White Rose Research Online

eprints@whiterose.ac.uk
https://eprints.whiterose.ac.uk
Universities of Leeds, Sheffield and York

Deposited via The University of Sheffield.

White Rose Research Online URL for this paper:
https://eprints.whiterose.ac.uk/id/eprint/243827/

Version: Accepted Version

Article:
Saribaz, Z.E., Debowska, A., Norman, P. et al. (2026) A within-person examination of the family stress model: family income, parental distress, and child mental health. Research on Child and Adolescent Psychopathology, 54 (4). 93. ISSN: 2730-7166

https://doi.org/10.1007/s10802-026-01489-0

© 2026 The Authors. Except as otherwise noted, this author-accepted version of a journal article published in Research on Child and Adolescent Psychopathology is made available via the University of Sheffield Research Publications and Copyright Policy under the terms of the Creative Commons Attribution 4.0 International License (CC-BY 4.0), which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited. To view a copy of this licence, visit http://creativecommons.org/licenses/by/4.0/

Reuse
This article is distributed under the terms of the Creative Commons Attribution (CC BY) licence. This licence allows you to distribute, remix, tweak, and build upon the work, even commercially, as long as you credit the authors for the original work. More information and the full terms of the licence here: https://creativecommons.org/licenses/

Takedown
If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.

UNIVERSITY OF LEEDS
University of Sheffield
UNIVERSITY of York

A Within-Person Examination of the Family Stress Model: Family Income, Parental Distress, and Child Mental Health

Abstract

The Family Stress Model (FSM) is a key framework explaining the relationship between family income and child mental health. However, most studies examining the FSM are cross-sectional and do not clearly distinguish within- from between-person effects, which limits robust inferences about how family income affects child mental health at the within-person level. This study addressed this gap by applying a Random Intercept Cross-Lagged Panel Model to data from the nationally representative UK Millennium Cohort Study, focusing on children aged 3, 5, 7, 11, and 14 (N = 11,845; ~49.9% female). Findings revealed that within-person decreases in family income were associated with subsequent increases in internalizing problems for boys from ages 3 to 5 and for girls from ages 7 to 11. Further, income was associated with externalizing problems indirectly but only among girls and only through maternal, not paternal, distress. Together, these findings suggest that within-person FSM processes operate in gender- and outcome-specific ways within families. Interventions may benefit from considering both child and parent gender, with maternal mental health as a particularly relevant target during economic hardship.

Keywords: Family Stress Model; within-person; family income; parental mental health; child mental health, Millennium Cohort Study.

A Within-Person Examination of the Family Stress Model: Family Income, Parental Distress, and Child Mental Health

Low family income is a well-documented risk factor for child mental health problems (Piotrowska et al., 2015; Wilson et al., 2025). Numerous studies have demonstrated that children living in economic strain are more likely to show internalizing (e.g., depression; Tracy et al., 2008) and externalizing problems (e.g., aggression; Mazza et al., 2016). Furthermore, exposure to economic hardship in childhood has been associated with enduring consequences that persist into adulthood, such as elevated risks of psychological disorders and financial insecurity (Odgers et al., 2008). Given that around 50% of all mental health disorders emerge before the age of 14 (Kessler et al., 2005), understanding mechanisms through which income affects child mental health is essential for effective interventions.

The Family Stress Model (FSM) is an influential theoretical framework for understanding the relations between family income and child mental health outcomes (Conger et al., 2000). According to this model, the association between economic disadvantage and child mental health problems is mediated primarily through parental psychological distress, which results from economic hardship (Kiernan & Mensah, 2009; Violato et al., 2011). This emotional distress experienced by parents predicts greater family conflict, which in turn leads to disruptions in parenting practices, ultimately resulting in child mental health problems (Conger & Conger, 2002; Conger et al., 1994; Masarik & Conger, 2017).

The FSM is supported by a range of evidence from different developmental stages and mental health outcomes (e.g., Conger & Conger, 2002; Kiernan & Huerta, 2008; Lee, 2022; Shelleby, 2018; Wilson et al., 2025; Yang et al. 2023; Yoder & Hoyt, 2005). For instance, Kiernan & Huerta (2008) examined children at age 3 in the Millennium Cohort

Study (MCS). This study found that the association of economic deprivation with emotional and behavioural problems were partly explained by maternal depressive symptoms and parenting factors, such as discipline methods. The effects observed were stronger for externalizing problems than emotional problems. Consistent with these findings, a cross-sectional examination of the FSM using MCS data (Yang et al., 2023) found that maternal distress mediated the association between lower family income and poorer child mental health in children aged 3-17. Additionally, Yoder and Hoyt (2005) investigated the applicability of the FSM to adolescent suicidal ideation. Their findings showed that economic adversity related to parental depressive symptoms, which were associated with harsh parenting. In turn, harsh parenting related to adolescent depressive symptoms, ultimately contributing to suicidal ideation (Yoder & Hoyt, 2005).

Although a variety of studies have examined the FSM, the literature has some important limitations. These include that research has predominantly focused on mother-child interactions, often overlooking the role of fathers (Neppl et al., 2015; Zietz et al., 2022). Very few studies have examined the role of both parents together (e.g., Ponnet et al., 2014; White et al., 2015), despite evidence that paternal and maternal depression frequently overlap (Kouros & Cummings, 2010; Neri et al., 2020). Family systems theory proposes that the subsystems within a family are interdependent and exert reciprocal influences on one another (Cox & Paley, 1997). Thus, examining both parents simultaneously allows for a more nuanced understanding of each parent's unique contribution to the family system (Kouros & Cummings, 2010; Neri et al., 2020).

Another important limitation of the existing FSM literature is its reliance on cross-sectional designs which precludes determining temporal ordering and increases vulnerability to confounding factors (Piotrowska et al., 2025). Considering that children's mental health, family income, and parental mental health problems may affect each other reciprocally

(Piotrowska et al., 2022; Thompson & Henrich, 2022), this is an important limitation. For instance, there may be reverse causation; it has been demonstrated that caring for a child with mental health difficulties may prevent parents' ability to return to work, thereby reducing household income (e.g., Amaro et al., 2024; Coley et al., 2011). Similarly, having a child with mental health problems can negatively affects parents' mental health (e.g., Saribaz et al., 2025; Speyer et al., 2022a; Thompson & Henrich, 2022).

Longitudinal designs that are able to capture stability of effects and temporal ordering have been suggested to support more robust causal inferences. One such design, Cross-lagged panel models (CLPMs), is particularly important as it allows for the estimation of reciprocal effects between variables over time, thereby enabling tests of reverse causation (Preacher, 2015). However, a recent systematic review examining longitudinal associations between socioeconomic status and child conduct problems reported that only a few studies controlled for prior levels of conduct problems and considered reciprocal effects (Piotrowska et al., 2025). One of the few studies that employed such a design was conducted by Piotrowska et al. (2022), who examined children aged 5-15 and tested the FSM using CLPM. This study found a longitudinal effect of income on conduct problems, but no mediation effect of familial factors was identified. Instead, the results provided stronger evidence that parenting and family difficulties were an outcome of conduct problems.

On the other hand, it is also important to acknowledge that simple CLPMs have limitations when it comes to establishing robust causal inferences. This is because CLPMs conflate within- and between-person effects, contaminating within-person estimates with between-person variance and producing biased parameters (Hamaker et al., 2015; Usami et al., 2019). In order to understand child mental health problems, developmental theory primarily focuses on within-individual changes (Berry & Willoughby, 2017). Therefore,

statistical models that disentangle within-individual from between-individual effects would provide more robust results compared to traditional CLPM (Hamaker et al., 2015).

A Random Intercept Cross-Lagged Panel Model (RI-CLPM) has been developed as an extension of the traditional CLPM to support disaggregation of between-person and within-person variance (Hamaker et al., 2015; Mund & Nestler, 2019). While the traditional CLPM assumes that individual scores fluctuate around a common group mean over time, the RI-CLPM posits that each individual fluctuates around their own stable, trait- like mean over time (Usami & Hamaker, 2019). Consequently, unlike the CLPM, the RI-CLPM enables the estimation of pure within-person autoregressive and cross-lagged effects. The method allows researchers to examine how changes in one variable predict changes in another over time within the same individual, while controlling for all confounding factors that remain constant over time (Hamaker et al., 2015). This offers a more precise understanding of individual-level change processes that is well-suited for developmental research (Berry & Willoughby, 2017).

Recent studies have examined within-person FSM processes using multilevel modelling approaches. For example, researchers have investigated the effects of safety nets (Wu et al., 2025) and pandemic-related stressors, such as financial cutbacks and fears of contracting COVID-19 (Boyer et al., 2022), on child mental health via maternal distress. However, these studies have an important limitation because multilevel models do not allow for bidirectional examination of effects (Falkenström et al., 2022), which is critical given that familial risk factors and child mental health may influence each other reciprocally (e.g., Speyer et al., 2022a). Consequently, the ability of these studies to rule out alternative causal pathways is limited, potentially leading to misleading conclusions regarding FSM processes (Falkenström et al., 2022). Unlike prior approaches, RI-CLPM allows for a clear separation of within- and between-person effects while also accommodating bidirectional relationships, thereby enabling more robust causal inference (Hamaker et al., 2015).

