| 14 I can't predict how my parents will behave in different situations | **0.754** | 0.059 | 0.089 |
| 15 Sometimes my parents yell at me for no reason | **0.708** | 0.136 | 0.016 |
| 10 My family environment was often tense and on edge | **0.441** | 0.122 | 0.278 |
| 9 People often moved in and out of my house fairly frequently | −0.097 | **0.930** | −0.148 |
| 8 The traffic around the house(s) I lived was unpredictable and chaotic | 0.101 | **0.821** | −0.146 |
| 6 I could not predict which of many caretakers (e.g., babysitters, nannies, neighbors, family) would be watching me | −0.072 | **0.802** | 0.109 |
| 7 I was never certain where it was safe to play | 0.002 | **0.784** | 0.124 |
| 5 I did not know when I would see my parent(s) | 0.050 | **0.609** | 0.197 |
| 2 When I woke up, I often didn't know what could happen in my house that day | −0.046 | −0.003 | **0.931** |
| 4 When I left my house I was never quite certain what would happen in my neighborhood | −0.025 | −0.157 | **0.913** |
| 3 My family life was generally inconsistent and unpredictable from day-to-day | 0.062 | 0.096 | **0.727** |
| 1 I never knew whether my parents would be there to pick me up from school | 0.037 | 0.180 | **0.466** |

Factor loadings of each item on the assumed main factor and other factors are reported. Values are in bold if factor loadings are equal to or above 0.40

at assessing subjective socioeconomic status (SES). Similarly, the Childhood Perceived Unpredictability Questionnaire (C-CPUQ) includes 16 items to evaluate three dimensions: unpredictability of parenting, unpredictability of the external environment, and unpredictability of daily happenings.

