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Longitudinal influences of adverse childhood experience patterns on mental health among older Chinese people

Yue Zeng[1*] and Renhui Lyu[2]

Abstract

Background Childhood experiences have been shown to affect mental health in later life. However, the relationships between childhood adversity patterns and mental health trajectories in later life have not been fully examined. Using a pattern-based approach, this research identified distinct patterns of exposure to adverse childhood experiences (ACEs) and longitudinal relationships between ACE patterns and mental health trajectories among older Chinese people.

Methods Using data on 4,343 respondents aged 60 or older from four waves of the China Health and Retirement Longitudinal Study (2011, 2013, 2015, and 2018) and a 2014 life history survey, latent class analysis was employed to identify patterns of ACEs. Parallel process latent growth curve models were applied to examine the longitudinal relationships between ACE patterns and depressive symptoms and cognitive function.

Results Three meaningful patterns of ACE emerged: Low ACEs, Polyvictimization, and Absence of parental care. ACE patterns were associated with the trajectory of cognitive function but not depression, and the effects were particularly evident in the Polyvictimization class.

Conclusions This study emphasizes the significant influences of ACE patterns on cognition in later life. Additionally, early screening, prevention, assessment, and interventions for people with polyvictimization experiences are critical for alleviating or delaying cognitive decline in later life.

Keywords Adverse childhood experience patterns, Depressive symptoms, Cognitive decline, Trajectory, Older Chinese people

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Background

Mental disorders, such as depression and cognitive impairment, have become a growing public health concern as leading causes of disability and death worldwide [1]. Given the rapid population aging in China, identifying modifiable factors for mental well-being should be a priority to achieve the target of healthy aging. Life course theory depicts individual development as a dynamic process, emphasizing the significance of time and timing in understanding how early-life exposures influence health outcomes [2]. The latency model suggests that early childhood conditions have direct and long-lasting effects on later-life health, because this period is a sensitive phase crucial for subsequent development [3]. However, some scholars have argued that early risk exposures may shape health outcomes in various ways, since childhood risk factors often occur in clusters, and health outcomes can vary significantly [4]. Furthermore, older Chinese individuals grew up during periods of significant social instability, facing limited resources and restricted access to healthcare services, factors that may contribute to social disparities and distinct health trajectories in later life [5–6]. Considering mental health is influenced by childhood experiences, understanding how adverse childhood experiences (ACEs) affect late-life mental health change can support interventions at particular life stages to prevent or postpone mental health decline in later life [7].

Long-term influences of ACEs

ACEs refer to potentially distressing and traumatic events that individuals experience before age 18, including child abuse (e.g., physical and emotional abuse), child neglect (e.g., physical and emotional neglect), and household dysfunctions (e.g., parental incarceration and domestic violence) [8]. Early childhood is a critical development period during which ACEs could have lifelong influences on mental health through changes in physiology, psychology, behaviour, and social interactions, along with their interplay [8]. First, exposure to ACEs can lead to neurobiological changes associated with mental risk, including elevated physiological responses, changes in cortisol levels, weakened immune function, and elevated inflammatory markers [9]. Second, growing up with ACEs can disrupt healthy development by exposing people to unstable early relationships and environments [8]. According to attachment theory and schema theory, individuals with ACEs are at high risk of developing maladaptive psychological schemas and dysfunctional attachment styles [10, 11]. Unhealed ACEs in adults can impair their social, cognitive, and emotional functioning and undermine their ability to form warm and attuned relationships with their children and partners [12], thereby increasing the likelihood of developing mental health problems. Studies have supported the relationships that exposure to ACEs, such as physical or verbal abuse, emotional neglect, parental divorce, parental domestic violence, or parental substance use, is associated with negative health outcomes in adulthood, including a low level of self-rated health [3, 13], risk of chronic diseases and disorders [14, 15], poorer cognition [16], and increased odds of depression [17, 18]. In addition, because ACEs tend to occur in clusters, a summative approach (i.e., creating a cumulative ACE index) typically has been used to examine the developmental effect of ACEs on mental health based on the cumulative risk model [19]. Individuals who experience at least one ACE are prone to experience others, and the number of ACE exposures may increase their risk of poor mental health, such as more symptoms of depression, anxiety, or suicidal ideation [20–22]. However, this approach is limited by the assumption that ACEs have equal weight [23].

