

RESEARCH ARTICLE

The role of harsh parenting styles in early and middle childhood emotion regulation: An examination in the millennium cohort study

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Emotion regulation development in early childhood is a foundation for later emotional and behavioural outcomes, parenting plays a crucial role in this development. Harsh parenting styles have a negative impact on children's emotional regulation, however, there is not clear evidence for the bidirectional effects between them. This study aims to use United Kingdom (UK) Millennium Cohort Study (MCS) longitudinal data, which includes 10,041 children aged 3, 5 and 7 years old to explore the bidirectional relationship between harsh parenting style and children's emotional regulation. The study used random intercept cross-lagged panel modelling (RI-CLPM), which allows for the examination of inter-individual differences over time while controlling for intra-individual differences. We found that there is a strong relationship between harsh parenting and emotional dysregulation in both directions. Specifically, harsh parenting at age 3 may increase children's emotional dysregulation at age 5, and emotional dysregulation at age 3 increases harsh parenting at age 5. In addition, emotional dysregulation at age 5 may lead to harsher parenting at age 7. Moreover, harsh parenting styles were significantly related to children's emotion regulation problems across all ages. These results emphasized the bidirectional role between harsh parenting styles and children's emotional regulation and highlighted the need for early intervention programs to promote positive parenting styles and healthy emotional development.

Keywords: children emotional regulation, harsh parenting, millennium cohort study, RI-CLPM**INTRODUCTION**

Emotion management abilities are crucial in achieving personal objectives and adjusting to the social environment depends heavily on effectiveness (Otterpohl & Wild, 2015). According to Gross (2015), effective emotion management techniques can help preserve mental health and improve social functioning. Emotion management skills include behavioural and cognitive approaches to control the degree and duration of emotional reactions (Kozubal *et al.*, 2023). Therefore, good emotional management requires people to adjust

their emotional arousal and valence to meet the needs of various situations (Koole, 2009).

Early on, this capacity to control emotions often develops gradually, and interactions with parents or other primary caregivers play a significant role in helping develop this capacity (Thompson, 1994; Tronick, 1989). The early years are important for the development of children's emotional self-control. During this period, children learn how to control their emotions instead of relying on extrinsic rewards from parents or their most loved toys which may not always be around (Hill *et al.*,

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2006). At this stage, children start to understand societal norms and rules through their peer interactions, in this process, they become aware of their own emotional experiences (Carlson, 1993). Also, they acquire new abilities such as theory of mind and inhibiting dominance by growing older (Wellman *et al.*, 2001; Carlson, 2005). With these skills, children are able to regulate their emotions by themselves (Keenan, 2000).

Many studies pointed to the significance of emotional regulation development for children's psychological well-being, social adaptation and academic performance (Dahl, 2004; Eisenberg & Morris, 2002). The ability to regulate emotions in early childhood could enhance social competence which will enable them to have better interpersonal relationships with other people and also engage in more appropriate interpersonal interactions (Meng *et al.*, 2020). Moreover, they can handle with difficulties or challenges better through good emotion regulation skills (Young *et al.*, 2019). Young *et al.* (2019) noted that children who had good self-regulation skills were more likely to be more resilient and cope better with stress. On the other hand, children who had problems managing or verbalizing their feelings were more vulnerable to a range of psychological issues (Gonçalves *et al.*, 2019). Gonçalves *et al.* (2019) have also pointed out that maladaptive emotion regulation was associated with the risk of developing emotion disorders including depression and these children are likely to exhibit externalizing symptoms like aggression.

Parenting styles have major influence on children's emotion regulation capabilities. A favourable parent-child relationship promotes emotional support and a sense of security, which is essential for children to develop effective emotion regulation (Morris *et al.*, 2017). When children feel that they are safe and that there is someone to encourage them, they can investigate and understand their emotions, hence self-regulate better (Paley & Hajal, 2022). Positive parenting fosters emotional security by setting definite guidelines and limits (Neppel *et al.*, 2020). Parents who respond appropriately when their offspring need help and give continuous emotional backing assist children in gaining skills necessary for controlling emotions. These boundaries train children on how to express feelings correctly while within the family setup thus creating an emotionally healthy environment (Houlberg *et al.*, 2016). By contrast, infants who are raised by a parent with a controlling and critical attitude tend to be less skilled at managing their own emotions (Calkins & Marcovitch, 2010). The hallmarks of harsh parenting are negative, punitive and controlling behaviours towards children (Chang *et al.*, 2003). This negative parenting style can be so upsetting that the child does not learn how to control these feelings (Mathis & Bierman, 2015). Harsh parenting such as physical punishments accompanied by

harsh words or even ignoring them emotionally do not help children learn how to cope with their strong emotions positively (Gershoff, 2002). These punitive measures may lead to fearfulness and anxiety disorders which might persist into adulthood promoting maladaptive coping strategies. Such approaches fail to provide the right vision for children so as they can develop constructive emotional regulation leading possibly to long term psychological problems (Ma & Song, 2023).