The Childhood Perceived Poverty and Wealth Questionnaire (C-CPPWQ) was adapted and validated across two samples. In Sample 1, exploratory factor analysis (EFA) identified a two-factor structure from the 14-item C-CPPWQ, reflecting core components of subjective socioeconomic status (SES), with item factor loadings ranging from 0.67 to 0.89 and explaining 66.91% of the variance. This structure was confirmed in Sample 2 through confirmatory factor analysis (CFA), which supported the two-factor model with loadings between 0.63 and 0.86The C-CPPWQ displayed robust factorial structure and consistency across samples. Internal reliability for all components and the total score was high, with Cronbach's alpha and McDonald's Omega coefficients ranging from 0.90 to 0.96, well above the 0.70 threshold indicative of reliability. In parallel, The Childhood Perceived Unpredictability Questionnaire (C-CPUQ) was adapted and validated across two samples. In Sample 1, exploratory factor analysis (EFA) identified a three-factor structure from the 16-item C-CPUQ, reflecting core components of perceived unpredictability, with item factor loadings ranging from 0.44 to 0.93 and explaining 65.31% of the variance. This structure was confirmed in Sample 2 through confirmatory factor analysis (CFA), which supported the three-factor model with loadings between 0.72 and 0.87, demonstrating a better fit than a single-factor model. The C-CPUQ displayed robust factorial structure and consistency across samples. Internal reliability for all components and the total score was high, with Cronbach's alpha and McDonald's Omega coefficients ranging from 0.90 to 0.96, well above the 0.70 threshold indicative of reliability. The structure of the C-CPPWQ was compared with the English version of the Childhood Harshness Scale (CHS) [28], revealing alignment in their two-factor structures. However, while CHS considers the second factor a methodological artifact due to reverse scoring, the C-CPPWQ interprets the first factor as capturing perceptions of poverty, including a scarcity mindset, and the second as reflecting perceptions of wealth. It is crucial to recognize that lacking wealth does not equate to experiencing poverty, suggesting that the conceptual alignment of these perceptions post-reverse scoring warrants further investigation. Although poverty can negatively impact individual development, not all children from impoverished backgrounds face limited futures. Outcome variations are influenced by a scarcity mindset which includes cognitive processes and beliefs associated with poverty [40, 41]. Consequently, we have
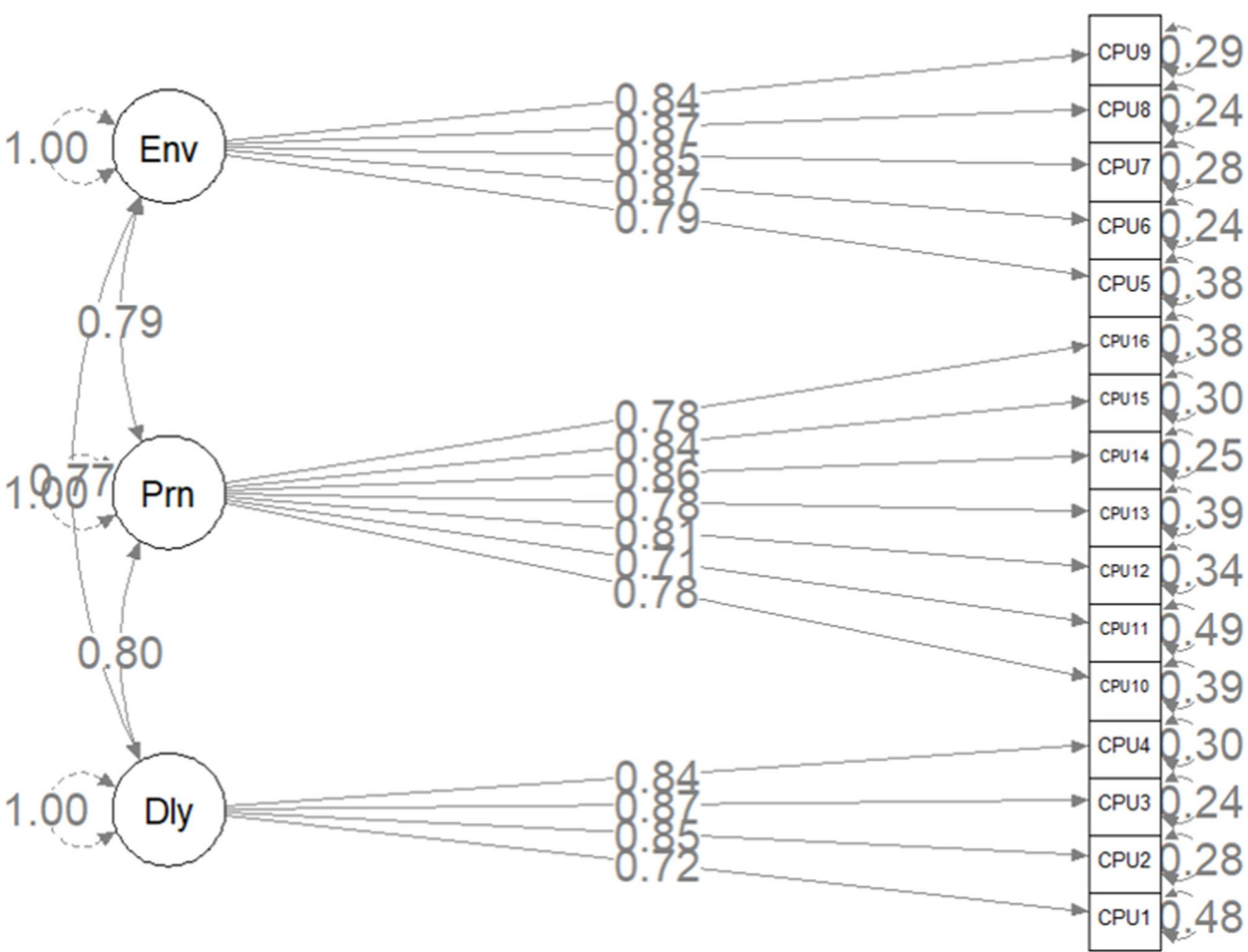
**Fig. 2** C-CPUQ's Path diagram from the CFA. Note: Env = Unpredictability of External Environment, Prn = Unpredictability of Parenting, Dly = Unpredictability of Daily Happening