Current Study

In the present study we apply a RI-CLPM to test a central component of the FSM using data from the MCS (Connelly & Platt, 2014). We follow children from ages 3 to 14 years to examine how fluctuations in family income predict changes in child mental health via variation in parental distress. Examining children across childhood and into early adolescence is important, as family influence is typically strongest during childhood and begins to decline in adolescence, when peers and neighbourhoods become increasingly salient (Smetana et al., 2006).

To our knowledge, no previous study has applied RI-CLPM to examine the FSM. RI-CLPM represents an important methodological advancement that allows for clear separation of within- and between-person effects while accommodating bidirectional relationships. Thereby applying RI-CLPM to the FSM allows a more precise test of the proposed mechanisms. Furthermore, the study covers an extensive developmental period spanning early childhood to early adolescence; previous FSM studies have usually examined only childhood (e.g., Scaramella et al., 2008) or adolescence (e.g., Farley & Kim-Spoon, 2017). This provides insights into how the processes proposed by the FSM unfold across different developmental stages. Finally, the simultaneous examination of both maternal and paternal distress offers a more comprehensive perspective on parental influences, allowing for the identification of unique effects associated with each parent.

Building on these contributions**,** the current study tested two hypotheses. First, we hypothesized that within-person decreases in income will be associated with within-person increases in child mental health problems (both internalizing and externalizing) over time. Second, we expected this association to be partially mediated by increases in parental distress at the within-person level.

We did not have a specific hypothesis regarding developmental stage or type of mental health problems, given the heterogeneity of findings in the existing literature. Some studies suggested that socioeconomic disadvantage had a stronger impact on younger children compared to adolescents (e.g., Piotrowska et al., 2015; Reiss, 2013), while others reported significant associations during adolescence as well (e.g., Yang et al., 2023). Similarly, while some studies found stronger effects of income on externalizing problems compared to internalizing problems (e.g., Kiernan & Hueartа., 2008; Amone-P'Olak et al., 2009), others found the opposite (e.g., Rijlaarsdam et al., 2012).

Beyond potential differences across developmental stages and types of mental health problems, FSM processes may also vary according to gender. At the child level, girls and boys may differ in emotional expression, partly due to developmental and socialisation processes that contribute to gendered patterns of emotional expression and internalising/externalising problems (Chaplin, 2015; Brody & Hall, 2008). These differences may extend to how girls and boys respond to familial risk factors (Drabick et al., 2006), with girls generally exhibiting more internalising problems and boys more externalising problems (Maughan et al., 2004). However, findings regarding gender differences in the association between family income and child mental health are inconsistent. Some studies reported that economic hardship was associated with greater internalizing problems in girls (e.g., Leve et al., 2005), others found that income was more strongly associated with externalizing problems in girls than in boys (e.g., Henninger & Luze, 2012), and still others reported no significant gender differences (e.g., Amone-P'Olak et al., 2009). As previous findings are heterogeneous, we did not propose a gender-related hypothesis. However, we still examined whether FSM processes differ for boys and girls as this could clarify whether these mechanisms are gender-specific or general and inform interventions that are more gender sensitive.

Gender may also shape FSM processes at the parental level. Mothers and fathers may experience and respond to financial stress differently in contexts where family roles and responsibilities are gendered (Falconier & Epstein, 2010). For example, where fatherhood is associated with financial provision, reduced income may threaten fathers' perceived provider role (Connell, 1987), which can lead to psychological distress (Springer et al., 2010). For mothers, who in many contexts including in the UK, are likely to undertake the greater share of caregiving (Walthery & Chung, 2021), the combination of caregiving demands and economic strain may heighten their vulnerability (Falconier & Epstein, 2011). These differences suggest that maternal and paternal distress may contribute differently to the association between family income and child mental health. As findings regarding the relative roles of mothers and fathers within the FSM remain mixed (e.g., Hogye et al., 2025; White et al., 2015), we have not advanced specific hypotheses regarding parent gender. However, examining both parents is important for identifying the unique contribution of each to these processes.

Methods

Participants

The study utilized data from the MCS, a nationally representative UK-based birth cohort study that followed approximately 19,000 children born between September 2000 and January 2002 (Connelly & Platt, 2014). Data collection began at the age of 9 months and there were further collections when the children were 3, 5, 7, 11, 14, and 17 and 23 years old. Disadvantaged families and ethnic minorities were oversampled (Joshi & Fitzsimons, 2016) and we used the MCS sampling weights, stratification and clustering variables to account for oversampling, attrition, and non-random dropouts (see Connelly & Platt, 2014; Hansen, 2014 for further information).

Participation in the cohort declined from 18,785 families at Wave 1 (9 months) to 11,760 at Wave 6 (age 14), reflecting an approximate 37% reduction over time. Participation was not strictly cumulative, as cohort members could miss one or more waves and rejoin in later assessments. Further details on attrition patterns are available in the MCS technical reports (e.g., Mostafa & Ploubidis, 2017).

The current study included all children who participated in any wave up to age 14 (N = 11,845; female = 5,907, male = 5,938). The sex of participants was recorded as assigned at birth (female/male). Ethnicity was assessed at Wave 1 (age 9 months). The analytic sample reported ethnicity predominantly as White (82.8%), followed by Pakistani and Bangladeshi (7.4%), Black or Black British (3.1%), Mixed (2.7%), Indian (2.6%), and other ethnic groups (1.4%). Ethnicity data were available for 11,411 of the 11,845 participants in the analytic sample.

Informed written consent was obtained from parents of the cohort children during the data collection, and the NHS Multi-Centre Ethics Committees approved the data collection (Shepherd & Gilbert, 2019). Full ethical details are available at: https://cls.ucl.ac.uk/wp-content/uploads/2017/07/MCS-Ethical-Approval-and-Consent-2019.pdf.

Measurements

Child Mental Health Problems. The parent reported Strengths and Difficulties Questionnaire (SDQ) was used to measure child internalizing and externalizing problems (Goodman, 1997), with data collected when the children were aged 3, 5, 7, 11, and 14 years. The SDQ is a 25- item questionnaire including 5 subscales: conduct problems (e.g., generally obedient), prosocial behaviour (e.g., considerate of other feelings), hyperactivity (e.g., restless, overreactive) and emotional problems (e.g., often complains of headaches) and peer problems (e.g., tends to play alone). Each subscale is composed of five items measured with

response options 'not true', scoring 0, 'somewhat true', scoring 1 and 'definitely true' scoring 2. For internalizing problems, the score is calculated from the sum of emotional and peer problems, whereas the externalizing difficulties score is the sum of conduct and hyperactivity problems. Each scale has a range of 0- 20, with a higher score indicating more difficulties. Within the MCS it has been demonstrated that the factor structure of the SDQ is invariant longitudinally and across gender (Croft et al., 2015; Murray et al., 2021), as well as across ethnicity and socioeconomic status (Toseeb et al., 2022). Internal consistency reliability was assessed using McDonald's omega (McDonald, 1999) and was acceptable across waves. For the internalizing scale, omega coefficients at ages 3, 5, 7, 11, and 14 were .61, .79, .67, .80, and .72, respectively. For the externalizing scale, corresponding values were .82, .78, .83, .78, and .82. See Online Resource Table 1 for further details.

Parent Psychological Distress. Parental distress was measured with the 6-item, Kessler 6 (K6) Scale at 3, 5, 7, 11 and 14 years (Kessler et al., 2002). Regarding the past 30 days, both parents were asked how often they felt "so depressed that nothing could lift you up", "nervous, hopeless, restless, or fidgety", "everything was an effort" and "worthless." These items were measured on a 5-point Likert scale with options ranging from "all the time" to "none of the time". In this study, all items have been reversed and rescaled from 0 to 4. Psychological distress scores were calculated by summing the items to provide a total score range 0-24 where higher scores indicate higher parental distress. The Kessler scale was found to have good internal consistency and reliability in the MCS (Flouri et al., 2019). In the current study, McDonald's omega coefficients indicated good internal consistency for both maternal (ω = .87–.90 across waves) and paternal distress (ω = .80– .85 across waves). Further details are provided in Online Resource Table 1.

Family income. A predefined income band list was used to assess respondents' total household income. The MCS team derived a continuous income measure from these banded responses using interval regression techniques (Stewart, 1983). OECD equivalised income was then calculated using these values, adjusting household income for differences in family size and composition using standardised equivalence weights. This produces a measure of economic resources comparable across households of different sizes (OECD, 2013; Hansen, 2014). In the current sample, equivalised household income (measured weekly) ranged from £14 to £1,362 across waves. As a reference, relative poverty in the UK is generally defined as household income below 60% of the national median equivalised income (Fitzsimons et al., 2017).

