Development and Psychopathology (2025), 1–9
doi:10.1017/S0954579425000033

CAMBRIDGE UNIVERSITY PRESS

Regular Article

The long-term effects of childhood maltreatment: Examining the indirect and cross-lagged pathways of maladaptive cognitive emotion regulation strategies and internalizing problems

Jianjun Huang[1], Xi Shen[1,2] and Jin-Liang Wang[1]

[1]Center for Mental Health Education, Faculty of Psychology, Southwest University, Chongqing, China and [2]Mental Health Education and Consultation Centre, Chongqing Medical University, Chongqing, China

Abstract

Childhood maltreatment, a significant distal risk factor for individual development, is potentially linked to maladaptive cognitive emotion regulation strategies (MCERS) and increased internalizing problems (i.e., depression and anxiety). Prior research has widely identified that MCERS mediate the link between childhood maltreatment and internalizing problems. However, this result overlooks the potential bidirectional relationship between MCERS and internalizing problems. In this study, we aim to explore whether childhood maltreatment longitudinally linked to internalizing problems through the mediating role of MCERS, or, conversely, was related to subsequent MCERS through internalizing problems. Gender differences in the associations between these variables were also examined. Participants were 892 adolescents from a longitudinal design with two waves (487 females, 405 males; M_{age} = 15.36, SD_{age} = 1.43). Our results indicated that childhood maltreatment was longitudinally related to MCERS and internalizing problems. T1 MCERS mediated the relationship between T1 child maltreatment and T2 internalizing problems, while T1 internalizing problems also played a mediating role between T1 child maltreatment and T2 MCERS. These findings were also equivalent across genders. Taken together, childhood maltreatment was longitudinally associated with internalizing problems through MCERS, and also related to subsequent MCERS through internalizing problems.

Keywords: Anxiety; childhood maltreatment; depression; longitudinal mediation; maladaptive cognitive emotion regulation strategies

(Received 1 September 2024; revised 28 December 2024; accepted 26 January 2025)

Introduction

Childhood maltreatment is one of the most prevalent early adverse experiences (Stoltenborgh et al., 2015), which includes physical neglect, physical abuse, emotional neglect, emotional abuse, and sexual abuse (Bernstein et al., 2003). Empirical evidence has linked childhood maltreatment to mental health symptoms among adolescents, especially internalizing problems (Wu et al., 2022; Zhang et al., 2022). For adolescents, depression and anxiety emerge as the two most prevalent internalizing problems (Zahn-Waxler et al., 2008), and both are positively associated with childhood maltreatment (Zhang et al., 2022). Childhood maltreatment was also a distal risk factor of maladaptive cognitive emotion regulation strategies (MCERS) (Morris et al., 2007), which are generally conceptualized as a contributing factor to internalizing problems (Dawel et al., 2021; Garnefski et al., 2001; Gross & John, 2003). Consequently, numerous studies have highlighted MCERS as a key mediator in explaining why childhood maltreatment induces internalizing problems (Guo et al., 2023; Huh et al., 2017; Wu et al., 2022). However, previous studies may overlook the potential bidirectional relationship between MCERS and internalizing problems (Dawel et al., 2021), as well as an alternative outcome: internalizing problems mediate the relationship between childhood maltreatment and MCERS (De France et al., 2019; Larsen et al., 2013; Spyropoulou & Giovazolias, 2022). Given these complex relationships, the present study proposed to use a two-wave longitudinal study to simultaneously test both of these potential outcomes. Specifically, examining whether childhood maltreatment leads to a reciprocal relationship between MCERS and internalizing problems.

Maladaptive cognitive emotion regulation strategies as a mediator

MCERS refer to the types of strategies that individuals employ in monitoring, evaluating, and modifying their emotional responses, which can result in negative psychological outcomes, including the four types of self-blame, rumination, catastrophizing, and other-blame (Garnefski et al., 2001). The Tripartite Model of the Impact of the Family on Children's Emotion Regulation and Adjustment (Morris et al., 2007) suggests that children's emotion regulation is influenced by parenting styles, parent-child attachment, and the emotional climate of the family. Warm, supportive parenting styles and family relationships promote children's acquisition of more

Corresponding author: Jin-Liang Wang; Email: wjl200789@163.com

Cite this article: Huang, J., Shen, X., & Wang, J-L. (2025). The long-term effects of childhood maltreatment: Examining the indirect and cross-lagged pathways of maladaptive cognitive emotion regulation strategies and internalizing problems. *Development and Psychopathology*, 1–9, https://doi.org/10.1017/S0954579425000033

adaptive cognitive emotion regulation strategies (Brumariu, 2015). Conversely, exposure to physical or psychological abuse and neglect will contribute to more emotional dysregulation (Gruhn & Compas, 2020). A recent study also found that childhood maltreatment was negatively associated with adolescents' adaptive cognitive emotion regulation strategies and positively associated with MCERS (Guo et al., 2023). Thus, childhood maltreatment may promote adolescents' more frequent use of MCERS.

Regular use of MCERS may further increase the risk of internalizing problems, such as depression (Huh et al., 2017) and anxiety (Wu et al., 2022). According to McLaughlin et al. (2011), adolescents who are unable to effectively regulate their emotions in the face of stressful events will experience long periods of psychological distress. Frequent use of MCERS has also been found to positively predict internalizing problems in adolescents six months later (Kokonyei et al., 2023). Furthermore, several types of MCERS (e.g., rumination, and suppression) have been found to explain the longitudinal association between childhood maltreatment and internalizing problems (Heleniak et al., 2016; Miu et al., 2022; Rek et al., 2022). Therefore, MCERS may longitudinally mediate the relationship between childhood maltreatment and internalizing problems.

An alternative model: internalizing problems as a potential mediator

While prior empirical evidence indicates the mediating role of MCERS between childhood maltreatment and internalizing problems, relevant theories and emerging longitudinal studies advocate for exploring the link between childhood maltreatment and MCERS, which may be explained by internalizing problems (Dawel et al., 2021).