**Table 3** Internal consistencies of C-CPPWQ and C-CPUQ

| Subscale | Number of items | M | SD | Cronbach's alpha | McDonald's Omega |
|---|---|---|---|---|---|
| C-CPPWQ | 14 | 60.05 | 17.11 | 0.91 | 0.88 |
| Perceived Poverty | 7 | 27.34 | 10.80 | 0.90 | 0.90 |
| Perceived Wealth | 7 | 32.71 | 10.05 | 0.94 | 0.94 |
| C-CPUQ | 16 | 46.48 | 22.72 | 0.95 | 0.95 |
| Unpredictability of Parenting | 7 | 22.24 | 10.72 | 0.92 | 0.92 |
| Unpredictability of External Environment | 5 | 11.65 | 7.56 | 0.92 | 0.93 |
| Unpredictability of Daily Happening | 4 | 12.40 | 6.50 | 0.89 | 0.89 |

identified two factors in our scale as "perceived poverty" and "perceived wealth." We encourage future research to explore differences between these two subscales and further validate them in diverse samples. Additionally, item 8 ("My family and I were usually able to purchase expensive presents for holidays, birthdays, etc.") was removed from the CHS in the development of the C-CPPWQ, as it was more culturally oriented towards gift-giving than indicative of socioeconomic status, which is the focus of our measures.

Likewise, the C-CUPQ, an extension version of the original CUS scale, adds six items focusing on unpredictability in parental behaviors and includes a systematic examination of its psychometric properties, leading

**Table 4** Pearson correlation coefficients of C-CPPWQ and C-CPUQ

| Scale | M | SD | C-CPPWQ | C-CPUQ | CTQ | Mini-K |
|---|---|---|---|---|---|---|
| C-CPPWQ | 60.05 | 17.11 | 1** | 0.35** | 0.26** | -0.28** |
| C-CPUQ | 27.34 | 10.80 | 0.35** | 1** | 0.73** | -0.35** |

< 0.05 **p < 0.01

to notable structural differences. Contrary to the unidimensional CUS, which includes items on peers and school environment, the C-CUPQ exclusively assesses the internal and external family environment, omitting peer-related items such as "I often did not know what to expect from other students at school." This revision reflects research indicating that family influences are more pivotal than peer influences on individual development before adolescence (age 10) [42]. In addition, three other items that were unclear or ambiguous in Chinese (e.g., "I did not know what to expect from my family when I had friends over," "Things were often chaotic in my house," and "I had a hard time knowing what my parent(s) or other people in my house were going to say") were excluded due to high cross-loadings in the EFA results. Finally, the revised C-CPUQ comprises three factors: Unpredictability of Parenting, Unpredictability of External Environment, and Unpredictability of Daily Happenings. These factors enable a multifaceted examination of how unpredictability influences individual development. By integrating the dimensional model of adversity and psychopathology (threat-deprivation model) [20], the structure of the C-CPUQ appears to reflect some aspects of threat and deprivation. Specifically, the Unpredictability of Parenting may be more closely associated with the unpredictability of abuse, particularly emotional abuse, as suggested by previous studies [31]. In contrast, the Unpredictability of External Environment may be more strongly linked to deprivation, as parents may need to frequently change jobs or environments to increase income—an issue faced by many of China's left-behind children [43]. Meanwhile, the Unpredictability of Daily Happenings reflects general unpredictability as perceived by individuals. Previous studies have shown that establishing stable daily routines within families can help mitigate the effects of external disruptions, such as pandemics, on individual development [44]. These hypotheses warrant further exploration in future research.