The neuroscience research also supports that parenting style could influence children's ability to regulate emotion. The neurobiological research on emotional regulation has demonstrated that vital brain areas like the hippocampus, amygdala and prefrontal cortex interact strongly in emotion regulation (Gross, 2015). These interwoven regions process nonverbal aspects of emotional communication, which enable the development of emotions as well as social connectedness necessary for coping with daily stresses (Palomero-Gallagher & Amunts, 2021). The development of these systems depends heavily on early object relations (Šimić *et al.*, 2021). It is through positive object relations and early interactions that these brain regions develop appropriately, thus enhancing an individual's emotional control. Conversely, negative early experiences like neglect or maltreatment can hinder growth in those brain parts leading to more problems concerning emotional regulation (Swain *et al.*, 2007).

Several studies revealed that children's emotion regulation is highly related to the parenting style. Additionally, bidirectional relation has been established between children's emotion regulation patterns and parenting styles in previous research (Moilanen *et al.*, 2015; Padilla-Walker *et al.*, 2012; Scaramella & Leve, 2004). Based on these findings, when children use poor strategies to regulate their emotions, their parents are more likely to use harsh parenting methods. The investigation of parenting style and children's emotion regulation can provide a direction for parents to use more appropriate parental approaches to support children's emotional development.

LITERATURE REVIEW

Parenting style has a significant impact on a child's emotion regulation ability (Eisenberg *et al.*, 1998; Morris *et al.*, 2013; Rutherford *et al.*, 2015). Children's capacity to effectively regulate their emotions is positively connected with warmth and acceptance in parent-child relationships (Morris & Age, 2009). However, too controlling or severe parenting might seriously impair a child's capacity to successfully control their emotions (Morris *et al.*, 2013). These parenting techniques frequently inhibit a child's independence and reduce

their chances of learning the self-control abilities. Overly controlling parents can limit the emotional support, which keeps them from developing the ability to manage their own emotions (Eisenberg *et al.*, 2010). As a result, children may become less able to manage stress and mood swing, which making them more susceptible to emotional difficulties. Furthermore, studies conducted in 2007 by Gunnar and Quevedo (2007) indicated that children who endure continuous parental criticism have higher levels of physiological stress reactions. Because of frequent emotional stress, young children may find it more challenging to properly control their emotions as a result of the increased stress. According to Liu *et al.* (2022), exposure to harsh parenting style in a long time may result in emotional sensitivity, which might make behavioural or emotional issues harder to deal with. Children who are raised with rigorous regulations and punishments from their parents frequently have lower self-esteem and feel more incompetent and uncomfortable about their abilities (Power, 2004).

Harsh parenting styles can have significant long-term implications. Children who are often encounter to strict parenting may suffer from a variety of poor self-experiences, such as despair, loneliness, low self-esteem, and a generalized feeling of shame (Nikolić *et al.*, 2023). Children's negative opinions of themselves might result from their parents who use harsh parenting techniques, which can create harmful habits of self-evaluation (Dadomo *et al.*, 2016). Children's emotional health may be negatively impacted by this poor self-perception even lasted in puberty and adulthood (Li *et al.*, 2023). Li *et al.* (2023) found that children who experience harsh parenting techniques are more likely to have heightened levels of anxiety, dejection, and emotional reactivity. The study found that harsh parenting is a significant predictor of depressive symptoms in 5047 Chinese teenagers between the ages of 14 and 20. They used a cross-sectional approach to analyze the data. Their large sample size provided strong evidence that children's emotional suffering is exacerbated when they experience unreasonable and aggressive parenting style. These children typically internalize the bad interaction with their parents, which affect their self-esteem and makes them more likely to experience psychiatric problems. Children who believe that their parents are always undervaluing or criticizing them may feel helpless and inadequate, which can exacerbate negative emotional states.

Children who have more negative relationships with their parents may develop negative interaction patterns in other social contexts (Chang *et al.*, 2003; Robertson *et al.*, 2012). These early unhealth experiences could influence how children react to social situations, often result in difficulties with building positive peer and teacher relationships (Calkins & Johnson, 1998). Calkins and Johnson (1998) found out that 18-month-old

toddlers who experienced maternal parenting style that interfered with their autonomy were more likely to use anger as a coping mechanism. According to research by Eisenberg *et al.* (1998), children whose mother used punitive methods were more likely to take up avoidance or revenge strategies and act out more aggressively at school. In this case, these children imitate their parents' harmful interaction styles, thus, they tend to have difficulties with acquiring adaptive self-control techniques and instead respond impulsively or aggressively when faced with challenges. Stressful parent-child relationships are more likely to make children react rashly or violently when faced with challenges (Lonigan *et al.*, 2017), which makes it more difficult for them to develop appropriate self-regulation techniques. These impulsive behaviours might be because of the lack of parents' emotional support, so that children are inadequate to develop a healthy way to regulate emotions. Liu *et al.* (2022) demonstrated that harsh parenting styles have an enduring effect. Their study included 235 elementary school students, and showed that violent behaviour in children was impacted by harsh parenting both directly and indirectly.