The Broaden-and-Build Theory of Positive Emotions (Fredrickson, 2001) suggests that positive emotions can broaden attention and cognition, yet negative emotions (e.g., depression, and anxiety) will hinder the construction of cognitive and psychological resources. Additionally, adaptive cognitive emotion regulation strategies typically demand more cognitive resources than MCERS (Joormann & Stanton, 2016). Thus, experiencing childhood maltreatment may increase susceptibility to internalizing problems, which would further make adolescents more inclined to use MCERS rather than adaptive cognitive emotion regulation strategies (Heesen et al., 2020).

Empirical studies provide more direct evidence of the association between internalizing problems and MCERS. A longitudinal study has found that adolescents' levels of depression are prospectively predictive of expressive suppression one year later, and not vice versa (De France et al., 2019; Larsen et al., 2013). Moreover, Spyropoulou and Giovazolias (2022) found that depression at a previous time positively predicted anger rumination among adolescents one year later, but anger rumination did not prospectively predict their depression levels. However, a three-wave longitudinal study conducted by Dawel et al. (2021) found a bidirectional relationship between expressive suppression and both depression and anxiety in adults during the COVID-19 pandemic. Although empirical studies have not reached consistent conclusions, it is rational to assume that MCERS are not only antecedents of internalizing problems but may also be outcomes of internalizing problems (Dawel et al., 2021; Spyropoulou & Giovazolias, 2022). Therefore, it is necessary to test the prospective effects of internalizing problems on MCERS.

Based on the above evidence, we proposed an alternative explanation: childhood maltreatment may also link MCERS through the longitudinal mediation of depression and anxiety.

Gender differences

According to previous studies, the association between childhood maltreatment, MCERS, and internalizing problems may vary according to gender (Zhang et al., 2024). Some studies found that exposure to childhood maltreatment, especially emotional abuse, exerts a more detrimental effect on females, potentially leading to more severe internalizing problems (Auslander et al., 2016). However, there are also studies reporting no gender difference in the relation between childhood maltreatment and depression (Arnow et al., 2011). Moreover, Nolen-Hoeksema (2012) suggested that females are more likely to be observed with depression and anxiety possibly due to their increased reliance on MCERS such as rumination. However, other studies suggest no gender differences in the association between MCERS and depression (Calvete et al., 2015; Guo et al., 2023). The mixed findings above suggest the necessity of further investigating the potential impact of gender on the longitudinal model of childhood maltreatment affecting MCERS and internalizing problems.

The present study

To reveal the long-term negative effects of childhood maltreatment and the potential bidirectional relationship between MCERS and internalizing problems, the present study proposed to use a two-wave longitudinal study to explore whether childhood maltreatment induces internalizing problems through MCERS, or, conversely, leads to MCERS through internalizing problems. Additionally, we investigated whether there were gender differences in the associations between the above variables. Putting these together, we proposed four hypotheses: Childhood maltreatment would have positive and longitudinal associations with MCERS and internalizing problems (hypothesis 1); MCERS would mediate the longitudinal relationship of childhood maltreatment with internalizing problems (hypothesis 2); Internalizing problems would mediate the longitudinal relationship of childhood maltreatment with MCERS (hypothesis 3); The relationships mentioned above would be influenced by gender (hypothesis 4). The conceptual longitudinal model is shown in Figure 1.

Method

Participants and procedure

We recruited adolescents from a high school in Chongqing, China to participate in a longitudinal mental health survey. The studies involving human participants were reviewed and approved by the corresponding author's university ethics committee. Informed consent was obtained from students and their parents before the survey. In October 2021 (T1), a total of 1,155 participants completed an online survey about childhood maltreatment, MCERS, depression, anxiety, and demographic information. We conducted the second survey in April 2023 (T2) and collected 892 responses, resulting in an attrition rate of 22.77%. The results of the attrition analysis showed no significant difference in T1 childhood maltreatment ($t = -1.72$, $p = 0.08$), T1 MCERS ($t = -0.76$, $p = 0.45$), T1 depression ($t = -0.96$, $p = 0.34$), and T1 anxiety ($t = -1.50$, $p = 0.13$) between attrition participants and those who participated in both two surveys. This result suggests that the attrition of participants was random. Finally, 892 adolescents

https://doi.org/10.1017/S0954579425000033 Published online by Cambridge University Press

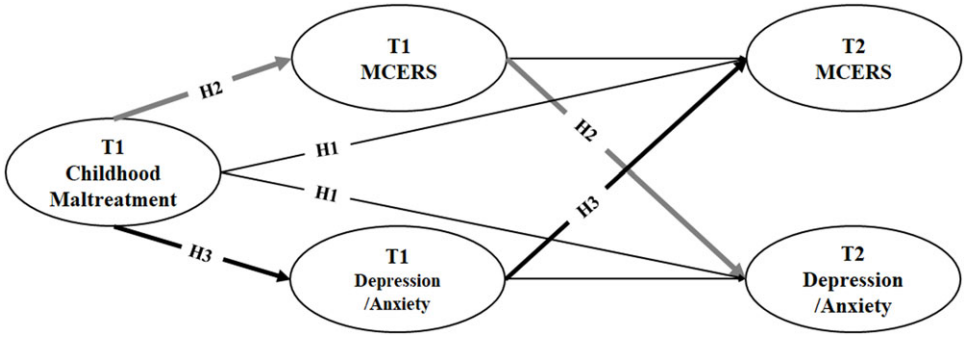

Figure 1. The conceptual longitudinal model. *Note*: MCERS = Maladaptive cognitive emotion regulation strategies.

(487 females, 405 males; $M_{age} = 15.36$, $SD_{age} = 1.43$) were included in subsequent analyses.

Measures

Childhood maltreatment

Childhood maltreatment, including physical neglect, emotional neglect, emotional abuse, physical abuse, and sexual abuse was measured by the Short Form of the Childhood Trauma Questionnaire (CTQ-SF; Bernstein et al., 2003). 25 items (e.g., "People in my family said hurtful or insulting things to me.") were rated and scored on a 5-point Likert scale (1 = Never to 5 = Always). The higher total scores represented higher levels of childhood maltreatment. It has been demonstrated good reliability and validity among Chinese adolescents (Guo et al., 2023). The Cronbach's α of this scale in this study was 0.91.