The concurrent validity studies indicate that childhood poverty (harshness) and unpredictability are negatively correlated with Mini-k, in line with findings from multiple studies [45, 46]. Individuals from harsh and unpredictable backgrounds may develop faster life history (LH) strategies, such as hastened sexual maturation and prioritization of immediate gains, due to the uncertainties of their future [11]. Additionally, there are significant positive correlations among the scores of the C-CPPWQ, C-CPUQ, and CTQ-SF. This pattern reflects the tendency of adverse childhood experiences (ACEs) to accumulate and cluster, exacerbating their negative impact on cognitive, emotional, and social development. Given this aggregation and its profound effects, using these three questionnaires together is recommended for a more exhaustive assessment of childhood adversity.

This study has several limitations. First, it primarily involved college students, limiting the generalizability of the findings to other age groups within the Chinese population. Second, the cross-sectional design depended on participants' recollections of their childhood conditions, which could introduce memory bias. Additionally, the evaluation of concurrent validity was restricted to the CTQ and Mini-K. Future research should expand to include a broader range of psychopathological symptoms and utilize longitudinal designs to enhance test-retest reliability and predictive validity, thus providing a more comprehensive understanding of the impacts of childhood environments. Lastly, we used a 10-year period to maintain consistency with previous studies [15, 28] and did not examine potential differences in recall ages. Understanding developmental periods is a critical question in ACEs research [47], and future studies could explore whether differences exist among various recall ages.

## Conclusion
In general, The Chinese version of the Childhood Perceived Poverty and Wealth Questionnaire (C-CPPWQ) assesses subjective socioeconomic status (SES) from two dimensions—perceived poverty and perceived wealth, each containing seven items. The Chinese version of the Childhood Perceived Unpredictability Questionnaire (C-CPUQ) evaluates perceived unpredictability across three dimensions: Unpredictability of Parenting (7 items), Unpredictability of External Environment (5 items), and Unpredictability of Daily Happenings (4 items). These questionnaires are concise, clearly articulated, and have demonstrated appropriate psychometric properties, including structural validity, internal consistency reliability, and concurrent validity in three Chinese samples.

**Abbreviations**

| | |
|---|---|
| C-CPPWQ | the Chinese versions of the Childhood Perceived Poverty and Wealth Questionnaire |
| C-CPUQ | the Chinese versions of the Childhood Perceived Unpredictability Questionnaire |
| ACEs | Adverse childhood experiences |
| ELA | Early life adversity |
| EFA | Exploratory Factor Analysis |
| CFA | Confirmatory Factor Analysis |
| Wlt | Perceived wealth |
| Wealth | Perceived wealth |
| Pvr | Perceived poverty |
| Poverty | Perceived wealth |
| Env | Unpredictability of External Environment |
| Prn | Unpredictability of Parenting |
| Dly | Unpredictability of Daily Happening |
| SES | socioeconomic status |
| CTQ-SF | the Childhood Trauma Questionnaire |
| CHS | Childhood harshness scale |
| CUS | Childhood unpredictability scale |
| LH | life history strategies |

| Mini-K | measures of life history strategies |
|--------|-------------------------------------|
| CFI    | Comparative Fit Index               |
| NFI    | Normed Fit Index                    |
| GFI    | Goodness-of-Fit Index               |
| TLI    | Tucker-Lewis Index                  |
| RMSEA  | Root Mean Square Error of Approximation |
| SRMR   | Standardized Root Mean Square Residual |

## Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s40359-025-02518-1.

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Supplementary Material 1

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## Declarations

### Ethics approval and consent to participate
All participants volunteered and received a data protection declaration in agreement with the Helsinki Declaration. They gave both, written and verbal, informed consent. The study was approved according to the ethical guidelines by the Ethical commission of Shanghai Mental health center (2023–54).