Research has also demonstrated that different harsh parenting styles, including physical punishment, psychological control, and neglect, have long-term effects on children's emotional and behavioural development. A one-year longitudinal study showed that adolescent violent behaviour and depressive symptoms were associated with control parenting styles, especially mother's rejection (Di Giunta *et al.*, 2023). Giunta *et al.* (2023) examined the mediating role of anger and sadness dysregulation between adolescent aggression and depressive symptoms and parental rejection and control. It was found that one year later, the mother's rejection at age 15 was related to violent behaviour and depressive symptoms. Additionally, the mother's rejection was strongly related to depressive symptoms through an indirect effect of sadness dysregulation, while the mother's rejection increased violent behaviour through an indirect effect of anger dysregulation. It might be explained by a lack of good connections with their parents, especially their mothers which has led to a decline in their self-confidence and problem-solving ability (Fischer *et al.*, 2006). Not only that, by analyzing 11 cohorts from eight countries, Lansford *et al.* (2014) found that physical punishment in early childhood predicted higher levels of externalizing behavioural problems, such as aggression and delinquency in adolescence thus, the impact of parenting styles can be seen even in the behavioural problems of younger children. A longitudinal study including 442 preschool and primary school children found a direct relationship

between harsh parenting style and increased emotional dysregulation and aggressive behaviour (Rademacher *et al.*, 2023). The results revealed that children's emotional dysregulation led to a positive indirect effect of harsh parenting on aggressive behaviour where it was observed that harsh parenting style may lead to emotional dysregulation, which in turn exacerbates aggressive behaviour.

Previous research has shown that harsh parenting styles have a significant short- and long-term impact on children's emotional regulation skills. Interactions between parents and children can also have a reciprocal influence on each other's behaviour and development throughout time (Moilanen *et al.*, 2015; Padilla-Walker *et al.*, 2012). In particular, children who have trouble controlling their emotions are more likely to get severe discipline from their parents (Scaramella & Leve, 2004). These children have a hard time controlling their strong negative emotions, which often results in frequent outbursts. Consequently, these acts often aggravate parents, who then respond violently, exacerbating the child's internal sad condition (Sroufe, 1996; Zucker, 1994). Data from long-term studies support the concept that parenting and children's emotional regulation have a reciprocal relationship. Moilanen *et al.* (2015) conducted a one-year longitudinal study of 489 adolescents aged 11–16 years and found a negative correlation between parents' eventual adoption of a permissive parenting style and adolescents' initially higher levels of emotional and behavioural self-regulation. According to this study, parenting skills may be influenced by a child's ability to self-regulate.

Numerous studies have been conducted on the relationship between emotion regulation and parenting styles, but there is a lot of conflicting evidence in the field. For example, Eisenberg *et al.* (2005) performed a three-wave longitudinal study that assessed effortful control—a temperamental trait vital to emotional regulation—and positive parenting practices with early adolescents at ages 9, 11 and 13 years. The researchers used structural equation modelling to examine data from 186 respondents, measuring effortful control, parenting styles as well as externalizing problems at three different time points separated by two years each. The research adopted a mixed approach by employing questionnaires and behavioural tasks to assess effortful control. While prior studies established a strong correlation between the use of harsh parenting style and children's ability to regulate their emotions Eisenberg *et al.* (2005) did not observe a direct relationship between these variables. They argued that while it is true that parenting practices do affect children's emotional self-

regulation, this effect may not be as direct or consistent as was once believed.

These findings underscore the complexities inherent in researching children's emotional development and parenting styles. They highlight the incongruities that indicate a need for further study, especially through longitudinal studies that give an overview of how different factors contribute to emotional regulation over time (Feng *et al.*, 2009). Because of the special ability to capture the dynamic character of emotional development, longitudinal study designs enable researchers to monitor changes and spot emerging trends in children's development. It is essential to comprehend these developmental processes over an extended period of time. The ways that children react to and adjust to parenting styles are dynamic. Parents might change as the child gets older and faces more difficult social, mental, and emotional situations. Therefore, to fully understand the ways that parenting styles impact emotional regulation across time, it is important to examine these interactions within a longitudinal framework. This research's long-term perspective can highlight minute changes in the relative efficacy of various parenting strategies as children go through distinct developmental phases.

THE PRESENT STUDY

As far as we are aware, no study has used a three-wave longitudinal design to investigate the reciprocal relationships between younger children's emotion control and strict parenting practices. Considering that younger children are usually more receptive to their parents' effects than older children. Understanding these early interactions is essential to designing therapies that might lessen the detrimental effects of harsh parenting on emotional development. Therefore, it is on purpose that the present study aims at closing this gap.

Emotion regulation in the early years has a significant impact on emotional and behavioural outcomes later in life. Therefore, a focus on early parenting styles is important for overall child emotion support and well-being. While much research has been conducted on the relationship between emotion regulation and parenting styles, there is still insufficient longitudinal evidence regarding their mutual effects. This paper aims to bridge this gap by examining how harsh parenting behaviour affects children's emotional regulation from early childhood through primary school years and how emotion regulation by children shapes their parents' practices. This study uses data from the UK Millennium Cohort Study (MCS) which comprises of information that covers different time points from age 3 to 7 years old enabling an analysis of lagged effects within individuals while controlling for intra-individual differences using a

random intercept cross-lagged panel model (RI-CLPM). This research aims to take into account the complicated nature of these associations by following children throughout various stages of development over time. Longitudinal inquiries are useful in identifying patterns as well as causal relationships hence effective measures aimed at promoting healthy emotional growth among preschoolers can be developed based on such findings.