Maladaptive cognitive emotion regulation strategies

The Maladaptive Cognitive Emotion Regulation Strategies Questionnaire (MCERSQ; Garnefski et al., 2001) was used to assess how participants think after experiencing threatening or stressful life events, including the four MCERS subtypes of self-blame, rumination, catastrophizing, and other-blame. It contains 16 items (e.g., "I feel largely responsible for what happened.") and responses are based on a 5-point Likert scale ranging from 1 (almost never) to 5 (almost always). The higher total score represented a more severe level of MCERS. This scale has shown good reliability and validity in Chinese adolescents (Gu et al., 2024). In this study, Cronbach's α of this scale were 0.93 and 0.95, respectively, at T1 and T2.

Depression

Depression was measured by the Self-rating Depression Scale (SDS; Zung, 1965). It contains 20 items and participants rated each item from 1 (a little of the time) to 4 (most of the time). One sample item is "I felt that life was meaningless," with higher scores indicating higher levels of depression. This scale has shown good reliability and validity in Chinese adolescents (Zhang et al., 2022). In this study, Cronbach's α of this scale were 0.94 and 0.95, respectively, at T1 and T2.

Anxiety

Anxiety was measured by the Self-Rating Anxiety Scale (SAS; Zung, 1971). It is a 20-item unidimensional scale and adolescents indicated how much they agree with it on a 4-point scale ranging from 1 (a little of the time) to 4 (most of the time). An example item is "I get upset easily or feel panicky." Higher scores represent higher levels of anxiety. This scale has shown good reliability and validity in Chinese culture (Zhang et al., 2022). In this study, Cronbach's α of this scale were 0.92 and 0.93, respectively, at T1 and T2.

Covariates

According to previous studies (Guo et al., 2023; Wu et al., 2022; Zhang et al., 2024), gender and age were found to be associated with childhood maltreatment, MCERS, and internalizing problems. Therefore, we collected demographic information on participants' gender and age.

Data analysis

All analyses were conducted in R version 4.3.3. The packages of *bruceR* and *lavaan* were used for primary and main analyses, respectively. Specifically, our data analysis followed the following three steps.

First, for primary analyses, we conducted descriptive statistics and correlation analyses. Moreover, regression analyses were used to examine the longitudinal association of study variables.

Second, we tested the longitudinal measurement invariance of MCERS and internalizing problems across two waves, a prerequisite for conducting cross-lagged analyses (Mackinnon et al., 2022). After establishing a baseline unconstrained model with good fit as configural invariance, we progressively conducted three more constrained models: (1) the metric invariance model, including equality of factor loadings, (2) the scalar invariance model, further including equality of observed variable intercepts, and (3) the residual invariance model, further including equality of observed variable error terms. In the construction of latent variable structural equation modeling, the mean scores of subscales of MCERSQ were used to create observed variables representing MCERS. In addition, the 20 items of SDS and SAS were used to create observed variables representing depression and anxiety, respectively. According to previous studies (Chen, 2007), a decrease in CFI larger than 0.01 and an increase in RMSEA larger than 0.015 indicate a lack of invariance. Therefore, based on ΔCFI and ΔRMSEA, we compared these models and chose the best-fit model. Moreover, the minimum requirement for cross-lagged panel analysis is to satisfy metric invariance (Mackinnon et al., 2022).

Finally, latent structural equation modeling was used to test the conceptual longitudinal models. In step 1, we further examined the potential indirect effects of MCERS and internalizing problems. Childhood maltreatment was a latent variable, and the average scores of the CTQ-SF's five subscales were used to create observed variables representing it (Guo et al., 2023). In step 2, multi-group analysis was used to test the potential effect of gender in the conceptual longitudinal models. Guided by Hu and Bentler (1999),

https://doi.org/10.1017/S0954579425000033 Published online by Cambridge University Press

Table 1. Descriptive statistics and correlations among variables

	M	*SD*	1	2	3	4	5	6	7	8
1 T2 Age	15.36	1.43	–							
2 T1 CM	1.29	0.41	−0.03	–						
3 T1 MCERS	2.37	0.74	0.12***	0.38***	–					
4 T2 MCERS	2.44	0.79	−0.01	0.18***	0.32***	–				
5 T1 Depression	1.42	0.46	0.08*	0.53***	0.50***	0.30***	–			
6 T2 Depression	1.40	0.49	−0.04	0.30***	0.35***	0.47***	0.44***	–		
7 T1 Anxiety	1.44	0.41	0.08*	0.49***	0.46***	0.30***	0.85***	0.40***	–	
8 T2 Anxiety	1.43	0.44	0.01	0.33***	0.30***	0.46***	0.48***	0.85***	0.46***	–

Note: *p <0.05. ***p < 0.001. CM = Childhood maltreatment. MECRS = Maladaptive cognitive emotion regulation strategies.

if the χ^2/df <3, RMSEA <0.08, CFI >0.90, TLI >0.90, SRMR <0.08, then the structural equation modeling is well-fitted.

Results

Preliminary analysis

The results of means, standard deviations, and inter-correlations are presented in Table 1. The correlation analysis revealed that childhood maltreatment at T1, MCERS at T1 and T2, depression at T1 and T2, and anxiety at T1 and T2 were significantly positively correlated (p_s <0.001). Since T2 age was significantly correlated with some study variables, and thus was controlled for in subsequent analyses.

Furthermore, we examined whether T1 childhood maltreatment predicted T2 MCERS and T2 internalizing problems. After controlling for T2 age and T1 MCERS, T1 childhood maltreatment significantly predicted T2 MCERS ($\beta = 0.07$, $p = 0.04$). Moreover, after controlling for T2 age and T1 internalizing problems, the effects of T1 childhood maltreatment on T2 depression ($\beta = 0.08$, $p = 0.02$) and T2 anxiety ($\beta = 0.14$, p <0.001) were significant.