ACE patterns

In recent years, identifying subgroups of ACEs with similar features has become a burgeoning research area. The dimensional model of adversity and psychopathology posits at least two core underlying dimensions of ACEs, threat-related ACEs and deprivation-related ACEs, that may differ in underlying mechanisms regarding their risks to neurodevelopment and psychopathology [24]. The life course intersectionality perspective indicates that mental health changes can be viewed as the intersection between population heterogeneity and life experiences with underlying life course mechanisms [7]. Thus, individuals with different ACE patterns may have distinct mental health trajectories in later life. Emerging studies have used a pattern-based approach (e.g., latent class analysis, or LCA) to identify typologies of ACE exposure. Using data from the 2018 China Health and Retirement Longitudinal Study, Yuan et al. reported three patterns of ACEs: Low ACEs, Household dysfunction, and Child maltreatment [25]. Compared with the Low ACEs class, only older individuals in the Child maltreatment class showed a higher risk of cognitive impairment. A study of older adults (aged 55 or older) in the US identified four ACE classes: High adversity, Low adversity, Child abuse, and Parental substance use. The High adversity and Child abuse classes were more likely to experience major depression compared to the Low adversity class [26]. Research on an urban sample of New Zealand women identified three ACE patterns: No/Low maltreatment, Sexual abuse, and Polyvictimization [27]. Childhood sexual abuse and Polyvictimization were associated with an increased risk of an internalizing disorder in older age. Limited research on older people showed that varied

patterns of ACEs may affect mental health differently. However, these studies had several critical limitations.

First, ACE patterns are a relatively understudied risk factor for multiple domains of mental health among older populations, because most studies have explored ACE patterns among children [28], adolescents [29, 30], young adults [28, 31], college students [32, 33], or women [34]. Second, a longitudinal design is needed to examine the long-term and concrete influence of ACEs on changes in mental health, but current findings are based on cross-sectional designs or short observation periods [25, 26]. In addition, research on ACEs should consider cultural context because ACE patterns vary widely across socioeconomic norms and geographic boundaries [31, 35]. Based on previous research and relevant theories, the following hypotheses were proposed in this research:

H1 Distinct patterns of ACEs will be identified among older Chinese people.

H2 Higher probabilities of ACEs are associated with poorer initial mental health status (i.e., more depressive symptoms and lower cognitive function).

H3 Higher probabilities of ACEs are associated with accelerated deterioration of mental health (i.e., worsening depressive symptoms and cognitive decline).

Present study

This research contributes to literature in three ways. First, this study extended life course models of health by combining the framework of child development (childhood adversity) with frameworks from gerontology and aging research (mental health in later life), expanding prior studies that mostly focused on children, adolescents, or college students. Second, we used LCA to explore patterns of ACEs among older people. Compared to the traditional index approach that simply sums all indicators, LCA is a pattern-based approach with advantages in capturing nuanced differences across indicators by classifying individuals into distinctive patterns that share similar endorsements regarding ACEs [36]. Last, we used parallel process latent growth curve models (PPMs) to examine how ACE patterns might affect the trajectories of depressive symptoms and cognition simultaneously, including initial mental health status and longitudinal trajectory changes, given prior studies were either cross-sectional or had a short observation period. Thus, the present study identified ACE patterns and examined their longitudinal associations with trajectories of mental health, including depressive symptoms and cognitive function, among older Chinese adults.

Methods

Data and sample

Data were extracted from four waves of the China Health and Retirement Longitudinal Study (CHARLS; 2011, 2013, 2015, and 2018) and a 2014 life history survey. CHARLS was a nationally representative survey that collected data on approximately 17,000 individuals aged 45 or older and their spouses, using a stratified, multistage probability sampling design based on household clusters [37]. Participants aged 60 or older ($n = 7{,}539$) who responded to the life history questionnaire ($n = 6{,}007$) were included in this study. Additionally, to partially address health selection issues, proxy respondents and respondents with self-reported memory-related problems were removed from the study ($n = 5{,}432$) [38]. We further studied sample attrition over time and selected respondents who had responded to at least three waves [39], creating a final analytic sample of 4,343 respondents.

