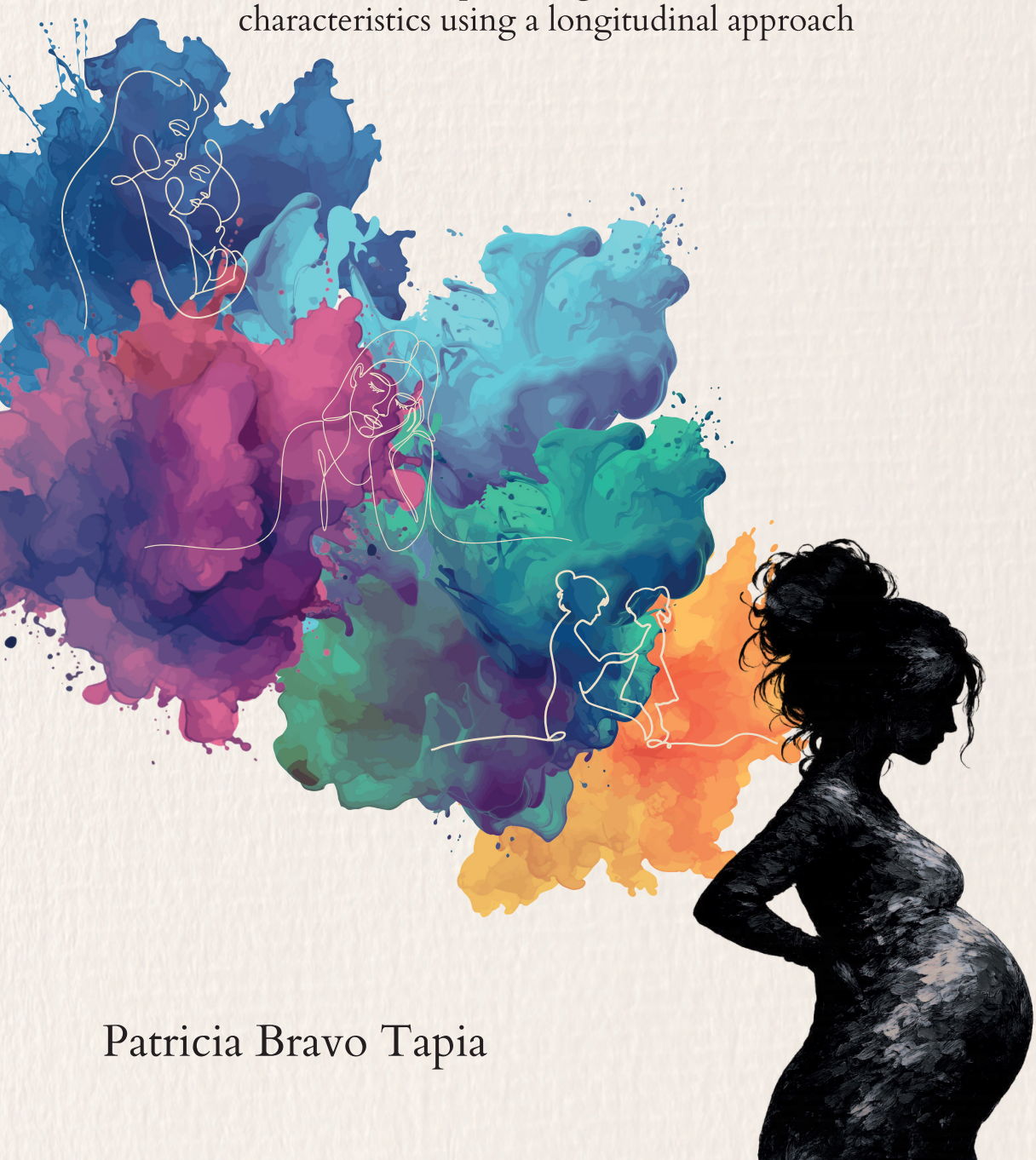
The Role of Early Experiences in Shaping Socio-emotional Development