### Consent for publication
Not applicable.

### Competing interests
The authors declare no competing interests.

### Conflict of interest
The authors declare no conflict of interest.

## References
1. Kessler RC, McLaughlin KA, Green JG, Gruber MJ, Sampson NA, Zaslavsky AM, Aguilar-Gaxiola S, Alhamzawi AO, Alonso J, Angermeyer M, et al. Childhood adversities and adult psychopathology in the WHO world mental health surveys. Br J Psychiatry. 2010;197(5):378–85. https://doi.org/10.1192/bjp.bp.110.080499.
2. Hughes K, Bellis MA, Hardcastle KA, Sethi D, Butchart A, Mikton C, Jones L, Dunne MP. The effect of multiple adverse childhood experiences on health: a systematic review and meta-analysis. Lancet Public Health. 2017;2(8):e356–66. https://doi.org/10.1016/S2468-2667(17)30118-4.
3. Guloksuz S, van Os J, Rutten BPF. The exposome paradigm and the complexities of environmental research in psychiatry. JAMA Psychiatry. 2018;75(10):985–6. https://doi.org/10.1001/jamapsychiatry.2018.1211.
4. Evans GW, Li D, Whipple SS. Cumulative risk and child development. Psychol Bull. 2013;139(6):1342–96. https://doi.org/10.1037/a0031808.
5. Bellis MA, Hughes K, Ford K, Ramos Rodriguez G, Sethi D, Passmore J. Life course health consequences and associated annual costs of adverse childhood experiences across Europe and North America: a systematic review and meta-analysis. Lancet Public Health. 2019;4(10):e517. https://doi.org/10.1016/S2468-2667(19)30145-8.
6. Smith KE, Pollak SD. Rethinking concepts and categories for Understanding the neurodevelopmental effects of childhood adversity. Perspect Psychol Sci. 2021;16(1):67–93. https://doi.org/10.1177/1745691620920725.
7. Smith KE, Pollak SD. Social relationships and children's perceptions of adversity. Child Dev Perspect. 2021;15(4):228–34.
8. Del Giudice M, Ellis BJ, Shirtcliff EA. The adaptive calibration model of stress responsivity. Neurosci Biobehavioral Reviews. 2011;35(7):1562–92.
9. Ellis BJ, Del Giudice M. Developmental adaptation to stress: an evolutionary perspective. Ann Rev Psychol. 2019;70:111–39.
10. Belsky J, Schlomer GL, Ellis BJ. Beyond cumulative risk: distinguishing harshness and unpredictability as determinants of parenting and early life history strategy. Dev Psychol. 2012;48(3):662–73. https://doi.org/10.1037/a0024454.
11. Ellis BJ, Figueredo AJ, Brumbach BH, Schlomer GL. Fundamental dimensions of environmental risk: the impact of harsh versus unpredictable environments on the evolution and development of life history strategies. Hum Nat. 2009;20(2):204–68. https://doi.org/10.1007/s12110-009-9063-7.
12. Adler NE, Boyce T, Chesney MA, Cohen S, Folkman S, Kahn RL, Syme SL. Socioeconomic status and health: the challenge of the gradient. Am Psychol. 1994;49(1):15.
13. Doom JR, Vanzomeren-Dohm AA, Simpson JA. Early unpredictability predicts increased adolescent externalizing behaviors and substance use: A life history perspective. Dev Psychopathol. 2016;28(4pt2):1505–16. https://doi.org/10.1017/s0954579415001169.
14. Maner JK, Dittmann A, Meltzer AL, McNulty JK. Implications of life-history strategies for obesity. Proc Natl Acad Sci U S A. 2017;114(32):8517–22. https://doi.org/10.1073/pnas.1620482114.
15. Mittal C, Griskevicius V, Simpson JA, Sung S, Young ES. Cognitive adaptations to stressful environments: when childhood adversity enhances adult executive function. J Pers Soc Psychol. 2015;109(4):604–21. https://doi.org/10.1037/pspi0000028.
16. Szepsenwol O, Simpson JA, Griskevicius V, Zamir O, Young ES, Shoshani A, Doron G. The effects of childhood unpredictability and harshness on emotional control and relationship quality: A life history perspective. Dev Psychopathol. 2022;34(2):607–20. https://doi.org/10.1017/s0954579421001371.
17. Maner JK, Hasty CR, Martinez JL, Ehrlich KB, Gerend MA. The role of childhood unpredictability in adult health. J Behav Med. 2023;46(3):417–28. https://doi.org/10.1007/s10865-022-00373-8.
18. McGinnis EW, Sheridan M, Copeland WE. Impact of dimensions of early adversity on adult health and functioning: A 2-decade, longitudinal study. Dev Psychopathol. 2022;34(2):527–38.
19. Jackson DB, Testa A, Vaughn MG. Adverse childhood experiences and school readiness among Preschool-Aged children. J Pediatr. 2021;230:191–7. https://doi.org/10.1016/j.jpeds.2020.11.023.
20. McLaughlin KA, Sheridan MA, Humphreys KL, Belsky J, Ellis BJ. The value of dimensional models of early experience: thinking clearly about concepts and categories. Perspect Psychol Sci. 2021;16(6):1463–72. https://doi.org/10.1177/1745691621992346.
21. Ellis BJ, Sheridan MA, Belsky J, McLaughlin KA. Why and how does early adversity influence development? Toward an integrated model of dimensions of environmental experience. Dev Psychopathol. 2022;34(2):447–71. https://doi.org/10.1017/s0954579421001838.
22. Bernstein DP, Stein JA, Newcomb MD, Walker E, Pogge D, Ahluvalia T, Stokes J, Handelsman L, Medrano M, Desmond D. Development and validation of a brief screening version of the childhood trauma questionnaire. Child Abuse Negl. 2003;27(2):169–90.
23. Young ES, Frankenhuis WE, Ellis BJ. Theory and measurement of environmental unpredictability. Evol Hum Behav. 2020;41(6):550–6. https://doi.org/10.1016/j.evolhumbehav.2020.08.006.
24. Anderson C, Kraus MW, Galinsky AD, Keltner D. The local-ladder effect: social status and subjective well-being. Psychol Sci. 2012;23(7):764–71. https://doi.org/10.1177/0956797611434537.
25. Cundiff JM, Smith TW, Uchino BN, Berg CA. Subjective social status: construct validity and associations with psychosocial vulnerability and self-rated health. Int J Behav Med. 2013;20(1):148–58. https://doi.org/10.1007/s12529-011-9206-1.