Measurement

ACEs

ACEs were measured using the self-reported questionnaire in the CHARLS 2014 life history survey, which collected information on adversities that occurred before age 17. Considering the existing literature [40–42] and finite ACE categories in the CHARLS, the underlying classes of ACEs were identified based on the following experiences: (a) parental absence (no dependents or parental divorce), (b) parental mental illness, (c) parental substance use, (d) domestic violence, (e) parental disability, (f) emotional neglect, and (g) physical abuse. ACE indicators were measured by dichotomous (1 = *yes*, 0 = *no*) or scaled (1 = *often*, 2 = *sometimes*, 3 = *not very often or rarely*, 4 = *never*) questions in the CHARLS 2014 life history survey. Following prior research [43], scaled questions were recoded as binary variables (1 = *often or sometimes*, 0 = *not very often or rarely or never*). ACE questions and measurements are presented in Supplementary Table 1.

Depressive symptoms

Depressive symptoms were assessed with the Chinese version of the Center for Epidemiologic Studies Depression Scale (range: 0–30) in the 2011–2018 CHARLS [44]. Respondents reported how they felt regarding 10 questions related to depressive symptoms (e.g., depressed, lonely, and fearful) during the past week (1 = *rarely or none of the time [< 1 day]*, 2 = *some or a little of the time [1–2 days]*, 3 = *occasionally or a moderate amount of time [3 days]*, 4 = *most or all of the time [5–7 days]*). After reversing two positive items (hopeful and happy), these 10 items were summed; a higher score indicated a higher level of depressive symptoms. The scale's reliability and validity have been established with Chinese samples

[45, 46]. Cronbach's alpha values were acceptable across all waves (0.76–0.81), indicating reasonable internal consistency.

Cognitive function

Cognitive function (range: 0–20) was assessed by episodic memory, an age-sensitive measure not subject to floor or ceiling effects [47]. Episodic memory was measured by immediate and delayed recall of 10 Chinese nouns. This cognition measure was selected from the 2011–2018 CHARLS, with a higher score indicating a higher level of cognitive function.

Following previous studies [24, 48], covariates in this study included age (in years); gender (1 = *male*, 0 = *female*); urbanicity (1 = *rural*, 0 = *urban*); marital status (1 = *married*, 0 = *other*); education level (1 = *less than lower secondary*, 2 = *upper secondary or vocational training*, 3 = *tertiary*); household income; activities of daily living (ADL) and their instrumental form (i.e., IADL); health behaviors such as smoking (1 = *still smoking*, 2 = *never smoked*, 3 = *quit smoking*) and drinking (1 = *yes*, 0 = *no*); and childhood health status compared to other children (1 = *much less healthy*, 2 = *somewhat less healthy*, 3 = *about average*, 4 = *somewhat healthier*, 5 = *much healthier*). These measures were extracted from the baseline survey. Following previous research [38], we also controlled attrition (1 = *response to three waves*, 0 = *response to four waves*) to tackle missingness across waves.

Statistical analysis

Latent class analysis (LCA) via Mplus 8.3 was used to characterize unobserved ACE patterns based on seven dichotomous childhood adversity indicators: parental absence, parental mental illness, parental substance use, domestic violence, parental disability, emotional neglect, and physical abuse. This model-based approach identifies behavioral patterns of individuals using observed indicators and then classifies them into distinctive subgroups [49]. The number of latent classes was assessed using model fit indexes, including the probability of class classification (≥ 5%), Bayesian information criterion (BIC), adjusted Bayesian information criterion (ABIC), adjusted Lo–Mendell–Rubin likelihood ratio (ALMR), and bootstrap likelihood ratio test (BLRT). A lower BIC or ABIC value suggests a better model fit, and a significant ALMR or BLRT result indicates the latent class model would be improved by adding one more class [50]. Entropy (> 0.80) and average posterior probability (> 0.70) were used to examine classification accuracy [49]. The full information maximum likelihood estimation (FIML) with Huber- White covariance adjustment was used to handle missing data.