A focus on parenting and maternal characteristics using a longitudinal approach



Patricia Bravo Tapia

Propositions

1. Maternal sensitivity decreases over the first 10 years of children's lives; however, it remains unclear which factors influence these trajectories. *(This thesis)*

2. Mental health is one mechanism through which mothers who experienced maltreatment impact the next generation; however, they do not necessarily develop an impaired attachment with their infants or show reduced sensitivity toward their offspring. *(This thesis)*

3. The accumulation of poor family functioning over the years, which seems partly a consequence of maternal childhood maltreatment experiences, is related to offspring internalizing and externalizing problems in adolescence. (This thesis)

4. Self-regulation in early childhood is related to body mass index in early adolescence. *(This thesis)*

5. Although culture tends to influence parenting, parental warmth appears to be an important and universal parenting characteristic across cultural contexts, as it relates to children's socioemotional trajectories and self-regulation. *(This thesis)*

6. Infants are motivated to approach caregivers because they require quick and appropriate responses to distress, even if the caregiver may neglect or mistreat them. For all species, neglect represents the earliest and most fundamental threat to survival. *(Lyons-Ruth, 2024)*

7. Studying the wide variety of family configurations worldwide and how children experience care from multiple attachment figures would help translate research into practice and have clear implications for social policies. *(Deneault et al., 2024)*

8. Academic freedom is a paramount condition against the replication of fake information. *(Van IJzendoorn & Bakermans-Kranenburg, 2024)*

9. A developmental pathway model considers intervention and treatment more broadly than a pathogen model. Helping a child get back to a positive trajectory demands more than just addressing symptoms. *(Sroufe, 2009)*

10. Child development is shaped by more than genetic or environmental influences alone; cumulative developmental history is also crucial. Embracing interdisciplinary approaches will strengthen our understanding and benefit society as a whole. *(Chicchetti & Toth, 2016)*

11. The world consists of moments, happenings, and processes, rather than things. We understand the world in its becoming, not in its being. *(Rovelli, 2017)*

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A focus on parenting and maternal characteristics using a longitudinal approach

Patricia Bravo Tapia

The Role of Early Experiences in Shaping Socio-emotional Development: A focus on parenting and maternal characteristics using a longitudinal approach

De rol van vroege ervaringen in de vorming van sociaal-emotionele ontwikkeling: een focus op opvoedings- en moederkenmerken met behulp van een longitudinaal onderzoek

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The Role of Early Experiences in Shaping Socio-emotional Development:
A focus on parenting and maternal characteristics using a longitudinal approach

De rol van vroege ervaringen in de vorming van sociaal-emotionele ontwikkeling: een focus op opvoedings- en moederkenmerken met behulp van een longitudinaal onderzoek