26. Griskevicius V, Tybur JM, Delton AW, Robertson TE. The influence of mortality and socioeconomic status on risk and delayed rewards: a life history theory approach. J Pers Soc Psychol. 2011;100(6):1015–26. https://doi.org/10.1037/a0022403.

27. Young ES, Griskevicius V, Simpson JA, Waters TE, Mittal C. Can an unpredictable childhood environment enhance working memory? Testing the sensitized-specialization hypothesis. J Pers Soc Psychol. 2018;114(6):891. https://doi.org/10.1037/pspi0000124.

28. Maranges HM, Hasty CR, Martinez JL, Maner JK. Adaptive calibration in early development: brief measures of perceived childhood harshness and unpredictability. Adapt Hum Behav Physiol. 2022;8(3):313–43. https://doi.org/10.1007/s40750-022-00200-z.

29. Wang Y, Lin Z, Hou B, Sun S. The intrinsic mechanism of life history trade-offs: the mediating role of control striving[J]. Acta Physiol Sinica. 2017;49(6):783–93.

30. Luo Y, Niu G, Chen H. Early life environmental unpredictability and overeating: Based on life history theory. Acta Psychologica Sinica, 2020, (10).

31. Ross LT, Hill EM. The family unpredictability scale: reliability and validity. J Marriage Family. 2000;62(2):549–62. https://doi.org/10.1111/j.1741-3737.2000.00549.x.