After unique ACE patterns were identified, parallel process latent growth curve models (PPMs) with a stepwise approach [51] were applied to examine the longitudinal relationships between ACE patterns and mental health (see Supplementary Fig. 2). Analyses commenced with unconditional latent growth curve modeling to identify the proper growth curve (linear or polynomial) of depressive symptoms and cognitive trajectories separately. After identifying the trajectories of depressive symptoms and cognition, unconditional PPMs were used to examine simultaneous changes in these trajectories over time, including (a) initial depressive symptoms (i.e., intercept) and initial cognition; (b) the rate of change of depressive symptoms (i.e., slope) and cognition; (c) initial depressive symptoms and the rate of change in cognition; and (d) initial cognition and the rate of change in depressive symptoms. Last, the LCA results and covariates were added to the PPMs to test how ACE patterns influenced mental health trajectories. The PPM analyses were adjusted for the complex survey design in CHARLS using sampling weights. Additionally, 10 imputed datasets were created using multiple imputation to correct missingness, and the results were combined using Rubin's rules [52]. The model fit was evaluated using the comparative fit index (CFI), Tucker–Lewis index (TLI), standardized root mean square residual (SRMR), and root mean square error approximation (RMSEA). The recommended cutoffs for acceptable model fit are CFI and TLI greater than 0.90, RMSEA less than 0.05, and SRMR less than 0.08 [49].

Results

Table 1 summarizes weighted distributions of the sample characteristics. Half of the respondents were male, and the majority were married (77.23%). The average age was 68 years, and more than half of the participants were rural residents (55.10%). More than 8% had a secondary school diploma or beyond. About 35% reported that their health status was better than that of other children during childhood. Respondents were relatively healthy, with relatively low scores for ADL ($M = 0.45$) and IADL ($M = 0.55$) limitations. About 30% of the participants smoked and consumed alcohol. Regarding ACEs, these older adults showed high probabilities of having experienced physical abuse (30.15%), parental mental illness (25.97%), and parental disability (19.98%). The mean scores of depressive symptoms and cognition were 8.65 and 6.78, respectively, at baseline. A slight increase in depressive symptoms and decrease in cognition occurred over time.

Identification of latent classes by ACEs

The results of the LCA for ACEs are presented in Fig. 1; Table 2. The three-class model showed the lowest BIC

Table 1 Weighted sample characteristics (*N* = 4,343)

Variables	%	*M* (*SE*)
Independent variables		
ACEs		
Parental absence	17.42	
Parental mental illness	25.97	
Parental substance use	7.70	
Domestic violence	8.63	
Parental disability	19.98	
Emotional neglect	10.63	
Physical abuse	30.15	
Dependent variables		
Depressive symptoms (range: 0–30)		
Wave 1 (2011)		8.65 (0.13)
Wave 2 (2013)		8.01 (0.12)
Wave 3 (2015)		8.41 (0.14)
Wave 4 (2018)		8.88 (0.14)
Cognition (range: 0–20)		
Wave 1 (2011)		6.78 (0.10)
Wave 2 (2013)		6.47 (0.08)
Wave 3 (2015)		5.36 (0.07)
Wave 4 (2018)		5.79 (0.11)
Covariates		
Age		68.03 (0.13)
Household income (in ¥1,000)		24.40 (0.75)
ADL (range: 0–6)		0.45 (0.02)
IADL (range: 0–5)		0.55 (0.02)
Male	49.87	
Rural	55.10	
Currently married	77.23	
Childhood health status (compared to other children)		
Much less healthy	5.06	
Somewhat less healthy	7.73	
About average	52.09	
Somewhat healthier	18.20	
Much healthier	16.92	
Education level		
Less than lower secondary	91.30	
Upper secondary and vocational training	6.29	
Tertiary	2.41	
Smoking		
Still smoke	29.40	
Never smoked	59.69	
Quit smoking	10.91	
Drank alcohol in the last year		
No	70.15	
Yes	29.85	

Note. M = weighted mean; *SE* = weighted standard error of mean; % = weighted percentage; ADL: activities of daily living; IADL: instrumental activities of daily living; ACEs: adverse childhood experiences

value (24,595.94) and ABIC value (24,522.85) and had a relatively high entropy value (0.77). The VLMR-LRT test suggested that the three-class model fit the data better (p <.001); however, the four-class model did not advance the three-class model (p >.05). The average posterior probabilities were 0.87 for Class 1, 0.82 for Class 2, and 0.94 for Class 3.

These three classes were labeled and interpreted using visual presentation. Class 1 had a low probability of experiencing all seven ACEs. This class was labeled "Low ACEs" and used as the reference for other classes. Class 2 was labeled "Polyvictimization." Individuals in this class experienced higher probabilities of physical abuse, emotional neglect, and witnessing domestic violence during childhood. Class 3 was labeled "Absence of parental care"; this class had higher probabilities of parental absence, parental mental illness, and parental disability compared to the other two classes.