METHODS

Participants

The longitudinal data involving 18,552 families and 18,827 children including twins and triplets (<https://cls.ucl.ac.uk/cls-studies/millennium-cohort-study/>; Connelly & Platt, 2014; Joshi & Fitzsimons, 2016). The respondents of the study were drawn from Child Benefit Registers between September 2000 and January 2002. A random design was used to achieve demographic heterogeneity and representativeness (Bornstein *et al.*, 2013). This sample is intentionally skewed towards particular groups such as those residing in disadvantaged areas, ethnic minorities and individuals coming from smaller nations within UK to ensure proper representation. And nearly half of males (51%) are represented in baseline sample while almost four-fifths cohort members (82%) are White ethnicity. In addition to demographic diversity, the MCS also collects information on various socio-economic indicators, such as parental education, employment status, and household income, allowing for a comprehensive understanding of the participants' backgrounds and environments. Data collection spans from 9 months to 17 years, with waves at ages 3, 5, 7, 11, 14, and 17. Despite rigorous data collection efforts, attrition occurred in each wave for various reasons, with participation rates declining from 81% at age 3 ($N = 15,590$) to 72% at age 7 ($N = 13,857$). Eligible families were continuously invited to participate in subsequent waves unless they opted out permanently. To mitigate the effects of non-random dropout and the intricate sampling design, the MCS offers attrition weights, stratification, and clustering variables for inclusion in analyses to ensure sample representativeness. In the final stage of data cleaning, this study exclusively retained valid data, resulting in a sample of 10,041 children (5,086 male and 4,955 female) from the MCS at ages 3, 5, and 7 years, corresponding to waves 2, 3, and 4.

Ethical considerations

The UK Economic and Social Research Council has funded the MCS and it was approved by London Multi-centre Research Ethics Committee (Shepherd & Gilbert, 2019). All parents' consenting to their participation in the study as well as their children were informed about the purpose of this study throughout all stages of data collection. Confidentiality was observed at every stage of

this project protecting privacy through data de-identification and secure storage.

Materials

Parenting styles were assessed using Straus's Conflict Tactics Scale: Parent to Child (CTSPC) (Straus *et al.*, 1998). This is a revision of the Conflict Tactics Scales (Straus, 1979) specifically aimed at parental behaviour and it is a frequently used measure of the conflict strategies of primary caregivers when encountering conflicts with their children. It has two main domains namely, physical assault and psychological aggression. Physical assault denotes actions like smacking, shouting or telling off while psychological aggression involves such behaviours as ignoring the child, sending them away or taking away treats. Caregivers mainly mothers in this study were asked how often they had used those strategies in response to misbehaviour from their children over the past year using a five-point Likert scale from "never" to "daily".

By using the Children's Social Behavior Questionnaire (CSBQ) (Hartman *et al.*, 2013), children's emotional regulation skills were assessed which is reliable and validated test that evaluates various aspects of emotional regulation on children. The reliability estimates for the CSBQ in previous studies have been found to be good to excellent (α s $> .70$), and it has demonstrated good convergent and discriminant validity (Collet *et al.*, 2023). A total of three items makes up all questions under Independence and self-regulation domain, Emotional Dysregulation, Impulsivity and Cooperation. For this study focused only on Emotional Dysregulation which had five items. These items investigate various aspects of emotional regulation including mood swings, getting overexcited, frustration easily, get over it quickly (reversed) and impulsivity. Respondents were then asked to make selection from among "not true", "somewhat true" as well as "certainly true", for every question put across to them by the researcher. Both questionnaires were administered in waves 2, 3 and 4 of the study.

Procedure

The MCS employed skilled interviewers to collect data. To ensure that there is always consistency in visits and interviewer effects are kept at a minimum, interviewers adhered to uniform practices. They visit each participants' home at every wave and held interviews with parent's face to face alongside questionnaires administration. The mothers did most of this through administering Straus's Conflict Tactics Scale: Parent to Child (CTSPC) and the Children's Social Behavior Questionnaire (CSBQ). Because both harsh parenting and child emotional dysregulation were reported by the main caregiver, most often the mother, the study may be affected by shared informant or common method bias.

Statistical analysis

This research aimed to employ RI-CLPM to explore how harsh parenting styles influence children's emotional regulation over time. The RI-CLPM can assist in identifying how variables at one point influence other variables at future points. The RI-CLPM is different from the traditional Cross-Lagged Panel Model (CLPM) as the RI-CLPM incorporates random intercepts to control for stable individual differences that separate within-person changes (Hamaker *et al.*, 2015). The RI-CLPM incorporates autoregressive effects, cross-lagged effects and within-time-point residual covariances that differentiate between-time changes from between-person variability. Previous studies have found that RI-CLM is more specifically intended to account for trait factors in three time points (Usami *et al.*, 2019). Thus, this study employed RI-CLPM to analyze the impact of parenting styles on children's emotional self-regulation at the age of 3, 5 and 7 years old across three waves of data collection.

The model was developed in R (R Core, 2021) with the help of the 'lavaan' function (Rosseel, 2012). Lavaan stands for 'latent variable analysis' and is a comprehensive package that deals with structural equation modeling (SEM) in R and it supports numerous statistical models such as confirmatory factor analysis and path analysis which is suitable for complicated longitudinal data. We assessed different models with additional paths to establish the best model. In this regard we checked for Root Mean Square Error of Approximation (RMSEA) whose value must be less than 0.08 to qualify for fit assessment; Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) which should have values greater than 0.90 indicating good fit; Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), Chi-square value (χ^2).