Longitudinal measurement invariance analysis

We examined the longitudinal measurement invariance of MCERS. As shown in Table 2, the decreases in CFI and the increase in RMSEA between metric invariance model - configural invariance model, scalar invariance model - metric invariance model, and residual invariance model - scalar invariance model were all less than 0.01. Therefore, the residual invariance model was established, surpassing the requirement of at least metric invariance. Similarly, longitudinal measurement invariance of depression and anxiety satisfied residual invariance. Thus, our all measures satisfied the prerequisite for interpreting cross-lagged results.

Longitudinal mediation analysis

As shown in Figure 2A, we first tested the longitudinal model A of childhood maltreatment, MCERS, and depression, with T2 age used as a control variable. The model fit was adequate, with indices of $\chi^2 = 3936.929$, $df = 1388$, $\chi^2/df = 2.836$, RMSEA = 0.045, CFI = 0.924, TLI = 0.922 and SRMR = 0.056. T1 childhood maltreatment was positively associated with T1 MCERS and T1 depression ($\beta = 0.46$, p <0.001; $\beta = 0.57$, p <0.001, respectively), while was not associated with MCERS and depression at T2. As presented in Table 3, all mediation paths were significant. Specifically, T1 MCERS mediated the relationship between T1 childhood maltreatment and T2 depression ($b = 0.08$, $SE = 0.03$, 95% CI [0.044, 0.153]). In addition, T1 depression mediated the relationship between T1 childhood maltreatment and T2 MCERS ($b = 0.10$, $SE = 0.04$, 95% CI [0.059, 0.202]). We further conducted an indirect effects differences test by Wald Test and found that the mediating effect of T1 depression was significantly higher than T1 MCERS (Wald χ^2 (1) = 5.52, $p = 0.02$).

Further, as shown in Figure 2B, we examined the longitudinal model B of childhood maltreatment, MCERS, and anxiety. The model fit was also acceptable: $\chi^2 = 4198.218$, $df = 1388$, $\chi^2/df = 3.025$, RMSEA = 0.048, CFI = 0.897, TLI = 0.894, SRMR = 0.052. After controlling for T2 age, T1 childhood maltreatment was positively associated with T1 MCERS, T1 anxiety and T2 anxiety ($\beta = 0.47$, p <0.001; $\beta = 0.55$, p <0.001; $\beta = 0.13$, $p = 0.04$, respectively), but not with T2 MCERS. Moreover, all mediation paths were significant. Specifically, T1 MCERS mediated the relationship between T1 childhood maltreatment and T2 anxiety ($b = 0.08$, $SE = 0.03$, 95% CI [0.042, 0.146]). T1 anxiety also mediated the relationship between T1 childhood maltreatment and T2 MCERS ($b = 0.09$, $SE = 0.03$, 95% CI [0.053, 0.181]). There were no significant differences between the mediating effects of T1 anxiety and T1MCERS (Wald χ2 (1) = 3.22, $p = 0.07$).

Multi-group analysis

To examine the potential effect of gender, multi-group analyses were conducted. Firstly, we examined whether there was a gender difference in longitudinal model A. Guided by Chen (2007), we first tested an unconstrained model (see Figure 3A), that is, all parameters were allowed to vary freely across genders. The CFI and RMSEA of the unconstrained model were 0.900 and 0.054, respectively. In addition, a constrained model was tested, where loadings and intercepts were set to be equal across genders. The CFI and RMSEA of this model were 0.895 and 0.055, respectively. By comparing the CFI and RMSEA of the two models, there were changes of CFI = 0.005 < 0.01 and RMSEA = 0.001 < 0.015. Therefore, the longitudinal model A was equivalent across genders.

Consistent with the above procedure, we tested an unconstrained longitudinal model B (see Figure 3B). The CFI and RMSEA of the unconstrained model were 0.874 and 0.054, respectively. Furthermore, the CFI and RMSEA of the constrained model were 0.869 and 0.055, respectively. By comparing the CFI and RMSEA of the two models, there were changes of

https://doi.org/10.1017/S0954579425000033 Published online by Cambridge University Press

Table 2. The longitudinal measurement invariance of MCERS and internalizing problems

Variable	Model	χ^2	df	RMSEA	CFI	TLI	SRMR	ΔCFI	ΔRMSEA
MCERS	Configural invariance	19.209	11	0.029	0.998	0.996	0.042	–	–
	Metric invariance	32.549	15	0.036	0.996	0.993	0.055	−0.002	0.007
	Scalar invariance	49.149	19	0.042	0.993	0.990	0.053	−0.003	0.006
	Residual invariance	78.062	23	0.052	0.987	0.984	0.043	−0.006	0.010
Depression	Configural invariance	2236.461	699	0.050	0.943	0.936	0.038	–	–
	Metric invariance	2326.955	719	0.050	0.940	0.935	0.050	−0.003	0.000
	Scalar invariance	2482.464	739	0.051	0.933	0.930	0.051	−0.007	0.001
	Residual invariance	2639.837	759	0.053	0.928	0.926	0.053	−0.005	0.002
Anxiety	Configural invariance	2620.135	699	0.055	0.903	0.891	0.044	–	–
	Metric invariance	2679.825	719	0.055	0.901	0.893	0.056	−0.002	0.000
	Scalar invariance	2794.137	739	0.056	0.896	0.890	0.056	−0.005	0.001
	Residual invariance	2893.878	759	0.056	0.892	0.889	0.056	−0.004	0.000

Note: MCERS = Maladaptive cognitive emotion regulation strategies.