PPMs

Supplementary Tables 2 and 3 present the unadjusted means at baseline and rate of change across waves of data collection for depressive symptoms and cognition. The model-estimated unconditional latent growth curve shows that the quadratic trajectory model of depressive symptoms (CFI = 1.00, TLI = 0.98, RMSEA = 0.04, SRMR = 0.01; see Supplementary Table 2) and the linear trajectory model of cognition (CFI = 0.96, TLI = 0.95, RMSEA = 0.04, SRMR = 0.03; see Supplementary Table 3) fit the data well, with a decreasing slope over time followed by an upward trend for depressive symptoms and a linear decline for cognition.

Supplementary Table 4 presents results from the unconditional PPMs. The findings indicate that baseline levels of depressive symptoms were negatively associated with baseline levels of cognition (r = -3.76, p <.001). Baseline levels of depressive symptoms or cognition were not associated with changes in cognition or depressive symptoms.

Table 3 presents the conditional PPM results of the estimated influence of ACE patterns on depressive symptoms and cognitive trajectories, with all models showing satisfactory model fit (CFI = 0.98, TLI = 0.96, RMSEA = 0.02, SRMR = 0.02). After adjusting for covariates, the Polyvictimization pattern did not differ from the Low ACEs pattern in terms of both initial levels of depressive symptoms (b = 0.34, SE = 0.39, p >.05) and depressive symptoms trajectory (slope: b = 0.27, SE = 0.52, p >.05; quadratic: b = -0.50, SE = 3.27, p >.05). Additionally, for the Absence of parental care pattern, both initial levels of depressive symptoms (b = -0.19, SE = 0.24, p >.05) and depressive symptoms trajectory (slope: b = 0.15, SE = 0.35, p >.05; quadratic: b = -0.35, SE = 2.19, p >.05) did not differ from those in the Low ACEs pattern.

For cognition, ACE patterns were not significantly associated with initial levels of cognitive function but were related to the trajectory of cognition. Specifically,

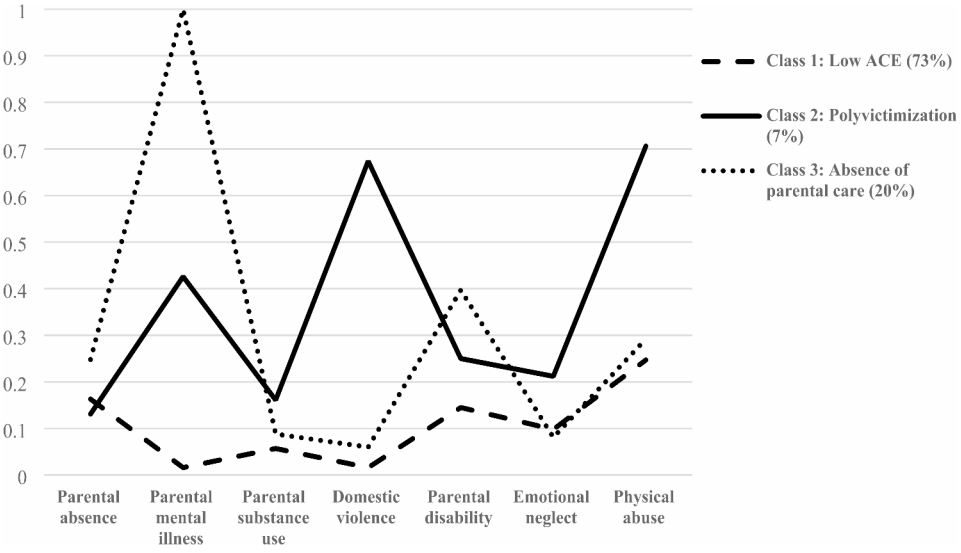

Fig. 1 Latent class analysis results for ACEs. Note: The numbers on the vertical axis indicate theprobability of endorsement of each ACE

Table 2 Latent class analysis results for the identification of the number of ACE patterns

	Two Classes	Three Classes	Four Classes
Model fit			
BIC	24,676.900	24,595.938	24,636.802
ABIC	24,629.236	24,522.853	24,538.296
VLMR-LRT	349.763**	145.797**	25.762
BLRT	354.982**	147.973**	26.147*
Entropy	0.366	0.770	0.715
Proportion of class			
Class 1	1,426 (33%)	3,162 (73%)	359 (8%)
Class 2	2,917 (67%)	297 (7%)	299 (7%)
Class 3		884 (20%)	170 (4%)
Class 4			3,515 (81%)