To address the concern about omitted control variables, an additional covariate-adjusted robustness analysis was conducted using observed-score autoregressive panel regressions. These models adjusted for child sex, family income, child ethnicity, baseline maternal psychological distress, and maternal education. For the selected RI-CLPM, the number of free parameters equaled the number of observed variances and covariances among the six repeated measures. Therefore, the model was just identified ($df = 0$). CFI, TLI, and RMSEA were retained for transparency but were not used to claim exceptional model fit.

RESULTS

The descriptive statistics results for harsh parenting and emotional dysregulation scores at ages 3, 5, and 7 are shown in Table 1.

Table 1: Descriptive statistics of harsh parenting and emotional dysregulation scores

Age	Harsh Parenting Mean (SD)	Emotional Dysregulation Mean (SD)
3	15.2 (4.3)	8.5 (2.6)
5	18.6 (3.9)	7.2 (2.1)
7	19.1 (4.0)	7.5 (2.3)

The mean and standard deviation (SD) of harsh parenting style and emotional dysregulation in each age group. The higher number in Harsh Parenting means harsher in parenting and higher numbers in Emotional Dysregulation means more dysregulated.

The RI-CLPM produced CFI = 1.00 and RMSEA = 0.00 (Table 2). These values should not be interpreted as evidence of an exceptionally accurate model because the selected RI-CLPM was just-identified ($df = 0$). The interpretation therefore focuses on the estimated autoregressive, cross-lagged, and within-wave covariance paths.

Table 2: Model information

	AIC	BIC	RMSEA	CFI	TLI
RI-CLPM ($df = 0$)	288944.8	289139.6	0	1	1

Importantly, the RI-CLPM results suggest a strong correlation between children's emotional dysregulation and harsh parenting. In the RI-CLPM model, the cross-lagged, standardized autoregression and covariance are the fix effects, and the results of random intercept of latent variables are random effects. Figure 1A summarizes the cross-lagged, standardized autoregressive and covariance parameters.

The RI-CLPM computed the random intercepts i1 (Harsh parenting style) and i2 (children's emotional dysregulation), which capture the overall average of a latent variable at different points in time (see Table 3). The standardized coefficients for Harsh Parenting are 0.643, 0.826, and 0.844 at age 3, age 5, and age 7 respectively. These increasing standardized coefficients indicating that there was a grow trend in differences between individuals as their level of harsh parenting rises. It means that early on there were very few distinctions between parents in harsh practices, so each family had almost the same levels of harsh parenting among themselves. This discrepancy became more apparent over time. The standardized coefficients for Emotional Dysregulation were almost identical at the 3, 5 and 7-year-old time points (0.576, 0.576 and 0.563, respectively), which suggested that emotional dysregulation maintained a relatively stable consistency across these three-time points. This stability implied that emotional dysregulation varies less across time and indicated that inter-individual differences in emotional dysregulation levels were also relatively stable.

Table 3: The random intercept for harsh parenting and emotional dysregulation

	Age 3	Age 5	Age7
Harsh Parenting	0.643	0.826	0.844
Emotional Dysregulation	0.576	0.576	0.563

First, the Figure 1B showed the cross-lagged effects path and Table 4 indicated the detailed results, parents' influence on children was significant in the first lag. Harsh parenting at age 3 was connected to enhancement in problems of emotional regulation at 5 years ($\beta = 0.032$, $p = .011$, 95%CI [0.003, 0.026]). Although this relation was not significant at 5 and 7 ($\beta = 0.015$, $p > .05$, 95%CI [-0.007, 0.024]), the coefficient fell within the confidence interval observed at the first lag. It suggests that nonsignificant effect sizes may not be completely invalid and that effects at both lags might reflect a similar trend. Nevertheless, harsh parenting's association with emotional dysregulation decreases over time.

Table 4: The model results for cross-lagged effects and autoregressive effects

Path	Estimate	z	P	Std. all	95%CI
Emotion5~Harsh3	0.015	2.538	0.011	0.032	[0.003, 0.026]
Emotion7~Harsh5	0.009	1.118	0.263	0.015	[-0.007, 0.024]
Harsh5~Emotion3	0.094	4.837	< 0.001	0.055	[0.056, 0.132]
Harsh7~Emotion5	0.230	8.772	< 0.001	0.136	[0.178, 0.281]
Harsh5~Harsh3	-0.006	-0.161	0.872	-0.008	[-0.085, 0.072]
Harsh7~Harsh5	-0.092	-3.675	< 0.001	-0.094	[-0.141,-0.043]
Emotion5~Emotion3	0.163	12.035	< 0.001	0.164	[0.137, 0.190]
Emotion7~Emotion5	0.253	16.610	< 0.001	0.247	[0.223, 0.283]

The Emotion means emotional dysregulation in children, and the Harsh means harsh parenting. The number behind the word refers to the age. The "~" means influenced by. For example, "Emotion5~Harsh3" means emotional dysregulation at age 5 influenced by harsh parenting at age 3.