Statistical Analysis

Following Speyer et al. (2022a), we employed RI-CLPM models based on Mulder and Hamaker's (2021) framework to examine the within-person effects of family income on child internalizing and externalizing problems via parental distress (see: jeroendmulder.github.io/RI-CLPM). Through the inclusion of random intercepts for each repeatedly measured variable, RI-CLPM disaggregates within- and between-person effects. The models allow covariance between the random intercepts, testing the association of the between- participants variance in the measured variables. To understand the within-individual dynamics, we also incorporated cross-lagged and autoregressive residual effects in addition to residual covariance within time points (for further explanation see Hamaker et al., 2015).

To investigate longitudinal mediation, we incorporated second-order cross-lagged effects, which consider the influence of variables from two preceding time points, in examining the path from family income to child mental health problems through parental distress (Lüdtke & Robitzsch, 2021). Second order cross-lagged effects were included from family income at age 3 to internalizing and externalizing problems at age 11; in addition,

from family income at age 7 to internalizing and externalizing problems at age 14 and from family income at age 11 to internalizing and externalizing problems at age 14. To evaluate the significance of indirect effects, 95% bootstrap confidence intervals were calculated with standard maximum likelihood estimation.

Models were fitted in Mplus 8.8 (Muthén & Muthén, 1998- 2017) with the robust maximum likelihood estimator (MLR). Missing data was addressed using full information maximum likelihood estimation, which yields unbiased estimates assuming that the data are missing at random (Enders, 2001). To account for the complex sampling design of the MCS and non- random dropout, all models included stratification and clustering variables as well as attrition weights. Tucker Lewis Index (TLI) and Comparative Fit Index (CFI) >.90 and Root Mean Squared Error of Approximation (RMSEA) <.05 (Kline, 2016) were used as cut-off values to indicate good model fit. The Mplus codes and corresponding model results are available on the Open Science Framework (OSF; https://osf.io/b95ay/?view_only=b66c79fd5b224b00bd5a5bf754b91cfd)

We also explored potential gender differences in the mechanisms proposed by the FSM. Thus, a multigroup RI-CLPM was estimated by constraining all autoregressive and cross-lag paths equally across boys and girls. In order to investigate whether structural paths differed by gender, this fully constrained model was compared with a baseline model where only identification constraints were imposed. Given the use of the MLR estimator, the Satorra-Bentler scaled chi-square difference test (Satorra & Bentler, 2001) was used to determine which model showed a better fit. Results showed that the unconstrained model fit the data significantly better than the fully constrained model, $\Delta\chi^2$ (116) = 1172.33, p<.001, with the unconstrained model demonstrating superior fit indices (CFI= .990, RMSEA= .027, TLI = .976) compared to the constrained model (CFI= .980, RMSEA= .032, TLI= .968). Therefore, we report separate analyses for girls and boys.

Descriptives

Descriptive statistics are presented in Online Resource Table 1, while the correlation matrix is shown in Online Resource Table 2.

Between and Within-Person Associations for Girls

The RI-CLPM model demonstrated excellent fit for girls (RMSEA = .021, CFI = .989, TLI = .973). Between-person associations showed that children whose mothers experienced higher levels of psychological distress exhibited more internalizing (r =.58) and externalizing problems (r =.41). Paternal psychological distress was also positively associated with these outcomes, albeit with weaker relationships for both internalizing (r = .25) and externalizing problems (r = .17). Lastly, children from lower-income families exhibited more internalizing (r = -.45) and externalizing problems (r = -.46) (see Table 3 in Online Resources).

At the within-person level, direct associations between income and children's mental health were found only for internalizing problems. Specifically, a decrease in family income at age 7 was associated with increased internalizing problems at age 11, although the effect size was small (β = -.04, $p < .001$). On the other hand, no significant effects from child mental health to family income were observed. Fig. 1 presents the standardized, significant autoregressive and cross-lagged parameters. See Table 4 in Online Resource for the full results.

There was statistical evidence of an indirect path from income to externalizing problems via maternal distress. Specifically, lower family income at age 7 was associated with higher levels of maternal distress at age 11, which in turn higher externalizing problems at age 14, though the indirect effect was very small (β = -.006, 95% CI [−0.012, −0.001], $p < .05$). In contrast, no such indirect effects were observed for internalizing problems across any developmental periods. See Tables 5 and 6 for the full results of mediation in Online Resource.

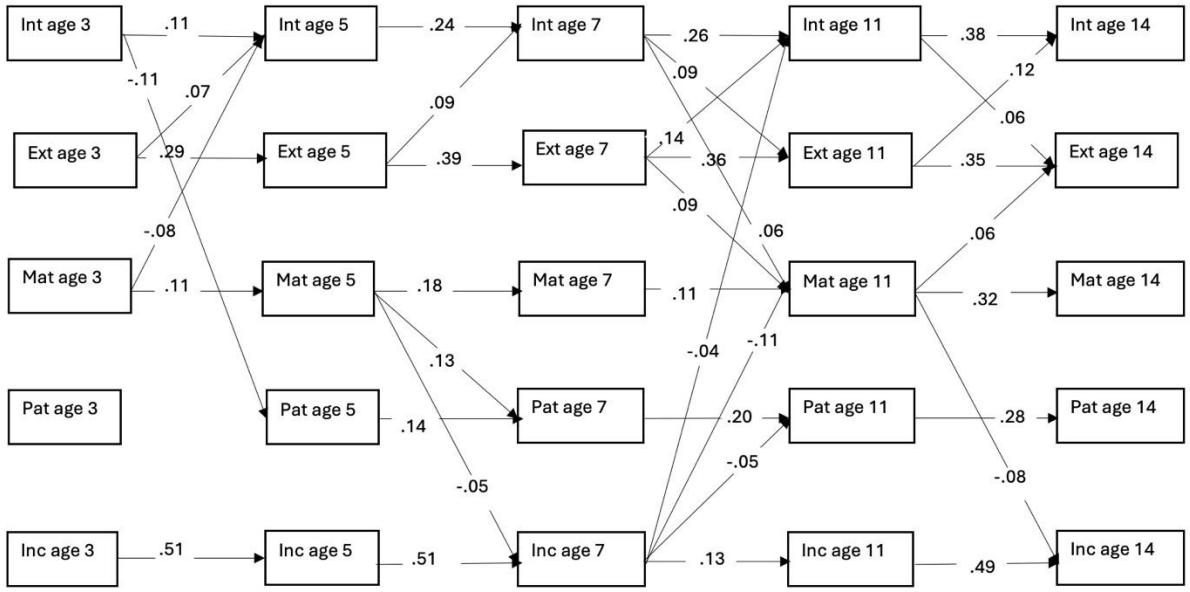

Fig. 1 RICLPM- Standardized autoregressive and cross- lagged parameters for girls. Paths are shown only if they are statistically significant. Int = Internalizing, Mat= Maternal psychological distress, Pat= Paternal psychological distress, Inc= Family income.

Between and Within-Person Associations for Boys

The RI-CLPM model also demonstrated an excellent fit in the boys' sample (RMSEA = .020, CFI = .990, TLI = .977). At the between-person level, results indicated that children of mothers with higher psychological distress levels showed greater internalizing (r = .55) and externalizing problems (r = .43). Paternal distress also showed positive but smaller associations (r = .25 for internalizing; r = .22 for externalizing). Lastly, children from lower-income families exhibited more internalizing *(*r = -.45) and externalizing problems (r = -.44) (see Table 7 in Online Resources).

At the within-person level, higher family income at age 3 was associated with a lower internalizing problems at age 7, though the effect was small (β = -.06, $p < .05$). No significant income-to-child effects were observed at any other developmental stage, and no significant child-to-income effects were found at any developmental stage. Significant cross-lagged and

autoregressive parameters are illustrated in Fig. 2 and full results are shown in Table 8 in the Online Resources.

Regarding indirect effects, no significant paths were found from family income to either internalizing or externalizing problems via parental distress. Tables 9 and 10 in the Online Resource present the full mediation results.