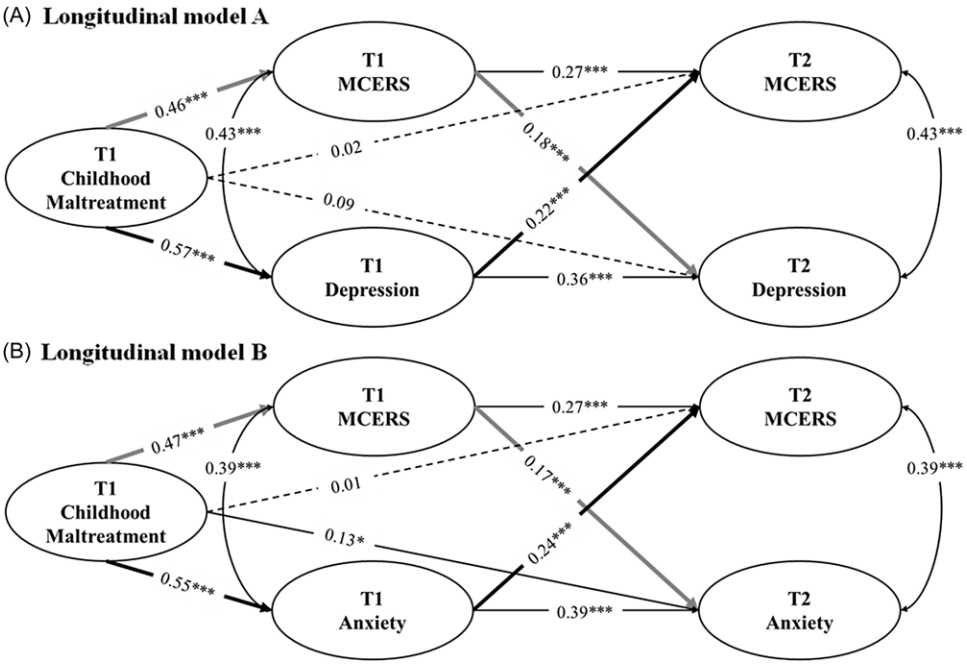

Figure 2. The longitudinal model A and B. *Note*: *$p < 0.05$. ***$p < 0.001$. Standardized coefficients are displayed. MCERS = Maladaptive cognitive emotion regulation strategies.

CFI = 0.005 < 0.01 and RMSEA = 0.001 < 0.015. Thus, the longitudinal model B was also equivalent across genders.

Discussion

The current study examined the indirect and cross-lagged pathways of MCERS and internalizing problems and potential gender differences in these longitudinal models. Findings revealed that childhood maltreatment was longitudinally associated with MCERS and internalizing problems. Furthermore, childhood maltreatment was longitudinally linked to T2 internalizing problems through T1 MCERS, and it was also associated with T2 MCERS through T1 internalizing problems. There were no gender differences in either longitudinal theoretical model. These findings reveal the complex relationship between childhood maltreatment, MCERS, and internalizing problems, and provide a more comprehensive perspective on psychological interventions for abused adolescents.

Consistent with **H1**, our study revealed the long-term effects of childhood maltreatment. First, the result of the longitudinal relationship between childhood maltreatment and internalizing problems is consistent with previous research (Javakhishvili & Widom, 2021). One potential explanation is that maladaptive schemas arising from early adverse experiences disrupt adolescents' cognitions, emotions, and interpersonal relationships, thereby making them more prone to internalizing problems in

https://doi.org/10.1017/S0954579425000033 Published online by Cambridge University Press

Table 3. Standardized indirect effects of longitudinal models

Model	Paths	Effect	*SE*	95%CI	
				LL	UL
A	T1CM→T1MCERS→T2MCERS	0.12	0.03	0.081	0.197
	T1CM→T1Depression→T2Depression	0.21	0.05	0.154	0.333
	T1CM→T1MCERS→T2Depression	0.08	0.03	0.044	0.153
	T1CM→T1Depression→T2MCERS	0.10	0.04	0.059	0.202
B	T1CM→T1MCERS→T2MCERS	0.13	0.03	0.082	0.199
	T1CM→T1Anxiety→T2Anxiety	0.20	0.04	0.156	0.323
	T1CM→T1MCERS→T2Anxiety	0.08	0.03	0.042	0.146
	T1CM→T1Anxiety→T2MCERS	0.09	0.03	0.053	0.181

Note: *SE* = standard error. CI = confidence interval, LL = lower limit, UL = upper limit. CM = Childhood maltreatment. MECRS = Maladaptive cognitive emotion regulation strategies.

the future (Young et al., 2003). Furthermore, childhood maltreatment was longitudinally associated with MCERS, reinforcing the notion that the early home environment significantly shapes an individual's emotion regulation over time (Gruhn & Compas, 2020).

The mediating role of maladaptive cognitive emotion regulation strategies

The present study found that MCERS mediated the longitudinal relationship between childhood maltreatment and internalizing problems, thereby supporting **H2**. This finding was consistent with previous research (Heleniak et al., 2016; Miu et al., 2022; Rek et al., 2022), and also supported the general view that MCERS resulting from childhood maltreatment are risk factors for psychological problems (Gross & John, 2003). Exposure to early adverse experiences may impede the development of adaptive emotion regulation strategies (Guo et al., 2023; Huh et al., 2017; Wu et al., 2022), making dealing with emotions that arise from the child maltreatment experience, or other stressful events, difficult (Zhou & Zhen, 2022). Consequently, they are more likely to use MCERS to manage and regulate their emotions. In this case, they may endure prolonged periods of psychological distress, ultimately increasing susceptibility to internalizing problems (McLaughlin et al., 2011). Overall, this finding highlights that MCERS are a key factor in linking childhood maltreatment with subsequent psychological problems in adolescents (Guo et al., 2023; Wu et al., 2022).

The mediating role of internalizing problems

In turn, consistent with **H3**, the longitudinal model of the current study also supported that internalizing problems mediate the association between childhood maltreatment and MCERS. Specifically, the strong association between T1 childhood maltreatment and T1 internalizing problems further leads to adolescents' more frequent use of MCERS at T2. This finding is consistent with previous studies suggesting that internalizing problems are not only a symptom of MCERS but can equally be a risk factor for subsequent MCERS (De France et al., 2019; Larsen et al., 2013). It also supported the Broaden-and-Build Theory of Positive Emotions (Fredrickson, 2001). In contrast to positive emotions, internalizing problems may act as a barrier to individuals' cognition and hinder the use of adaptive emotion regulation strategies. Consequently, they may resort to MCERS (Heesen et al., 2020; Joormann & Stanton, 2016). In addition, adolescents who have experienced childhood maltreatment may worry that outwardly expressing depression and anxiety will elicit negative peer evaluations and rejection, and thus choose MCERS to regulate emotion (Coyne, 1976). In conjunction with the previous findings, the current study reveals that there is a "vicious circle" of negative psychological consequences of childhood maltreatment. Specifically, internalizing problems induced by childhood maltreatment and MCERS reinforce each other, ultimately exacerbating psychological distress among abused adolescents.