In addition, child-to-parent effect showed that there was a significant relationship between emotional dysregulation and harsh discipline at different periods of time (see Figure 1B and Table 4). Precisely, emotional regulation problems at age 3 increased harsh parenting at age 5 ($\beta = 0.055$, $p < .01$), whereas emotional regulation problems at age 5 significantly predicted an increase in harsh parenting style by the time the child reaches age 7 ($\beta = 0.136$, $p < .01$). Thus, children exhibiting higher emotional regulation issues with increasing ages have a tendency of experiencing more severity from their parent's disciplinary strategies later in life. According to RI-CLPM effect size benchmark for lagged effects, .03 is considered a small effect, .07 is a moderate one and .12 is the large effect. To this standard, children's lagged effects at ages 3 to 5 were small to medium effects. But

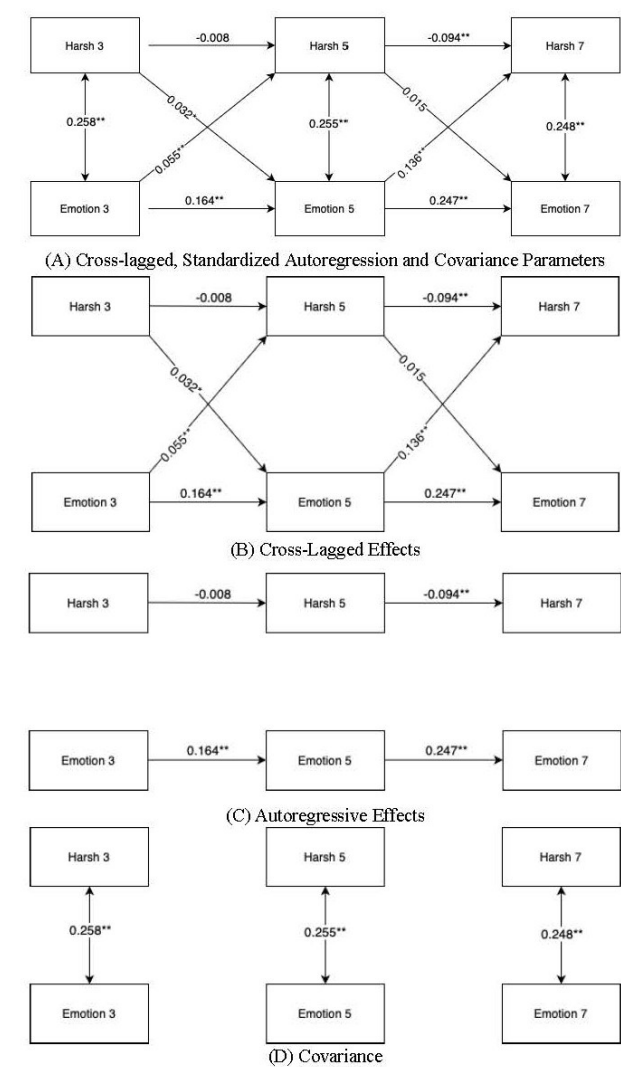


Figure 1. Cross-lagged associations between harsh parenting and children's emotional dysregulation at ages 3, 5, and 7 (Harsh means harsh parenting style and Emotion means children's emotional dysregulation. The number followed by the word refers to the children's age. Fig 1A. is the overall summary of the cross-lagged, standardized autoregressive and covariance parameters. Fig 1B shows the cross-lagged effect, Fig 1C shows the autoregressive effect, Fig 1D shows the covariance. * = $P \leq 0.05$; ** = $P \leq 0.01$.)

smaller lag effects were found among those aged 5–7 years old as compared to those aged 3–5 years old, which implies that as children get older their influence over parents seems to a very low extent.

Additionally, autoregressive effects indicated that children's emotional dysregulation remained steady between 3–5 and 5–7 years old, whereas harsh parenting continued only between 5 to 7 years (see Figure 1C and Table 4). Specifically, the children's emotional dysregulation had a significant effect during ages 3 to 5 ($\beta = 0.164$, $p < .001$) as well as during ages 5 and 7 ($\beta = 0.247$, $p < .001$). For parents, harsh parenting at age 3 was not related to harsh parenting at age 5 ($\beta = -0.008$, $P = 0.872$). On the contrary, a harsh parenting style at

age 5 predicted that there would be a harsh parenting style at age 7 ($\beta = -0.094$, $p < .001$). Harsh parenting was variable over time points with no stability in place, by contrast, the child's levels of emotional dysregulation were fairly stable indicating that past level of emotional dysregulation is a good predictor for future levels of emotional dysregulation.

Furthermore, the analysis of covariance results from the harsh parenting and emotional dysregulation at different time points also indicated a significant positive correlation (see Figure 1D). The relationship between harsh discipline and emotional dysregulation was significant and consistent across age 3 ($\beta = 0.258$, $p < .001$), age 5 ($\beta = 0.255$, $p < .001$), and age 7 ($\beta = 0.248$, $p < .001$), suggesting that there is a long-term effect of harsh discipline on emotional dysregulation during such periods. It follows therefore that in general, parents with a higher tendency for hard disciplinary measures have their children more likely to show general emotional dysregulation tendencies.

In the covariate-adjusted robustness analysis ($N = 8,677$), observed-score autoregressive panel regressions adjusted for child sex, family income, child ethnicity, baseline maternal psychological distress, and maternal education. The observed-score cross-lagged associations were not eliminated after adjustment: harsh parenting at age 3 predicted emotional dysregulation at age 5 ($\beta = 0.088$, $p < .001$), emotional dysregulation at age 3 predicted harsh parenting at age 5 ($\beta = 0.081$, $p < .001$), harsh parenting at age 5 predicted emotional dysregulation at age 7 ($\beta = 0.086$, $p < .001$), and emotional dysregulation at age 5 predicted harsh parenting at age 7 ($\beta = 0.117$, $p < .001$). These models are reported as sensitivity analyses because they do not separate stable between family differences in the same way as the RI-CLPM.