Note. BIC = Bayesian information criterion; ABIC = adjusted Bayesian information criterion

VLMR-LRT = Vuong–Lo–Mendell–Rubin adjusted likelihood ratio test; BLRT = bootstrap likelihood ratio test

*$p < .05$. **$p < .001$

the negative association between classes of ACEs and changes in cognition indicates that older adults in the Polyvictimization class (b = -0.23, SE = 0.10, $p < .05$) experienced a faster decline in cognitive function over time, compared with those in the low ACEs class. Those in the Absence of parental care class (b = -0.14, SE = 0.08, $p > .05$) showed similar trends, but the results were not statistically significant.

Discussion

Although the literature on ACEs and mental health is growing, previous research has not examined the association between ACE patterns and mental health trajectories among older people. Given childhood is a critical period of health development [6], this research identified patterns of ACE exposure and investigated the longitudinal relationships between ACE patterns and mental health in later life among older Chinese people.

This study indicates that clustering is an informative approach to identifying the heterogeneity of ACEs. Three distinct classes of ACE exposure—Low ACEs, Polyvictimization, and Absence of parental care—were identified among older Chinese people, suggesting that ACEs do not occur independently but are linked in patterned ways. Most older adults were classified as having Low ACEs, as identified extensively in previous research [25, 31], followed by the Absence of parental care and Polyvictimization. The identification of the Polyvictimization pattern is consistent with research conducted using samples of younger populations [31], in which household violence referred to high levels of violence in the home, directed toward both children and other household members. Older adults represented by the Polyvictimization pattern experienced the highest concurrent exposure to child maltreatment and domestic violence. In addition, this study uncovered a novel pattern of exposure involving high probabilities of parental absence, parental mental illness, and parental disability. Older adults in this class experienced a high level of absence of parental care during childhood. The older adults who participated in the survey were children in the 1940s to 1960s in China. During this period, China experienced major social instability and unpredictability (wars, political revolutions, etc.) that traumatized and shocked many families, both physically and psychologically, causing many adults to experience mental and physical illnesses and disabilities [53]. This may have contributed to the lack of parental care for Chinese children born and raised during this period. These findings highlight the significance of examining ACEs based on cultural context because they could

Table 3 Conditional parallel process model estimates for ACE patterns and mental health trajectories

	Intercept	Slope	Quadratic
	b (SE)	b (SE)	b (SE)
Depressive symptoms (ref: Low ACEs)			
Polyvictimization	0.34 (0.39)	0.27 (0.52)	−0.50 (3.27)
Absence of parental care	−0.19 (0.24)	0.15 (0.35)	−0.35 (2.19)
Cognition (ref: Low ACEs)			
Polyvictimization	0.23 (0.21)	−0.23 (0.10)*	
Absence of parental care	0.27 (0.16)	−0.14 (0.08)	
Model fit			
CFI	0.98		
TLI	0.96		
RMSEA	0.02		
SRMR	0.02		

Note. Results are based on models adjusted for gender, age, urbanicity, education, marital status, income, drinking, smoking, childhood health status, ADL, IADL, and attrition. Results were combined using 10 imputed datasets. CFI = comparative fit index; TLI = Tucker Lewis Index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual

*$p < .05$

vary across geographic, socioeconomic, and cultural norms [31].

Further examination of the relationship between ACE patterns and mental health trajectories indicated that depressive symptoms did not show significant differences between ACE patterns. This may reflect a combination of Chinese culture and traditional norms. For example, Chinese parents usually do not use verbal expressions of love to show their concern for their children [54], and corporal punishment of children is often seen as normal discipline with a blurred boundary with physical abuse [55]. Another explanation is that the effect of ACE patterns on depressive symptoms may be mediated by other factors rather than the direct effect. Research on specific ACE types has suggested that early exposure to disadvantages could influence mental health through psychosocial pathways, such as coping strategies, the development of self-esteem, or social support [41, 56]. Moreover, previous literature indicated that gender might be a key moderator; childhood adversity was associated with depression among women [25, 57]. Researchers could further explore the moderating effect or potential mechanisms between patterns of ACEs and depression.