Gender differences

Our findings show that longitudinal models are equivalent across genders, and this result is consistent with previous studies (Arnow et al., 2011; Calvete et al., 2015; Guo et al., 2023). Despite this, there are studies revealing gender differences in the association between childhood maltreatment experience and MCERS (Nolen-Hoeksema, 2012; Zhang et al., 2024). The non-significant findings in our study could be explained by the fact that we focused on the overall maltreatment and MCERS, while prior studies investigated the association between distinct maltreatment and specific emotional regulation strategies (e.g., emotional abuse and rumination) (Nolen-Hoeksema, 2012; Zhang et al., 2024). Furthermore, our result may also indicate that emotional regulation problems resulting from childhood maltreatment, as well as internalizing problems, are prevalent across genders (Guo et al., 2023).

Implications and limitations

The present findings contribute to the literature in several ways. First, our longitudinal study provides a more comprehensive perspective to examine the relationship between childhood maltreatment and internalizing problems, addressing the shortcomings of previous cross-sectional designs. Second, the current study verified the possibility that childhood maltreatment longitudinally influences MCERS through internalizing problems. Furthermore, it reveals a potential cross-lagged relationship between internalizing problems and MCERS, while previous cross-sectional studies have virtually ignored the possibility of such an outcome. Additionally, prior longitudinal studies have mostly focused on exploring the effects of internalizing problems on two

https://doi.org/10.1017/S0954579425000033 Published online by Cambridge University Press

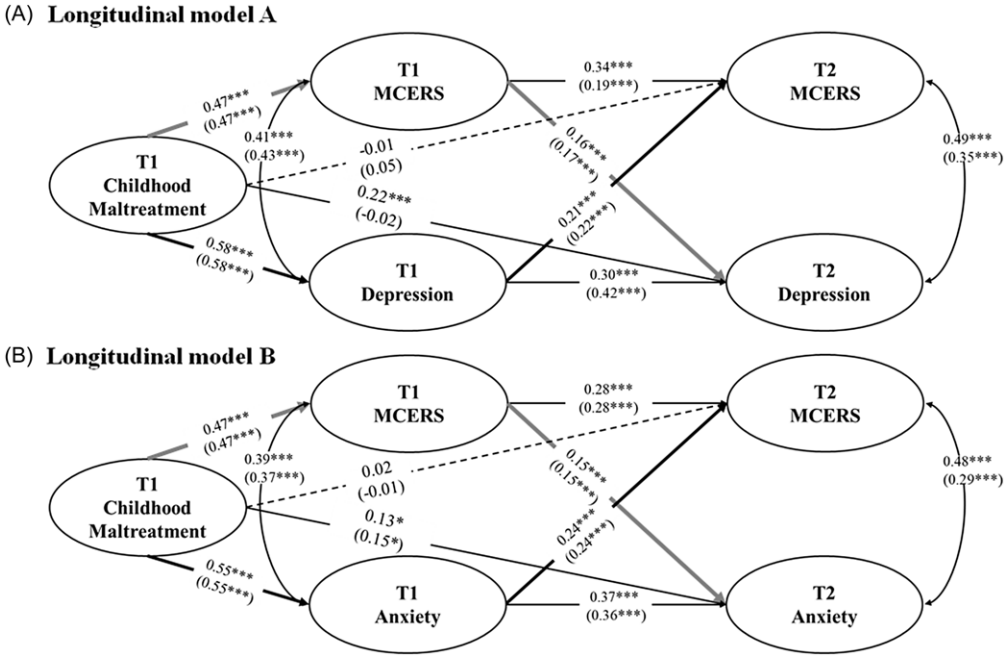

Figure 3. The longitudinal unconstrained model A and B in multi-group analyses. *Note*: $*p < 0.05$. $***p < 0.001$. Path coefficients in parentheses are for males. Standardized coefficients are displayed. MCERS = Maladaptive cognitive emotion regulation strategies.

emotion regulation strategies, namely, expressive suppression and rumination. Thus, this result complements and extends previous research while validating relevant theories.

Our findings have some practical implications and potential clinical intervention value. The current findings suggest a bidirectional relationship between MCERS and internalizing problems. Therefore, psychological interventions need to both guide adolescents to avoid using MCERS and comprehensively explore the underlying drivers of their maladaptive emotion regulation styles and the subsequent impact. Regarding psychological interventions for MCERS, counselors can use Cognitive Behavioral Therapy to help adolescents recognize their irrational beliefs and guide them to analyze events more objectively so that they can change their maladaptive coping styles (Li et al., 2024). Additionally, promoting adolescents' non-judgmental awareness of their thoughts and emotions through mindfulness interventions (Scafuto et al., 2022), thereby increasing their ability to regulate emotions, can also reduce the frequency of MCERS use. Notably, if adolescents use MCERS as a result of uncontrollable negative emotions, direct alleviation of the negative emotions may also be effective.

The current study also has some shortcomings. First, our longitudinal survey was conducted only twice, which does not allow us to fully reveal the complex relationships between variables. Especially for longitudinal mediation effects, the current study cannot fully determine the temporal precedence in which the independent variable affects the mediator variable. Future research could further reveal the dynamic and complex relationships between variables with longitudinal investigations at multiple time points. Second, the study sample was only derived from Chinese high school students, and there was a certain degree of attrition of our study participants due to students' promotion to higher education as well as transferring to other schools. Therefore, future research could test this result in other samples (e.g., children, and adults) and expand the sample size. Third, specific sub-dimensions such as emotional abuse and rumination were not thoroughly examined. Subsequent studies could focus on the relationship between specific types of abuse or specific emotion regulation strategies and internalizing problems.