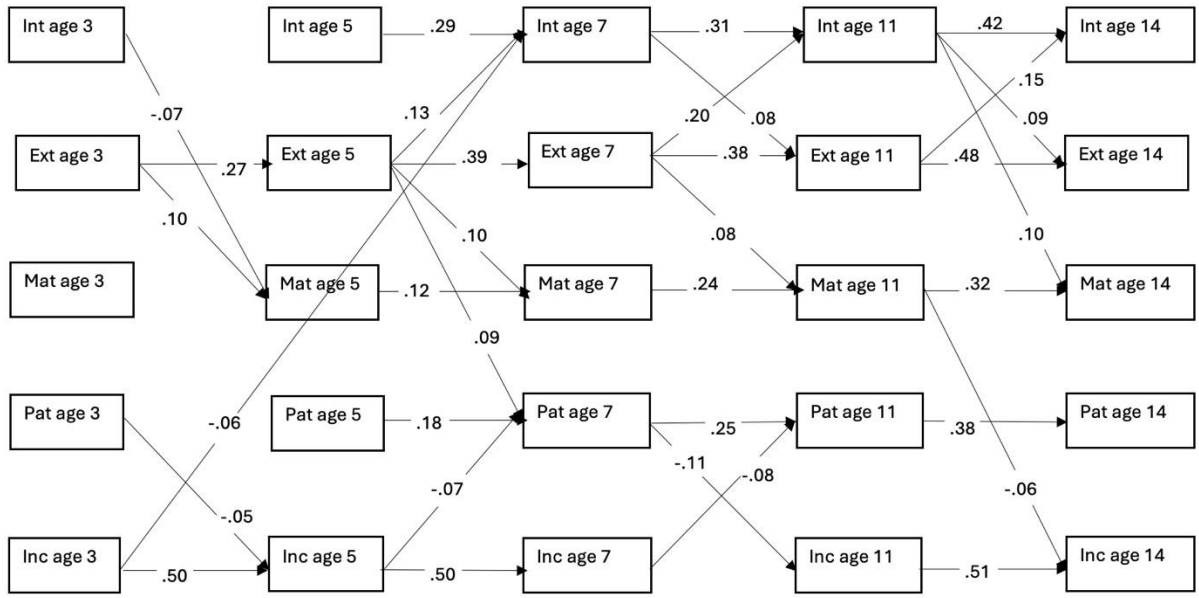

Fig. 2 RICLPM- Standardized autoregressive and cross- lagged parameters for boys. Paths are shown only if they are statistically significant. Int = Internalizing, Mat= Maternal psychological distress, Pat= Paternal psychological distress, Inc= Family income.

Sensitivity Analyses

Two sensitivity analyses confirmed the robustness of our findings. First, bootstrapping analyses using standard maximum likelihood estimation replicated the significance of mediation effects obtained with MLR estimation (see Tables 5 and 6 for girls, and 9 and 10 for boys in Online Resource). Second, a standard CLPM was estimated to assess whether findings were driven by the within- and between-person disaggregation inherent in the RI-CLPM approach. A multigroup CLPM was conducted to test for gender invariance using the Satorra-Bentler scaled $\Delta\chi^2$ difference test (Satorra & Bentler, 2001). The results supported the

unconstrained model, indicating that the model parameters differed across gender ($\Delta\chi2(116) = 979.37$, $p < .001$). The CLPM showed good fit for both genders: girls (RMSEA = .049, CFI = .930, TLI = .859) and boys (RMSEA = .047, CFI = .934, TLI = .867).

The CLPM findings supported the mediation of the effects of low income on child mental health problems through maternal rather than paternal distress. For girls, maternal distress mediated the relationship between family income and internalizing problems across all developmental periods (ages 3→7, 5→11, 7→14) and externalizing problems during early and middle childhood (ages 3→7, 5→11). For boys, maternal distress mediation was significant only for internalizing problems during early and middle childhood (ages 3→7, 5→11). The sum of indirect effects was significant for all supported pathways in both genders. All results for both girls and boys are provided in the Online Resources: Tables 11–12 show the full results with confidence intervals; Figs. 1 and 2 display the standardized significant autoregressive and cross-lagged parameters; and Tables 13–16 report the bootstrapping results.

Discussion

The present study examined the relations between family income and child mental health by disaggregating between- from within-person effects and tested parental distress as a mediator of these relations. On the basis of the FSM, we hypothesized that within-person decreases in family income would lead to within-person increases in child mental health problems, with within-person increase in parental distress partially mediating these relations. The findings provided partial support for these hypotheses. While direct and indirect pathways were observed, they differed by child gender, parent gender, and outcome type, suggesting that FSM dynamics within families may depend on these factors.

Effects of Income on Child Outcomes

A significant within-person association between decreases in family income and increased internalizing problems was observed for boys but not girls in early childhood (ages 3–5). A similar pattern was observed for internalizing problems among girls during the transition to adolescence (ages 7–11). No significant associations were observed between family income and children's mental health problems between ages 11 and 14 for either boys or girls.

The finding that income was associated with internalizing problems in boys during early childhood is consistent with research indicating that children may be at heightened sensitivity to family economic conditions during childhood (Lansford et al., 2018). However, it is important to consider the gender-specific nature of this effect. Although self-regulation was not directly assessed in the present study, one possible explanation draws on developmental research suggesting that boys may show relatively lower self-regulatory capacities than girls in early childhood (Coyne et al., 2015; Tao et al., 2014). Self-regulation, defined as the ability to regulate emotions, behaviours, and thoughts (McClelland and Cameron, 2012), is thought to protect children from family stressors (Crespo et al., 2019; Flouri et al., 2014). Prior work using the MCS has similarly identified self-regulation as a protective factor in the context of economic disadvantage (Flouri et al., 2014). One possibility, therefore, is that differences in self-regulatory development may help to explain why this association appeared only among boys in this developmental period, although this interpretation remains speculative given that self-regulation was not directly measured.

With regard to girls, the association observed between income at age 7 and internalizing problems at age 11 may be partly explained by evidence suggesting that girls may be particularly vulnerable both to internalizing difficulties during the transition to adolescence (Lewis et al., 2015; Leve et al., 2005; Ullsperger & Nikolas, 2017) and to the effects of peer rejection, an important risk factor for internalizing problems (Hjalmarsson,

2017; Jenchura et al., 2016). Living in low-income families may heighten risk of peer difficulties through restricted access to social resources and a greater sense of loneliness (Benner & Wang, 2014), which may in turn contribute to internalizing problems among girls (Platt et al., 2013).

A further important finding concerns the absence of a significant association between family income at age 11 and child mental health at age 14, which may appear inconsistent with prior studies reporting income–mental health associations during adolescence (e.g., Noonan et al., 2018; Yang et al., 2025), including those using the MCS (Yang et al., 2025).These discrepancies may partly reflect methodological differences. Many prior studies have relied on approaches that conflate within-person and between-person variance which can lead to biased estimates of the income-child mental health association (Hamaker et al., 2015). Our sensitivity analyses using the CLPM support this interpretation, showing stronger effects of income than the RI-CLPM (see Figs. 1 and 2 in the Online Resources). It is also possible that the effects of income on child mental health are realised less through direct pathways and more through family processes such as parental distress, consistent with the indirect pathways observed in the present study and with the broader FSM framework (Masarik & Conger, 2017).

Indirect Effects via Parental Distress

Consistent with the FSM (Conger & Conger, 2002; Masarik & Conger, 2017), we found an indirect association between family income and child mental health problems. However, this pathway was observed only for girls, via maternal but not paternal distress. Specifically, a decline in family income at age 7 was associated with increased maternal distress at age 11, which in turn increased externalizing problems at age 14.

That this pathway examined through maternal rather than paternal distress is consistent with previous research indicating that maternal mental health can play an important mediating role between family income and children's mental health problems (Lai et al., 2020; Noonan et al., 2018). On the other hand, the present findings differ from some studies testing the FSM which report a mediating role for paternal distress (e.g., Hogye et al., 2025). Relatively few studies examined maternal and paternal distress within the same model, however, which limits direct comparison with our findings. Indeed, some research suggests that paternal distress may affect child outcomes less directly, operating instead through its effects on maternal behavior and parenting quality rather than as an independent pathway to child mental health (White et al., 2015; Zietz et al., 2022). These findings may suggest that maternal and paternal distress may influence child outcomes via partially distinct mechanisms, with maternal distress representing a more consistent mediating pathway in the present study.

One possible explanation for the role of maternal distress is that mothers may be more vulnerable to decreases in family income. Women often experience higher levels of financial stress than men, partly because their capacity to respond to financial difficulties can be constrained by the unequal division of childcare responsibilities and their relatively disadvantaged position in the labour market (Falconier & Epstein, 2011; Ponnet, 2014). Gender differences in coping strategies may further contribute to this pattern, with women more likely to engage in emotion-focused coping such as rumination, while men more often adopt problem-focused or avoidant strategies (Falconier & Epstein, 2011). These factors may help explain why maternal distress was identified as a more proximal pathway through which decreases in family income affect child outcomes in the present study.

The restriction of this indirect pathway to girls needs further consideration. Although fathers are becoming more involved in caregiving (Han & Jun, 2013), mothers often remain the primary caregivers in many households (Pakaluk & Price, 2020), including in the UK (Gaunt et al., 2022), resulting in more frequent interactions with children. Adolescents are more likely to seek emotional support from mothers than fathers (Mayseless et al., 1998), and the mother-daughter relationship has been described as a particularly close dyadic bond within the family system (Livings, 2021; Mayseless et al., 1998). This relational closeness may heighten girls' sensitivity to fluctuations in maternal emotional functioning and, in turn, to the effects of maternal distress on their mental health. Previous research also suggests that boys may be less emotionally dependent on their families than girls during adolescence (Geuzaine et al., 2000; Paterson et al., 1994), which could reduce their sensitivity to maternal distress. Future research should examine whether parent-child relationship quality moderates FSM associations and to further clarify gender differences in these processes.