The results indicate no significant differences in initial cognitive function across ACE classes. One possible explanation is that adulthood socioeconomic status (SES), including factors such as education and occupation, serves as a protective buffer for baseline cognitive function [7]. However, the accelerated cognitive decline observed in the Polyvictimization class after the age of 60—China's statutory retirement age, which serves as the baseline for our study—suggests that these protective mechanisms may weaken over time. We further found that older adults in the Polyvictimization class showed a faster decline in cognitive function over time compared to the Low ACEs class, which is consistent with previous cross-sectional evidence [25]. Older adults in the Polyvictimization pattern experienced concurrent exposure to physical abuse, emotional neglect, and domestic violence. Based on previous studies, trauma exposure is a risk factor for cognitive decline and different kinds of trauma may cause different damage to cognitive function [58, 59]. For example, research showed that emotional abuse was associated with impaired spatial working memory performance, whereas physical neglect correlated with impaired spatial working memory and pattern recognition memory [59]. Additionally, childhood trauma was associated with poorer cognitive performance, especially when paired with witnessing physical violence and experiencing physical and sexual trauma [60]. Thus, older adults classified by the Polyvictimization pattern experienced multiple adversities that may have exacerbated the negative effect on cognitive function.

Additionally, the cognitive reserve hypothesis suggests that mental stimulation attained through individual-level achievement creates an initial protective buffer for cognitive function in older age [7, 61]. However, early adversity could diminish this cognitive reserve, making older adults more susceptible to cognitive decline in later life [56, 62]. Unexpectedly, compared with the Low ACEs class, the Absence of parental care was not significantly associated with cognitive function. A possible explanation is that receiving care from other family members and relatives or strengthening friendship bonds may compensate for the negative effect of the absence of parental care on mental health [63, 64].

This study has important implications for professional interventions and programs. As indicated by the results, experiencing child maltreatment and domestic violence simultaneously during childhood was linked to more rapid cognitive decline. Therefore, these conditions require special attention and can be a key criterion

for screening. Professionals, such as social workers or health care workers, could use these findings to inform their practice by screening for ACEs [28]. People who have experienced polyvictimization would benefit from heightened mental health screening. Furthermore, understanding how ACEs contribute to health later in life is significant for developing nursing interventions. Because childhood experiences are integrated with different environmental systems, developing multiple social supportive sources is necessary. Intervention projects such as strengthening emotionally supportive relationships may alleviate or delay the risk of cognitive decline [63]. Last, mental health and social service programs involving health education should be provided to individuals who experienced polyvictimization, which may improve their quality of life and alleviate the pressure on health and medical systems.

This study has several limitations. First, the CHARLS did not include all types of ACEs, such as community and collective violence and sexual abuse, even though these items are prone to be associated with health [64]. Future research could consider incorporating these key categories to validate and expand the current study. Second, ACE measures were retrospectively assessed by self-report, which was subjective to recall bias. Third, similar to other research [65], because the CHARLS lacks information on cognitive ability or depression during childhood, this study could not control for early life cognition and depression conditions. However, it controlled for childhood health status to decrease this potential bias, based on evidence indicating that childhood health conditions may increase the risk of ACEs and disease later in life [3]. Fourth, a large proportion of individuals were excluded from our analyses because of loss of follow-up, which may cause selection bias and reduce the generalizability of our study findings. Last, this study only included depressive symptoms and cognitive function as measures of mental health due to data availability. Future studies are encouraged to expand this study with more mental health indicators, given these two variables may not capture the complex nature of mental health. In addition, although this study examined the influence of ACE patterns on episodic memory, future studies could consider a more comprehensive measurement of cognitive function.

Conclusion

This study identified three ACE patterns—Low ACEs, Polyvictimization, and Absence of parental care—among older Chinese adults. Additionally, this research advanced our knowledge of the longitudinal relationship between ACE patterns and mental health trajectories and found that ACE patterns have been associated with cognitive changes but not with changes in depressive symptoms. These findings highlight the significant influences of ACE patterns on cognition in later life and provide early screening, prevention, assessment, and interventions for individuals who experienced polyvictimization during childhood.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12877-025-05913-w.

Supplementary Material 1

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Author contributions
Y. Z. conceptualized the study questions and approach, carried out the analyses, and wrote and revised the article. R. L. contributed to revising the article. Both authors read and approved the final manuscript.

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Data availability
The data are available on the CHARLS website: https://charls.charlsdata.com/pages/data/111/en.html. To access and use these survey data for research purposes, approval should be obtained from the CHARLS team at Peking University.

Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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