Conclusion

The current study examined the longitudinal relationships between childhood maltreatment, MCERS, and internalizing problems, such as depression and anxiety, while also exploring the potential mediating role of MCERS and internalizing problems. Our findings provided evidence that childhood maltreatment is a distal risk factor for adolescents' MCERS and internalizing problems. Moreover, childhood maltreatment exacerbated subsequent internalizing problems by facilitating adolescents' MCERS. In addition, childhood maltreatment fosters adolescents' subsequent MCERS via internalizing problems. These findings unravel the complex relationships between childhood maltreatment, MCERS, and internalizing problems, which would provide practical guidelines for psychological interventions.

Acknowledgments. Thanks to all the participants who provided support for this study.

Author contributions. Jianjun Huang and Xi Shen contributed equally to this research.

Funding statement. None.

Competing interests. The authors declare that there is no conflict of interest.

References

Arnow, B. A., Blasey, C. M., Hunkeler, E. M., Lee, J., & Hayward, C. (2011). Does gender moderate the relationship between childhood maltreatment and adult depression? *Child Maltreatment*, *16*(3), 175–183. https://doi.org/10.1177/1077559511412067

Auslander, W., Sterzing, P., Threlfall, J., Gerke, D., & Edmond, T. (2016). Childhood abuse and aggression in adolescent girls involved in child welfare: The role of depression and posttraumatic stress. *Journal of Child & Adolescent Trauma*, *9*(4), 359–368. https://doi.org/10.1007/s40653-016-0090-3

https://doi.org/10.1017/S0954579425000033 Published online by Cambridge University Press

Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., Stokes, J., Handelsman, L., Medrano, M., Desmond, D., & Zule, W. (2003). Development and validation of a brief screening version of the childhood trauma questionnaire. *Child Abuse & Neglect*, *27*(2), 169–190. https://doi.org/10.1016/s0145-2134(02)00541-0

Brumariu, L. E. (2015). Parent-child attachment and emotion regulation. *New Directions for Child and Adolescent Development*, *2015*(148), 31–45. https://doi.org/10.1002/cad.20098

Calvete, E., Orue, I., & Hankin, B. (2015). Cross-lagged associations among ruminative response style, stressors, and depressive symptoms in adolescents. *Journal of Social and Clinical Psychology*, *34*(3), 203–220. https://doi.org/10.1521/jscp.2015.34.3.203

Chen, F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling*, *14*(3), 464–504. https://doi.org/10.1080/10705510701301834

Coyne, J. C. (1976). Toward an interactional description of depression. *Psychiatry: Journal for the Study of Interpersonal Processes*, *39*(1), 28–40.

Dawel, A., Shou, Y., Gulliver, A., Cherbuin, N., Banfield, M., Murray, K., Calear, A. L., Morse, A. R., Farrer, L. M., & Smithson, M. (2021). Cause or symptom? A longitudinal test of bidirectional relationships between emotion regulation strategies and mental health symptoms. *Emotion*, *21*(7), 1511–1521. https://doi.org/10.1037/emo0001018

De France, K., Lennarz, H., Kindt, K., & Hollenstein, T. (2019). Emotion regulation during adolescence: Antecedent or outcome of depressive symptomology? *International Journal of Behavioral Development*, *43*(2), 107–117. https://doi.org/10.1177/0165025418806584

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist*, *56*(3), 218–226. https://doi.org/10.1037/0003-066X.56.3.218

Garnefski, N., Kraaij, V., & Spinhoven, P. (2001). Negative life events, cognitive emotion regulation and emotional problems. *Personality and Individual Differences*, *30*(8), 1311–1327. https://doi.org/10.1016/S0191-8869(00)00113-6

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, *85*(2), 348–362. https://doi.org/10.1037/0022-3514.85.2.348

Gruhn, M. A., & Compas, B. E. (2020). Effects of maltreatment on coping and emotion regulation in childhood and adolescence: A meta-analytic review. *Child Abuse & Neglect*, *103*, 104446. https://doi.org/10.1016/j.chiabu.2020.104446

Gu, J., Guo, Y., & Wang, J.-L. (2024). Childhood maltreatment and internet addiction among chinese adolescents: A moderated mediation model. *Journal of Affective Disorders*, *350*, 721–727. https://doi.org/10.1016/j.jad.2024.01.175

Guo, Y. Y., Gu, J. J., Gaskin, J., Yin, X. Q., Zhang, Y. H., & Wang, J. L. (2023). The association of childhood maltreatment with internet addiction: The serial mediating effects of cognitive emotion regulation strategies and depression. *Child Abuse & Neglect*, *140*, 106134. https://doi.org/10.1016/j.chiabu.2023.106134

Heesen, K., Rasing, S., Vermulst, A., Tak, Y., Engels, R., & Creemers, D. (2020). Associations between coping strategies and depressive symptoms in adolescence: A longitudinal perspective. *The Journal of Early Adolescence*, *41*(7), 027243162097853. https://doi.org/10.1177/0272431620978533

Heleniak, C., Jenness, J. L., Stoep, A. V., McCauley, E., & McLaughlin, K. A. (2016). Childhood maltreatment exposure and disruptions in emotion regulation: A transdiagnostic pathway to adolescent internalizing and externalizing psychopathology. *Cognitive Therapy and Research*, *40*(3), 394–415. https://doi.org/10.1007/s10608-015-9735-z

Hu, L.-t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Huh, H. J., Kim, K. H., Lee, H. K., & Chae, J. H. (2017). The relationship between childhood trauma and the severity of adulthood depression and anxiety symptoms in a clinical sample: The mediating role of cognitive emotion regulation strategies. *Journal of Affective Disorders*, *213*, 44–50. https://doi.org/10.1016/j.jad.2017.02.009

Javakhishvili, M., & Widom, C. (2021). Childhood maltreatment, sleep disturbances, and anxiety and depression: A prospective longitudinal investigation. *Journal of Applied Developmental Psychology*, *77*, 101351. https://doi.org/10.1016/j.appdev.2021.101351

Joormann, J., & Stanton, C. H. (2016). Examining emotion regulation in depression: A review and future directions. *Behaviour Research and Therapy*, *86*, 35–49. https://doi.org/10.1016/j.brat.2016.07.007