The FSM pathway discussed here was observed for externalizing but not for internalizing, problems. Prior FSM research has reported associations with both internalizing and externalizing outcomes (e.g., Rijlaarsdam et al., 2012), although some studies suggest these pathways may be particularly salient for externalizing problems (e.g., Kiernan & Huerta, 2008). The present findings add to this literature by suggesting that the pathway through maternal distress may be particularly relevant for externalizing problems in adolescence. One possible explanation is that maternal distress may disrupt parenting processes. Mothers experiencing distress have been found to be more likely to engage in less responsive or more punitive parenting behaviours (e.g., Midouhas & Oliver, 2023), which are consistently associated with higher levels of externalizing problems in adolescence (Wang & Liu 2018). Within the FSM framework, this pattern may reflect a pathway in which decreases in family income may lead to increases in maternal distress, which in turn may

disrupt effective parenting and contribute to externalizing behaviours. As parenting was not directly analysed in the present study, this interpretation should be treated with caution, and future research incorporating direct measures of parenting would be valuable.

Lastly, another important finding was the absence of mediational effects during childhood, which differs from studies reporting such effects at younger ages (e.g., Kiernan & Huerta, 2008). One explanation for this discrepancy may lie in the analytical approach, as separating within- and between-person effects means cross-lagged effects represent only within-person variance (Hamaker et al., 2015). Consistent with this, our CLPM sensitivity analyses indicated mediational effects at earlier timepoints. Alternatively, income effects during childhood may operate through mediating mechanisms not examined here.

Strengths and Limitations

The present study has several strengths. The use of a within-person modelling approach (RI-CLPM) in a large, nationally representative UK sample allowed us to distinguish within- from between-person effects, providing a more nuanced understanding of FSM mechanisms. Moreover, unlike many prior studies that focused only on maternal pathways (e.g., Adaranijo & Mbamba, 2025; Wilson et al., 2025) or examined limited age ranges (Kiernan & Huerta, 2008), we simultaneously modelled both maternal and paternal psychological distress across ages 3 to 14, allowing for examination of potential variations across family members and developmental stages.

Several limitations should, however, be noted. First, while longer-term effects of family income on parental distress and child mental health have been widely documented, income-related stressors such as sudden job loss may also affect families over shorter timescales (Fanta et al., 2025). As MCS assessment waves were spaced at intervals of at least two years, our analyses may not capture such short-term dynamics, and the findings more

likely reflect longer-term developmental processes. Future research using designs with more frequent assessments, such as ecological momentary assessment or daily diary methods, would be valuable (Griffith et al., 2021).

Second, the present study provides a partial test of FSM mechanisms. Although parental psychological distress was examined as a mediator, other mechanisms proposed by the FSM such as parenting practices and interparental conflict were not included due to inconsistent measurement across age groups in the MCS. Including these pathways would provide a more comprehensive test of the model.

Third, although the RI-CLPM accounts for stable between-person differences, it remains vulnerable to time-varying confounders (Hamaker et al., 2015). Unmeasured life events between waves, such as parental divorce or job loss, could influence child outcomes independently of prior levels of income and parental distress (Speyer et al., 2022a), and the observed within-person associations should therefore be interpreted with caution.

Fourth, it should be noted that the RI-CLPM is a conservative analytical approach. Because most psychological constructs show strong stability over time, and because the model controls for prior levels of each construct as well as stable between-person differences, the remaining variance available to be explained by predictors is limited (Adachi & Willoughby, 2014). Accordingly, the effect sizes observed in the present study, particularly for indirect pathways, were small but comparable to those reported in similar longitudinal designs (e.g., Speyer et al., 2022b). Such effects should not be interpreted as trivial, as even modest within-person effects may carry practical significance at the population level (Speyer et al., 2022a).

Fifth, assessment intervals in the MCS were not equally spaced, ranging from two to four years between waves. This limits direct comparability of autoregressive and cross-lagged

coefficients across developmental periods, and apparent differences in associations should therefore be interpreted cautiously, as they may partly reflect measurement spacing rather than genuine developmental differences.

Implications

First, the observation that boys and girls show different vulnerabilities to income changes within the same developmental periods suggests that the effects of family income on child mental health vary across genders (e.g., Leve et al., 2005; Due et al., 2003). Interventions targeting improvements in families' economic conditions (e.g., income support) and mental health may therefore be more effective when they take both child gender and developmental context into account.

Second, the association between decreasing family income and adolescent girls' externalizing problems via maternal distress suggests the potential value of early preventive efforts targeting behavioural difficulties among economically disadvantaged adolescent girls, particularly given the longer-term academic (Okano et al., 2019) and social consequences (Reef et al., 2010) of externalizing problems.

Third, the mediating role of maternal distress suggests that maternal mental health is an important pathway through which economic hardship may shape adolescent girls' externalizing problems as specified in the FSM (Conger et al., 2002). Policies that combine economic support with services that protect maternal mental health, rather than treating them as separate concerns, may be more effective in improving child mental health. Beyond these policy implications, if replicable, these findings may also help refine theoretical models such as the FSM by incorporating gender-specific pathways of risk and resilience.

Finally, the differences between RI-CLPM and CLPM findings suggest that distinguishing within- from between-person effects has important implications not only for

theory but also for policy, as studies that do not separate these sources of variance may overestimate income effects and potentially misinform intervention priorities (Hamaker et al., 2015).

References

Adachi, P., & Willoughby, T. (2014). Interpreting effect sizes when controlling for stability effects in longitudinal autoregressive models: Implications for psychological science. *European Journal of Developmental Psychology*, *12*(1), 116–128. https://doi.org/10.1080/17405629.2014.963549

Adaranijo, E. T., & Mbamba, C. R. (2025). "Growing up under pressure": The family stress model and its role in psychological aggression and physical assault across early and late childhood. *Child Abuse & Neglect*, *164*, 107472. https://doi.org/10.1016/j.chiabu.2025.107472

Amaro, J., Costa, R., Popovic, M., Maule, M. M., Mehlum, I. S., & Lucas, R. (2024). Association of child neurodevelopmental or behavioural problems with maternal unemployment in a population-based birth cohort. *Social Psychiatry and Psychiatric Epidemiology*, *59*(4), 643–655. https://doi.org/10.1007/s00127-023-02464-6

Amone-P'Olak, K., Burger, H., Ormel, J., Huisman, M., Verhulst, F. C., & Oldehinkel, A. J. (2009). Socioeconomic position and mental health problems in pre- and early-adolescents. *Social Psychiatry and Psychiatric Epidemiology*, *44*(3), 231–238. https://doi.org/10.1007/s00127-008-0424-z

Benner, A. D., & Wang, Y. (2014). Demographic marginalization, social integration, and adolescents' educational success. *Journal of Youth and Adolescence*, *43*(10), 1611–1627. https://doi.org/10.1007/s10964-014-0151-6

Berry, D., & Willoughby, M. T. (2017). On the practical interpretability of cross-lagged panel models: Rethinking a developmental workhorse. *Child Development*, *88*(4), 1186–1206. https://doi.org/10.1111/cdev.12660

Boyer, C. J., Ugarte, E., Buhler-Wassmann, A. C., & Hibel, L. C. (2022). Latina mothers navigating COVID-19: Within- and between-family stress processes over time. *Family Relations*, *72*(1), 23–39. https://doi.org/10.1111/fare.12748

Brody, L. R., & Hall, J. A. (2008). Gender and emotion in context. In M. Lewis, J. M. Haviland-Jones, & L. F. Barrett (Eds.), *Handbook of emotions* (3rd ed., pp. 395–408). Guilford Press.

Chaplin, T. M. (2015). Gender and Emotion Expression: A Developmental Contextual perspective. *Emotion Review*, *7*(1), 14–21. https://doi.org/10.1177/1754073914544408

Coley, R. L., Ribar, D., & Votruba-Drzal, E. (2011). Do children's behavior problems limit poor women's labor market success? *Journal of Marriage and Family*, *73*(1), 33–45. https://doi.org/10.1111/j.1741-3737.2010.00787.

Conger, R. D., & Conger, K. J. (2002). Resilience in midwestern families: Selected findings from the first decade of a prospective, longitudinal study. *Journal of Marriage and Family*, *64*(2), 361–373. https://doi.org/10.1111/j.1741-3737.2002.00361.x

Conger, R. D., Ge, X., Elder, G. H., Lorenz, F. O., & Simons, R. L. (1994). Economic stress, coercive family process, and developmental problems of adolescents. *Child Development*, *65*(2), 541–561. https://doi.org/10.1111/j.1467-8624.1994.tb00768.x

Conger, K. J., Rueter, M. A., & Conger, R. D. (2000). The role of economic pressure in the lives of parents and their adolescents: The Family Stress Model. In L. J. Crockett & R. K. Silbereisen (Eds.), *Negotiating adolescence in times of social change* (pp. 201–223). Cambridge University Press.