32. Figueredo AJ, Vásquez G, Brumbach BH, Schneider SMR, Sefcek JA, Tal IR, Hill D, Wenner CJ, Jacobs WJ. Consilience and life history theory: from genes to brain to reproductive strategy. Dev Rev. 2006;26(2):243–75. https://doi.org/10.1016/j.dr.2006.02.002.

33. Sai X, Zhao Y, Geng Y, Zhu L, Zhaang H. Revision of the Mini-K scale in Chinese college students. Chin J Clin Psychol. 2022;30(05):1160–4. https://doi.org/10.16128/j.cnki.1005-3611.2022.05.030.

34. Zhao X, Zhang Y, Li L, Zhou Y, Li H, Yang S. Reliability and validity of the Chinese version of childhood truama questionnaire. Chin J Tissue Eng Res. 2005;9(020):105–7.

35. Howard MC. A review of exploratory factor analysis decisions and overview of current practices: what we are doing and how can we improve? Int J Hum Comput Interact. 2016;32(1):51–62.

36. Fabrigar LR, Wegener DT, MacCallum RC, Strahan EJ. Evaluating the use of exploratory factor analysis in psychological research. Psychol Methods. 1999;4(3):272.

37. Browne MW, Cudeck R. Alternative ways of assessing model fit. Sociol Methods Res. 1992;21(2):230–58.

38. Luo Y, Chen X, Zeng W, Xiao M, Liu Y, Gao X, Chen H. Associations of harsh, unpredictable environment, amygdala connectivity and overeating for children. Prog Neuropsychopharmacol Biol Psychiatry. 2023;120:110644. https://doi.org/10.1016/j.pnpbp.2022.110644.

39. Chen B-B, Shi Z, Sun S. Life history strategy as a mediator between childhood environmental unpredictability and adulthood personality. Pers Indiv Differ. 2017;111:215–9.

40. Mani A, Mullainathan S, Shafir E, Zhao J. Poverty impedes cognitive function. Science. 2013;341(6149):976–80. https://doi.org/10.1126/science.1238041.

41. Shah AK, Mullainathan S, Shafir E. Some consequences of having too little. Science. 2012;338(6107):682–5. https://doi.org/10.1126/science.1222426.

42. Steinberg L, Morris AS. Adolescent development. Annu Rev Psychol. 2001;52:83–110. https://doi.org/10.1146/annurev.psych.52.1.83.

43. Wen YJ, Hou WP, Zheng W, Zhao XX, Wang XQ, Bo QJ, Pao C, Tang YL, Tan T, Li XB, et al. The neglect of Left-Behind children in China: A Meta-Analysis. Trauma Violence Abuse. 2021;22(5):1326–38. https://doi.org/10.1177/1524838020916837.

44. Liu S, Fisher PA. Early experience unpredictability in child development as a model for Understanding the impact of the COVID-19 pandemic: A translational neuroscience perspective. Dev Cogn Neurosci. 2022;54:101091. https://doi.org/10.1016/j.dcn.2022.101091.

45. Brumbach BH, Figueredo AJ, Ellis BJ. Effects of harsh and unpredictable environments in adolescence on development of life history strategies: A longitudinal test of an evolutionary model. Hum Nat. 2009;20(1):25–51. https://doi.org/10.1007/s12110-009-9059-3.

46. Chang L, Lu HJ, Lansford JE, Skinner AT, Bornstein MH, Steinberg L, Dodge KA, Chen BB, Tian Q, Bacchini D, et al. Environmental harshness and unpredictability, life history, and social and academic behavior of adolescents in nine countries. Dev Psychol. 2019;55(4):890–903. https://doi.org/10.1037/dev0000655.

47. Belsky J, de Haan M. Annual research review: parenting and children's brain development: the end of the beginning. J Child Psychol Psychiatry. 2011;52(4):409–28. https://doi.org/10.1111/j.1469-7610.2010.02281.x.

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