Kokonyei, G., Kovács, L. N., Szabó, J., & Urbán, R. (2023). Emotion regulation predicts depressive symptoms in adolescents: A prospective study. *Journal of Youth and Adolescence*, *53*(1), 1–17. https://doi.org/10.1007/s10964-023-01894-4

Larsen, J. K., Vermulst, A. A., Geenen, R., van Middendorp, H. B., English, T., Gross, J. J., Ha, T., Evers, C., & Engels, R. C. M. E. (2013). Emotion regulation in adolescence: A prospective study of expressive suppression and depressive symptoms. *The Journal of Early Adolescence*, *33*(2), 184–200. https://doi.org/10.1177/0272431611432712

Li, J. A., Li, J., Hou, Y., Zhang, W. J., Wang, G. C., & Qu, Z. Y. (2024). Underlying mechanisms of change in the effects of cognitive behavior therapy on posttraumatic stress disorders among Chinese children: Results from a randomized controlled trial. *Child Abuse & Neglect*, *156*, 107023. https://doi.org/10.1016/j.chiabu.2024.107023

Mackinnon, S., Curtis, R., & O'Connor, R. (2022). Tutorial in longitudinal measurement invariance and cross-lagged panel models using lavaan. *Meta-Psychology*, *6*, 1–20. https://doi.org/10.15626/MP.2020.2595

McLaughlin, K. A., Hatzenbuehler, M. L., Mennin, D. S., & Nolen-Hoeksema, S. (2011). Emotion dysregulation and adolescent psychopathology: A prospective study. *Behaviour Research and Therapy*, *49*(9), 544–554. https://doi.org/10.1016/j.brat.2011.06.003

Miu, A. C., Szentágotai-Tătar, A., Balázsi, R., Nechita, D., Bunea, I., & Pollak, S. D. (2022). Emotion regulation as mediator between childhood adversity and psychopathology: A meta-analysis. *Clinical Psychology Review*, *93*, 102141. https://doi.org/10.1016/j.cpr.2022.102141

Morris, A. S., Silk, J. S., Steinberg, L., Myers, S. S., & Robinson, L. R. (2007). The role of the family context in the development of emotion regulation. *Social Development*, *16*(2), 361–388. https://doi.org/10.1111/j.1467-9507.2007.00389.x

Nolen-Hoeksema, S. (2012). Emotion regulation and psychopathology: The role of gender. *Annual Review of Clinical Psychology*, *8*(1), 161–187. https://doi.org/10.1146/annurev-clinpsy-032511-143109

Rek, S. V., Reinhard, M. A., Bühner, M., Freeman, D., Adorjan, K., Falkai, P., & Padberg, F. (2022). Identifying potential mechanisms between childhood trauma and the psychological response to the COVID-19 pandemic in Germany: A longitudinal study. *Scientific Reports*, *12*(1), 12964. https://doi.org/10.1038/s41598-022-13205-1

Scafuto, F., Ghiroldi, S., Montecucco, N. F., Presaghi, F., & Iani, L. (2022). The mindfulness-based gaia program reduces internalizing problems in high-school adolescents: A cluster randomized controlled trial. *Mindfulness*, *13*(7), 1804–1815. https://doi.org/10.1007/s12671-022-01920-9

Spyropoulou, E., & Giovazolias, T. (2022). Anger rumination in early adolescence: Risk factor or outcome of depressive symptoms? A prospective study. *Journal of Youth and Adolescence*, *51*(9), 1708–1719. https://doi.org/10.1007/s10964-022-01624-2

Stoltenborgh, M., Bakermans-Kranenburg, M. J., Alink, L. R. A., & van Ijzendoorn, M. H. (2015). The prevalence of child maltreatment across the globe: Review of a series of meta-analyses. *Child Abuse Review*, *24*(1), 37–50. https://doi.org/10.1002/car.2353

Wu, Y.-Q., Liu, F., Chan, K. Q., Wang, N.-X., Zhao, S., Sun, X., Shen, W., & Wang, Z.-J. (2022). Childhood psychological maltreatment and internet gaming addiction in Chinese adolescents: Mediation roles of maladaptive emotion regulation strategies and psychosocial problems. *Child Abuse & Neglect*, *129*, 105669. https://doi.org/10.1016/j.chiabu.2022.105669

Young, J. E., Klosko, J. S., & Weishaar, M. E. (2003). *Schema therapy: A practitioner's guide*. Guilford Press.

Zahn-Waxler, C., Shirtcliff, E. A., & Marceau, K. (2008). Disorders of childhood and adolescence: Gender and psychopathology. *Annual Review of Clinical Psychology*, *4*(1), 275–303. https://doi.org/10.1146/annurev.clinpsy.3.022806.091358

Zhang, R., Hou, F., Lin, Y., Geng, Y., & Kong, F. (2024). Associations between emotional maltreatment, depression and self-harm among chinese adolescents: A three-wave longitudinal mediation model. *Child Abuse & Neglect*, *152*, 106761. https://doi.org/10.1016/j.chiabu.2024.106761

Zhang, Y., Liao, H.-P., Gu, J., & Wang, J. (2022). Anxiety and depression related to childhood maltreatment in teenagers: Comparing multiple individual risk model, cumulative risk model and latent profile analysis. *Child Abuse & Neglect*, *128*, 105630. https://doi.org/10.1016/j.chiabu.2022.105630

Zhou, X., & Zhen, R. (2022). How do physical and emotional abuse affect depression and problematic behaviors in adolescents? The roles of emotional regulation and anger. *Child Abuse & Neglect*, *129*, 105641. https://doi.org/10.1016/j.chiabu.2022.105641

Zung, W. W. (1965). A self-rating depression scale. *Archives of General Psychiatry*, *12*(1), 63–70. https://doi.org/10.1001/archpsyc.1965.01720310065008

Zung, W. W. (1971). A rating instrument for anxiety disorders. *Psychosomatics: Journal of Consultation and Liaison Psychiatry*, *12*(6), 371–379. https://doi.org/10.1016/S0033-3182(71)71479-0

https://doi.org/10.1017/S0954579425000033 Published online by Cambridge University Press