Connell, R. W. (1987). *Gender and power: Society, the person and sexual politics.* Stanford University Press.

Connelly, R., & Platt, L. (2014). Cohort profile: UK Millennium Cohort Study (MCS). *International Journal of Epidemiology*, *43*(6), 1719 1725. https://doi.org/10.1093/ije/dyu001

Conger, R. D., Wallace, L. E., Sun, Y., Simons, R. L., McLoyd, V. C., & Brody, G. H. (2002). Economic pressure in African American families: A replication and extension of the family stress model. *Developmental Psychology*, *38*(2), 179–193. https://doi.org/10.1037/0012-1649.38.2.179

Cox, M. J., & Paley, B. (1997). Families as systems. *Annual Review of Psychology*, *48*(1), 243–267. https://doi.org/10.1146/annurev.psych.48.1.243

Coyne, M. A., Vaske, J. C., Boisvert, D. L., & Wright, J. P. (2015). Sex Differences in the Stability of Self-Regulation across Childhood. *Journal of Developmental and Life-Course Criminology*, *1*(1), 4–20. https://doi.org/10.1007/s40865-015-0001-6

Crespo, L. M., Trentacosta, C. J., Udo-Inyang, I., Northerner, L., Chaudhry, K., & Williams, A. (2019). Self-regulation mitigates the association between household chaos and children's behavior problems. *Journal of Applied Developmental Psychology*, *60*, 56–64. https://doi.org/10.1016/j.appdev.2018.10.005

Croft, S., Stride, C., Maughan, B., & Rowe, R. (2015). Validity of the strengths and difficulties questionnaire in preschool-aged children. Pediatrics (Evanston), 135(5), e1210–e1219. https://doi.org/10.1542/peds.2014-2920

Drabick, D. a. G., Beauchaine, T. P., Gadow, K. D., Carlson, G. A., & Bromet, E. J. (2006). Risk factors for conduct problems and depressive symptoms in a cohort of Ukrainian children. *Journal of Clinical Child & Adolescent Psychology*, *35*(2), 244–252. https://doi.org/10.1207/s15374424jccp3502_8

Due, P., Lynch, J., Holstein, B., & Modvig, J. (2003). Socioeconomic health inequalities among a nationally representative sample of Danish adolescents: The role of different types of social relations. *Journal of Epidemiology & Community Health*, *57*(9), 692–698. https://doi.org/10.1136/jech.57.9.692

Enders, C. K. (2001). The Performance of the full information maximum likelihood estimator in multiple regression models with missing data. *Educational and Psychological Measurement*, *61*(5), 713–740. https://doi.org/10.1177/0013164401615001

Falconier, M. K., & Epstein, N. B. (2010). Relationship satisfaction in Argentinean couples under economic strain: Gender differences in a dyadic stress model. *Journal of Social and Personal Relationships*, *27*(6), 781–799. https://doi.org/10.1177/0265407510373260

Falconier, M. K., & Epstein, N. B. (2011). Female-demand/male-withdraw communication in Argentinian couples: A mediating factor between economic strain and relationship distress. *Personal Relationships*, *18*(4), 586–603. https://doi.org/10.1111/j.1475-6811.2010.01326.x

Falkenström, F., Solomonov, N., & Rubel, J. A. (2022). How to model and interpret cross-lagged effects in psychotherapy mechanisms of change research: A comparison of multilevel and structural equation models. *Journal of Consulting and Clinical Psychology*, *90*(5), 446–458. https://doi.org/10.1037/ccp0000727

Fanta, A., Kim, S. E., Huang, C. J., Tsai, W., & Huang, C. Y. (2025). Economic stress and child outcomes: the family stress model among Asian American families during COVID-19. *Frontiers in Psychology*, *16*, 1591730. https://doi.org/10.3389/fpsyg.2025.1591730

Farley, J. P., & Kim-Spoon, J. (2017). Parenting and adolescent self-regulation mediate between family socioeconomic status and adolescent adjustment. *The Journal of Early Adolescence*, *37*(4), 502–524. https://doi.org/10.1177/0272431615611253

Fitzsimons, E., Goodman, A., Kelly, E., & Smith, J. P. (2017). Poverty dynamics and parental mental health: Determinants of childhood mental health in the UK. *Social Science & Medicine, 175*, 43–51. https://doi.org/10.1016/j.socscimed.2016.12.040

Flouri, E., Midouhas, E., & Joshi, H. (2014). Family Poverty and Trajectories of Children's Emotional and Behavioural Problems: The Moderating Roles of Self-Regulation and

Verbal Cognitive Ability. *Journal of Abnormal Child Psychology*, *42*(6), 1043–1056. https://doi.org/10.1007/s10802-013-9848-3

Flouri, E., Sarmadi, Z., & Francesconi, M. (2019). Paternal psychological distress and child problem behavior from early childhood to middle adolescence. *Journal of the American Academy of Child & Adolescent Psychiatry, 58*(4), 453–458

Gaunt, R., Jordan, A., Tarrant, A., Chanamuto, N., Pinho, M., & Wezyk, A. (2022). *Caregiving dads, breadwinning mums: Transforming gender in work and childcare?* Nuffield Foundation. https://www.nuffieldfoundation.org/project/caregiving-dads-breadwinning-mums-creating-gender-equality-in-the-home

Geuzaine, C., Debry, M., & Liesens, V. (2000). Separation from Parents in Late Adolescence: The Same for Boys and Girls? *Journal of Youth and Adolescence*, *29*(1), 79–91. https://doi.org/10.1023/a:1005173205791

Goodman, R. (1997). The strengths and difficulties questionnaire: A research note. *Journal of Child Psychology and Psychiatry, 38*(5), 581–586. https://doi.org/10.1111/j.1469-7610.1997.tb01545.x

Griffith, J. M., Young, J. F., & Hankin, B. L. (2021). Longitudinal Coupling of Depression in Parent–Adolescent Dyads: Within- and Between-Dyads Effects over time. *Clinical Psychological Science*, *9*(6), 1059–1079. https://doi.org/10.1177/2167702621998313

Hamaker, E. L., Kuiper, R. M., & Grasman, R. P. P. P. (2015). A critique of the cross-lagged panel model. *Psychological Methods*, *20*(1), 102–116. https://doi.org/10.1037/a0038889

Han, Y. S., & Jun, W. P. (2013). Parental involvement in child's development: Father vs. mother. *Open Journal of Medical Psychology*, *02*(04), 1–6. https://doi.org/10.4236/ojmp.2013.24b0010

Hansen, K. (Ed.). (2014). *Millennium Cohort Study first, second, third, fourth and fifth surveys: A guide to the datasets* (8th ed.). Centre for Longitudinal Studies. https://cls.ucl.ac.uk/wp-content/uploads/2017/07/MCS-Guide-to-the-Datasets-022014.pdf

Henninger, W. R., & Luze, G. (2012). Moderating effects of gender on the relationship between poverty and children's externalizing behaviors. *Journal of Child Health Care*, *17*(1), 72–81. https://doi.org/10.1177/1367493512447532

Hjalmarsson, S. (2017). Poor kids? Economic resources and adverse peer relations in a nationally representative sample of Swedish adolescents. *Journal of Youth and Adolescence*, *47*(1), 88–104. https://doi.org/10.1007/s10964-017-0747-8

Hogye, S. I., Jansen, P. W., Lucassen, N., & Keizer, R. (2025). From prenatal economic pressure to child problem behavior at age 6: An examination of the longitudinal family stress model and the role of social support in two-parent families. *Developmental Psychology*. https://doi.org/10.1037/dev0001942

Jenchura, E. C., Gonzales, N. A., Tein, J., & Luecken, L. J. (2016). Gender and the interplay of source of support and peer social rejection on internalizing among Mexican American youth. *Journal of Youth and Adolescence*, *46*(4), 787–800. https://doi.org/10.1007/s10964-016-0589-9

Joshi, H., & Fitzsimons, E. (2016). The Millennium Cohort Study: the making of a multi-purpose resource for social science and policy. *Longitudinal and Life Course Studies*, *7*(4). https://doi.org/10.14301/llcs.v7i4.410

Kessler, R., Andrews, G., Colpe, L., Hiripi, E., Mroczek, D., Normand, S., Walters, E., & Zaslavsky, A. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine, 32*(6), 959–976. https://doi.org/10.1017/S0033291702006074

Kessler, R. C., Chiu, W. T., Demler, O., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey

Replication. *Archives of General Psychiatry*, 62(6), 593-602. 10.1001/archpsyc.62.6.593

Kiernan, K. E., & Mensah, F. K. (2009). Poverty, maternal depression, family status and Children's cognitive and behavioural development in early childhood: A longitudinal study. *Journal of Social Policy*, *38*(4), 569–588. https://doi.org/10.1017/s0047279409003250

Kiernan, K. E., & Huerta, M. C. (2008). Economic deprivation, maternal depression, parenting and children's cognitive and emotional development in early childhood. *British Journal of Sociology*, *59*(4), 783–806. https://doi.org/10.1111/j.1468-4446.2008.00219.x

Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). The Guilford Press.