DISCUSSION

The purpose of this study was to investigate prospective associations between harsh parenting styles and children's emotional dysregulation by using data from the UK Millennium Cohort Study. The RI-CLPM results partially confirm the hypothesis. More specifically, evidence for bidirectionality was clearest from age 3 to age 5, whereas from age 5 to age 7 the RI-CLPM primarily supported a child-to-parent pathway. Harsh parenting at age 5 did not significantly predict emotional dysregulation at age 7 in the RI-CLPM.

Early parenting is crucial to the development of children's emotional regulation skills, which mature as they become older (Eisenberg *et al.*, 1998; Morris *et al.*, 2013; Rutherford *et al.*, 2015). The current study's results supported this idea by showing a strong correlation

between harsh parenting style and children's emotional dysregulation throughout the crucial window of time between the ages of three and seven. More specifically, our findings show that children who had more harsh parenting—which includes both physical and psychological abuse—had more severe issues controlling their emotions. These challenges showed themselves as mood swings, hyperarousal, irritation, and heightened annoyance, among other manifestations. These emotional difficulties imply that harsh parenting may worsen a child's inclination towards emotional instability in addition to failing to assist them in learning adaptive emotional control techniques (Liu *et al.*, 2022). This is in concordance with other studies that found out that children may have a problem with their emotional regulation if they are subjected to more harsh parenting strategies (Ma & Song, 2023; Morris *et al.*, 2013; Rademacher *et al.*, 2023). Also, they may experience difficulties in impulse control and maintaining a positive attitude in different situations (Vasiou *et al.*, 2023). The ability of children to cope with emotional challenges may be limited by lack of parental care and harsh parenting practices that may hinder the development of resilience and emotional regulation (Wang *et al.*, 2024).

Furthermore, the results indicated that the autoregressive effect of children's emotional regulation between the ages of 3 and 7 could last for a long time. It stressed that emotional regulation difficulties that emerge in childhood can persist the random intercept of emotional regulation also had a consistent slope indicating that there was little within-person variability over the period of early infancy. Children's stable emotional regulation state indicates that children who had higher scores in emotional dysregulation at age 3 had higher scores in emotional dysregulation at age 7 and if they were more emotionally dysregulated than their peers at age 3 they were likely to remain so at age 7.

These results highlighted the significance of emotional development during the first years of life and this importance is connected with the formation of self-regulation skills in infants at an early age (Frankel *et al.*, 2012). Young children with emotional dysregulation are likely to have social problems and challenging reactions to stress (Berzenski, 2018). This cycle of emotional dysregulation can significantly affect children's behaviour as well as their future emotional and social well-being (Paulus *et al.*, 2021). For instance, Newton *et al.* (2016) found that children with poor emotional regulation skills are likely to exhibit aggression or social isolation. In addition, it has been found that early emotional dysregulation is associated with the onset of mental health disorders such as anxiety and depression which may persist into adulthood (Eisenberg *et al.*, 2001).

However, there was a clear difference in harsh parenting and children's emotional dysregulation as they grew older. In particular, harsh parenting showed a slow decline trend, but children's emotional dysregulation tended to get worse. For example, harsh parenting styles noted at age 3 did not substantially indicate the same styles at age 5. Instead, between the ages of 5 and 7, there was a marginal but noteworthy decline in harsh parenting style. Some empirical research supports this view. According to Lansford *et al.* (2014), parents are observed to reduce the frequency and intensity of their harsh disciplinary measures after their children get older and start school. Additionally, due to the development of cognitive and social skills in children, they may well relate better to a kinder more communicative type of parenting (Wiggers & Paas, 2022). Furthermore, parents may adopt more positive parenting techniques as a result of growing awareness of the detrimental impacts on the emotional and psychological health of their children, and they may change their attitudes and views of their parenting styles (Rubin *et al.*, 1999). Moreover, parents may find that using harsh or punishing methods becomes less necessary as children become more independent and capable of self-regulation (Kuppens & Ceulemans, 2018). Kuppens and Ceulemans (2018) indicated that when children become older, parents frequently choose a parenting style that balances support and punishment, as opposed to a more authoritarian one.

A more thorough examination of the parenting styles random intercept showed a slow but gradual rise over time. This suggested that early parenting had very minimal variations among parents, with slight differences in the ways they approached bringing up their children during their first years of life. But as children grow older, these variations in parenting styles grow more noticeable. Parenting style throughout the first few years of life might vary depending on many circumstances. Parents often have strong attitudes towards what makes up good childrearing based on their own upbringing, cultural norms and societal expectations (Holden & Miller, 1999). Parents' attitudes and methods of parenting their children can change as their children grow, both mentally and physically (Lee & Han, 2021). For instance, parents may realize that harsh parenting is no longer appropriate or required as their children grow more self-reliant and socially involved (Sanvictores & Mendez, 2022). Alternatively, they could use more gentle and subtle parenting strategies that better suit their child's growing comprehension and maturity.