Kouros, C. D., & Cummings, E. M. (2010). Longitudinal associations between husbands' and wives' depressive symptoms. *Journal of Marriage and Family*, *72*(1), 135–147. https://doi.org/10.1111/j.1741-3737.2009.00688.x

Lai, E. T., Schlüter, D. K., Lange, T., Straatmann, V., Andersen, A. N., Strandberg-Larsen, K., & Taylor-Robinson, D. (2020). Understanding pathways to inequalities in child mental health: a counterfactual mediation analysis in two national birth cohorts in the UK and Denmark. *BMJ Open*, *10*(10), e040056. https://doi.org/10.1136/bmjopen-2020-040056

Lansford, J. E., Malone, P. S., Tapanya, S., Tirado, L. M. U., Zelli, A., Alampay, L. P., Al-Hassan, S. M., Bacchini, D., Bornstein, M. H., Chang, L., Deater-Deckard, K., Di Giunta, L., Dodge, K. A., Oburu, P., Pastorelli, C., Skinner, A. T., Sorbring, E., & Steinberg, L. (2018). Household income predicts trajectories of child internalizing and externalizing behavior in high-, middle-, and low-income countries. *International Journal of Behavioral Development*, *43*(1), 74–79. https://doi.org/10.1177/0165025418783272

Lee, H. (2022). Family economic hardship and children's behavioral and socio-emotional outcomes in middle childhood: Direct and indirect pathways. *Children and Youth*

Services Review, 138, 106527. https://doi.org/https://doi.org/10.1016/j.childyouth.2022.106527

Leve, L. D., Kim, H. K., & Pears, K. C. (2005). Childhood temperament and family environment as predictors of internalizing and externalizing trajectories from ages 5 to 17. *Journal of Abnormal Child Psychology*, *33*(5), 505–520. https://doi.org/10.1007/s10802-005-6734-7

Lewis, A. J., Kremer, P., Douglas, K., Toumborou, J. W., Hameed, M. A., Patton, G. C., & Williams, J. (2015). Gender differences in adolescent depression: Differential female susceptibility to stressors affecting family functioning. *Australian Journal of Psychology*, *67*(3), 131–139. https://doi.org/10.1111/ajpy.12086

Livings, M. S. (2021). The gendered relationship between maternal depression and adolescent internalizing symptoms. *Social Science & Medicine*, *291*, 114464. https://doi.org/10.1016/j.socscimed.2021.114464

Lüdtke, O., & Robitzsch, A. (2021). A critique of the random intercept cross-lagged panel model. *Psychological Methods*. https://doi.org/10.31234/osf.io/6f85c

Masarik, A. S., & Conger, R. D. (2017). Stress and child development: A review of the Family Stress Model. *Current Opinion in Psychology*, *13*, 85–90. https://doi.org/10.1016/j.copsyc.2016.05.008

Maughan, B., Rowe, R., Messer, J., Goodman, R., & Meltzer, H. (2004). Conduct Disorder and Oppositional Defiant Disorder in a national sample: developmental epidemiology. *Journal of Child Psychology and Psychiatry*, *45*(3), 609–621. https://doi.org/10.1111/j.1469-7610.2004.00250.x

McClelland, M. M., & Cameron, C. V. (2012). Self-Regulation in Early Childhood: Improving Conceptual Clarity and Developing Ecologically Valid Measures. *Child Development Perspectives*, 6, 136–142

McDonald, R.P. (1999). Test theory: A unified treatment. Mahwah, NJ: Erlbaum.

Mayseless, O., Wiseman, H., & Hai, I. (1998). Adolescents' relationships with father, mother and same gender friend. *Journal of Adolescent Research*, 13, 101–123. https://doi.org/10.1177/0743554898131006

Mazza, J. R., Pingault, J., Booij, L., Boivin, M., Tremblay, R., Lambert, J., Zunzunegui, M. V., & Côté, S. (2016). Poverty and behavior problems during early childhood. *International Journal of Behavioral Development*, *41*(6), 670–680. https://doi.org/10.1177/0165025416657615

Midouhas, E., & Oliver, B. R. (2023). Maternal mental-health treatment moderates the association between psychological distress and harsh parenting: A prospective cohort study. *PLoS ONE*, *18*(2), e0282108. https://doi.org/10.1371/journal.pone.0282108

Mostafa, T. & Ploubidis, G. B. 2017. Millennium Cohort Study. Sixth Survey 2015-2016. Technical report on response (Age 14), London, UCL Centre for Longitudinal Studies.

Mulder, J. D., & Hamaker, E. L. (2021). Three extensions of the random intercept cross-lagged panel model. *Structural Equation Modeling a Multidisciplinary Journal*, *28*(4), 638–648. https://doi.org/10.1080/10705511.2020.1784738

Mund, M., & Nestler, S. (2019). Beyond the cross-lagged panel model: Next-generation statistical tools for analyzing interdependencies across the life course. *Advances in Life Course Research*, *41*, 100249. https://doi.org/10.1016/j.alcr.2018.10.002

Murray, A. L., Speyer, L. G., Hall, H. A., Valdebenito, S., & Hughes, C. (2021). A longitudinal and gender invariance analysis of the Strengths and difficulties questionnaire across ages 3, 5, 7, 11, 14, and 17 in a large U.K.- representative sample. *Assessment*, *29*(6), 1248–1261. https://doi.org/10.1177/10731911211009312

Muthén, L. K., & Muthén, B. O. (1998–2017). *Mplus user's guide* (8th ed.) Muthén & Muthén.

Neppl, T. K., Senia, J. M., & Donnellan, M. B. (2015). Effects of economic hardship: Testing the Family Stress Model over time. *Journal of Family Psychology*, *30*(1), 12–21. https://doi.org/10.1037/fam0000168

Neri, E., Giovagnoli, S., Genova, F., Benassi, M., Stella, M., & Agostini, F. (2020). Reciprocal influence of depressive symptoms between mothers and fathers during the first postpartum year: A comparison among full-term, very low, and extremely low birth weight infants. *Frontiers in Psychiatry*, *11*. https://doi.org/10.3389/fpsyt.2020.578264

Noonan, K., Burns, R., & Violato, M. (2018). Family income, maternal psychological distress and child socio-emotional behaviour: Longitudinal findings from the UK Millennium Cohort Study. *SSM - Population Health*, *4*, 280–290. https://doi.org/10.1016/j.ssmph.2018.03.002

Odgers, C. L., Moffitt, T. E., Broadbent, J. M., Dickson, N., Hancox, R. J., Harrington, H., Poulton, R., Sears, M. R., Thomson, W. M., & Caspi, A. (2008). Female and male antisocial trajectories: From childhood origins to adult outcomes. *Development and Psychopathology*, *20*(2), 673–716. https://doi.org/10.1017/s0954579408000333

OECD Framework for statistics on the distribution of household income, consumption and wealth. (2013). In *OECD eBooks*. https://doi.org/10.1787/9789264194830-en

Okano, L., Jeon, L., Crandall, A., Powell, T., & Riley, A. (2019). The cascading effects of externalizing behaviors and academic achievement across developmental transitions: Implications for Prevention and intervention. *Prevention Science*, *21*(2), 211–221. https://doi.org/10.1007/s11121-019-01055-9

Paterson, J. E., Field, J., & Pryor, J. (1994). Adolescents' perceptions of their attachment relationships with their mothers, fathers, and friends. *Journal of Youth and Adolescence*, *23*(5), 579–600. https://doi.org/10.1007/bf01537737

Pakaluk, C. R., & Price, J. (2020). Are mothers and fathers interchangeable caregivers? *Marriage & Family Review*, *56*(8), 784–793. https://doi.org/10.1080/01494929.2020.1778318

Piotrowska, P. J., McIntyre, N.A., Hales, G., Frith, M., Stride, C. B., Maughan, B., Rowe, R. (2025). *Why is lower family socio-economic status associated with conduct problems in children and adolescents? A systematic review of longitudinal studies*. PsyArXiv. https://doi.org/10.31234/osf.io/pq74b_v1

Piotrowska, P. J., Stride, C. B., Croft, S. E., & Rowe, R. (2015). Socioeconomic status and antisocial behaviour among children and adolescents: A systematic review and meta-analysis. *Clinical Psychology Review*, *35*(1), 47–55. https://doi.org/10.1016/j.cpr.2014.11.003

Piotrowska, P. J., Stride, C. B., Maughan, B., Ford, T., McIntyre, N. A., & Rowe, R. (2022). Understanding the relationship between family income and conduct problems: findings from the mental health of children and young people survey. *Psychological Medicine*, *53*(9), 3987–3994. https://doi.org/10.1017/s0033291722000654

Platt, B., Kadosh, K. C., & Lau, J. Y. (2013). The role of peer rejection in adolescent depression. *Depression and Anxiety*, *30*(9), 809–821. https://doi.org/10.1002/da.22120

Ponnet, K. (2014). Financial stress, parent functioning and adolescent problem behavior: An actor–partner interdependence approach to family stress processes in low-, middle-, and high-income families. *Journal of Youth and Adolescence*, *43*(10), 1752–1769. https://doi.org/10.1007/s10964-014-0159-y

Preacher, K. J. (2015). Advances in Mediation Analysis: A survey and synthesis of new developments. *Annual Review of Psychology*, *66*(1), 825–852. https://doi.org/10.1146/annurev-psych-010814-015258

Reef, J., Diamantopoulou, S., Van Meurs, I., Verhulst, F. C., & Van Der Ende, J. (2010). Developmental trajectories of child to adolescent externalizing behavior and adult DSM-IV disorder: results of a 24-year longitudinal study. *Social Psychiatry and Psychiatric Epidemiology*, *46*(12), 1233–1241. https://doi.org/10.1007/s00127-010-0297-9

Reiss, F. (2013). Socioeconomic inequalities and mental health problems in children and adolescents: A systematic review. *Social Science & Medicine*, 90, 24–31. https://doi.org/10.1016/j.socscimed.2013.04.026.

Saribaz, Z. E., Speyer, L. G., Norman, P., Debowska, A., & Rowe, R. (2025). Does poverty moderate within-family relations between children's and parents' mental health? *Current Psychology*, *44*(12), 11842–11853. https://doi.org/10.1007/s12144-025-07881-1

Satorra, A., & Bentler, P. M. (2001). A scaled difference Chi-Square Test Statistic for moment structure analysis. *Psychometrika*, *66*(4), 507–514. https://doi.org/10.1007/bf02296192

Scaramella, L. V., Sohr-Preston, S. L., Callahan, K. L., & Mirabile, S. P. (2008). A test of the Family Stress Model on toddler-aged children's adjustment among Hurricane Katrina impacted and nonimpacted low-income families. *Journal of Clinical Child & Adolescent Psychology*, *37*(3), 530–541. https://doi.org/10.1080/15374410802148202

Shelleby, E. C. (2018). Economic stress in fragile families: Pathways to parent and child maladjustment. *Journal of Child and Family Studies, 27*(12), 3877–3886. https://doi.org/10.1007/s10826-018-1232-z

Shepherd P., & Gilbert E. (2019, July). *Millennium Cohort Study Ethical Review and Consent*. Retrivied December 5, 2025, from https://cls.ucl.ac.uk/wp-content/uploads/2017/07/MCS-Ethical-Approval-and-Consent-2019.pdf

Smetana, J. G., Campione-Barr, N., & Metzger, A. (2006). Adolescent development in interpersonal and societal contexts. *Annual Review of Psychology*, *57*(1), 255–284. https://doi.org/10.1146/annurev.psych.57.102904.190124

Speyer, L. G., Hall, H. A., Hang, Y., Hughes, C., & Murray, A. L. (2022a). Within-family relations of mental health problems across childhood and adolescence. *Journal of Child Psychology and Psychiatry*, *63*(11), 1288–1296. https://doi.org/10.1111/jcpp.13572

Speyer, L. G., Hang, Y., Hall, H. A., & Murray, A. L. (2022b). The role of harsh parenting practices in early- to middle-childhood socioemotional development: An examination in the Millennium Cohort Study. *Child Development*, *93*(5), 1304–1317. https://doi.org/10.1111/cdev.13761

Springer, K. W. (2010). Economic dependence in marriage and husbands' midlife health. *Gender & Society*, *24*(3), 378–401. https://doi.org/10.1177/0891243210371621

Stewart, M. B. (1983). On least squares estimation when the dependent variable is grouped. *The Review of Economic Studies, 50*(4), 737–753. https://doi.org/10.2307/2297773

Tao, T., Wang, L., Fan, C., & Gao, W. (2014). Development of self-control in children aged 3 to 9 years: Perspective from a dual-systems model. *Scientific Reports*, *4*(1), 7272. https://doi.org/10.1038/srep07272

Rijlaarsdam, J., Stevens, G. W. J. M., Van Der Ende, J., Hofman, A., Jaddoe, V. W. V., Mackenbach, J. P., Verhulst, F. C., & Tiemeier, H. (2012). Economic disadvantage and young children's emotional and behavioral problems: Mechanisms of

risk. *Journal of Abnormal Child Psychology*, *41*(1), 125–137. https://doi.org/10.1007/s10802-012-9655-2

Thompson, A.J., Henrich C.C. (2022). Cross-lagged effects between parent depression and child internalizing problems. *Journal of Family Pysychology*, *36*(8), 1428-1438. 10.1037/fam0001012.

Toseeb, U., Oginni, O., Rowe, R., & Patalay, P. (2022). Measurement invariance of the strengths and difficulties questionnaire across socioeconomic status and ethnicity from ages 3 to 17 years: A population cohort study. *Plos One, 17*(12). https://doi.org/10.1371/journal.pone.0278385

Tracy, M., Zimmerman, F. J., Galea, S., McCauley, E., & Vander Stoep, A. (2008). What explains the relation between family poverty and childhood depressive symptoms? Journal of Psychiatric Research, 42(14), 1163–1175. https:// doi. org/ 10. 1016/j. jpsyc hires. 2008. 01. 011

Ullsperger, J. M., & Nikolas, M. A. (2017). A meta-analytic review of the association between pubertal timing and psychopathology in adolescence: Are there sex differences in risk? *Psychological Bulletin*, *143*(9), 903–938. https://doi.org/10.1037/bul0000106

Usami, S., Murayama, K., & Hamaker, E. L. (2019). A unified framework of longitudinal models to examine reciprocal relations. *Psychological Methods*, *24*(5), 637–657. https://doi.org/10.1037/met0000210

Violato, M., Petrou, S., Gray, R., & Redshaw, M. (2011). Family income and child cognitive and behavioural development in the United Kingdom: Does money matter? *Health Economics*, *20*(10), 1201–1225. https://doi.org/10.1002/hec.1665

Walthery, P., & Chung, H. (2021). *Sharing of childcare and well-being outcomes: An empirical analysis*. Government Equalities

Office. https://www.gov.uk/government/publications/childcare-shared-care-and-well-being-outcomes-for-families/sharing-of-childcare-and-well-being-outcomes-an-empirical-analysis

Wang, M., & Liu, L. (2018). Reciprocal relations between harsh discipline and children's externalizing behavior in China: a 5-Year longitudinal study. *Child Development*, *89*(1), 174–187. https://doi.org/10.1111/cdev.12724

White, R. M. B., Liu, Y., Nair, R. L., & Tein, J. (2015). Longitudinal and integrative tests of family stress model effects on Mexican origin adolescents. *Developmental Psychology*, *51*(5), 649–662. https://doi.org/10.1037/a0038993

Wilson, N., Minnis, H., McDaid, S. (2025). Household income and children's mental health outcomes: the mediating role of maternal wellbeing and parent–child relationship quality. *Eur Child Adolesc Psychiatry*, *34*, 3601–3611. https://doi.org/10.1007/s00787-025-02765-y

Wu, Q., Radey, M., McWey, L., & Millender, E. F. (2025). Within-family processes among safety nets, maternal parenting stress, and child behavioral problems among low-income families: The importance of race and ethnicity. *Family Process*. https://doi.org/10.1111/famp.13056

Yang M., Carson C., Creswell C., Violato M., (2023). Child mental health and income gradient from early childhood to adolescence: Evidence from the UK. *SSM-Polulation Health*, *24* (101534). https://doi.org/10.1016/j.ssmph.2023.101534

Yang, M., Violato, M., & Carson, C. (2025). The changing role of family income in mental health from childhood to adolescence: findings from a UK longitudinal study. *Archives of Public Health*, *83*(1), 224. https://doi.org/10.1186/s13690-025-01702-4

Yoder, K. A., & Hoyt, D. R. (2005). Family economic pressure and adolescent suicidal ideation: Application of the Family Stress Model. *Suicide and Life-Threatening Behavior*, *35*(3), 251–264. https://doi.org/10.1521/suli.2005.35.3.251

Zietz, S., Lansford, J. E., Liu, Q., Long, Q., Oburu, P., Pastorelli, C., Sorbring, E., Skinner, A. T., Steinberg, L., Tapanya, S., Tirado, L. M. U., Yotanyamaneewong, S., Alampay, L. P., Al-Hassan, S. M., Bacchini, D., Bornstein, M. H., Chang, L., Deater-Deckard, K., Di Giunta, L., . . . Gurdal, S. (2022). A longitudinal examination of the family stress model of economic hardship in seven countries. *Children and Youth Services Review*, *143*, 106661. https://doi.org/10.1016/j.childyouth.2022.106661