Additionally, our results showed that early parenting styles and emotion regulation had a bidirectional

relationship. The most evident period for this bidirectional association between difficult parenting and emotional control problems was between the ages of three and five years. This suggested that harsh parenting has a negative influence on children's emotional dysregulation, in turn, children's maladaptive emotional regulation can then lead to even stricter parenting. And as children become older, they may be more likely to experience difficulties with emotional control. Children's capacity to control and regulate their emotions is greatly influenced by their interactions with their caregivers during their early years (Hill *et al.*, 2006). Thus, when children have difficulty dealing with their emotions, they may receive more severe parenting methods in response to those difficulties. It was consistent with prior studies which have shown that they are characterized by reciprocal effects in which the actions of one party have a major impact on the development of the other (Moulanen *et al.*, 2015; Padilla-Walker *et al.*, 2012). More specifically, a child's emotional dysregulation can be considerably exacerbated by bad parenting practices, which are marked by harsh or punishing behaviours. Children who already have trouble controlling their emotions may become harder to handle, which may force parents to employ more severe forms of discipline. This intensification may further solidify the child's maladaptive emotional regulation habits, making it more difficult for them to get healthy coping skills (Yan *et al.*, 2021).

However, the harsh parenting style showed a little decrease from 5 to 7 years old. The substantial developmental shift might be because children are starting to go to elementary school (Lim *et al.*, 2021). Children are exposed to a wider social environment at this time, which includes interactions with classmates and teachers, giving them access to different resources for emotional regulation techniques (Kurki *et al.*, 2017). They can see and learn from a range of role models outside of their parents when they participate in more regulated social and educational settings. With this experience, children could grow more emotionally autonomous and become less reliant on their parents to assist them regulate emotions (Carlson, 1993; Cole & Hall, 2008). For instance, Eisenberg *et al.* (2005) did not see the similar correlation that we saw in younger children between early adolescent parenting techniques and emotional control. Possible explanations for this might be because of the developmental stage differences. Since younger children are more reliant on their parents, they may be directly impacted by the actions of their parents. On the other hand, older children could come up with their own methods of handling their feelings and become less dependent on their parents.

LIMITATIONS AND FUTURE DIRECTIONS

However, this study has some limitations. First, the sample was mostly taken from the UK cohort so the findings may not be easily applied to other populations. Parenting styles in different cultures and how they influence children's ability to regulate their emotions are different. For instance, Lansford *et al.* (2014) found out that physical punishments were diverse in many countries. While in some countries physical punishment is regarded as negative in others it may be perceived as positive and beneficial for the child (Lee & Han, 2021). Lee and Han (2021) noted that in many Eastern cultures, harsh parenting was considered as a sign of a parent's higher concern for children and even could be helpful in some cases (Kim & Song, 2020). More cross-sectional research is needed to understand how these dynamics evolve over time in other countries.

Second, the core measures were reported primarily by mothers, which may introduce common method bias and inflate associations between parenting and child behavior. Future research should use multiple informants, including fathers, teachers, direct observations, and child assessments. Third, this study did not consider all factors that may influence parenting styles. The revised robustness analyses included child sex, family income, child ethnicity, baseline maternal psychological distress, and maternal education, but unmeasured confounding remains possible. Parenting styles may be significantly affected by parents' psychological well-being, parenting stress, attachment and other factors (Bahmani *et al.*, 2022; Feizi *et al.*, 2014). Hence these aspects may partly explain the development of maladaptive patterns in parent-child relationships with implications on the child's capacity to manage emotional responses. In addition, it is also important to note that child temperament and personality characteristics play a major role in moderating the effects of parenting practices on emotional regulation. For instance, Kochanska *et al.* (2007) found that children with more malleable temperament suffered less from harsh discipline.

Thus, future research can be focused on a large number of important topics. First research conducted across cultural boundaries is necessary. Future studies might explore how parenting methods in different cultural norms affect children's emotional development over time. Also, a wider range of variables that could affect parenting style should be considered, such as parental psychological well-being, stress levels, and attachment patterns. Consequently, scholars can generate complex models that take into account intricate connections between parents' traits and children's attributes. More studies need to be done into the bidirectional relationship between parenting practices and children's

emotional regulation. It would be especially helpful to establish causal pathways and understand the relationship between parenting style and emotional regulation over time.

CONCLUSION

In conclusion, the study demonstrated prospective associations between emotional dysregulation and harsh parenting styles in early childhood. The RI-CLPM showed a parent-to-child association from age 3 to age 5 and child-to-parent associations across both developmental intervals. These findings suggest that parenting style and children's emotion regulation may influence one another over time, while the observational design and single-informant measurement require cautious interpretation. Parent-specific programs can be developed to help parents improve their parenting styles to promote positive emotional development in children. For instance, the Lifelong Healthy Parenting program supports positive parenting which could help reduce parent-child conflict and minimizes physical punishment, and psychological abuse of children (Ward *et al.*, 2020). This program could decrease the negative consequences from unhealthy parenting and reinforce children's healthy emotional development.

DECLARATION

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Author contributions

Xue Guo: Conceptualization, Data curation, Methodology, Software, Validation, Formal analysis, Investigation, Writing—Original draft, Visualization. Xiaoyun Su: Data curation, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Writing—Original draft, Writing—Review and Editing, Visualization. Pei Sun: Conceptualization, Methodology, Resources, Writing—Review and Editing, Supervision, Project administration, Funding acquisition.

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Conflict of interest

The authors declare no competing interest.

Use of large language models, AI and machine learning tools

None declared.

Data availability statement

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