Thesis

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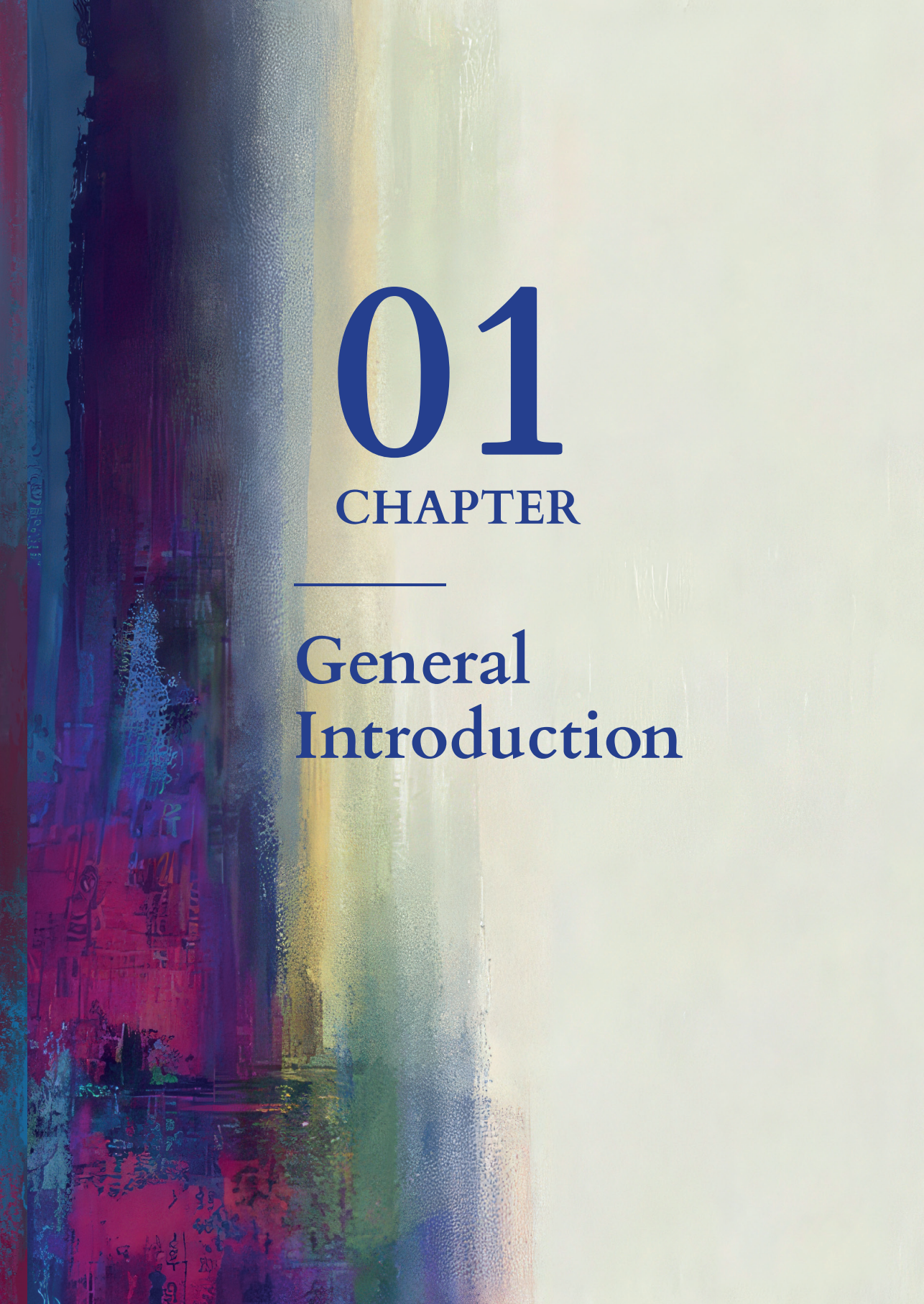
01
CHAPTER



01
CHAPTER

General Introduction

General Introduction

How did we become the persons we are now? This question has long intrigued philosophers, psychologists, and various disciplines over the years. The transitions in a life course and from one developmental stage to another are influenced by multiple determinants. To understand these changes, potential predictors must be considered simultaneously and from a dynamic perspective over time (Sroufe, 2005). If we consider the case of a girl and a boy, both 13-year-old kids from different cultures. The girl adapted well to her school but struggled to express her emotions. The boy showed disruptive behavior at school since first grade, yet he has many friends at school and in his neighborhood. How did these kids develop into who they are at age 13? Was this pattern the same before, at a younger age? How did they develop the capacity to respond to challenges at school or in interaction with peers? Were they born in that way? Are their families functioning in a similar manner? Is their culture accepting these types of behaviors as "normative behavior"? The answer to these questions is not always straightforward, given the complexity of human development. This scenario underscores the variety of viewpoints and experiences that may emerge, for example, due to cultural differences among adolescents of different sexes. Therefore, to fully comprehend the origin of emotional and behavioral problems, we need to understand the developmental history of individuals (Sroufe, 2009).

Past research has suggested that child development depends on multifactorial determinants and interactions with diverse systems surrounding a child, including the child's own characteristics. Based on a bioecological framework, both distal and proximal factors play a significant role (Bronfenbrenner, 1994). The most proximal system is the family, which significantly contributes to child outcomes to a large extent from early years onwards. Parenting has been extensively studied as an important determinant of children's emotional well-being. Moreover, several parental characteristics have been demonstrated to have an impact, such as maternal psychopathology, past maltreatment experiences, family atmosphere, maternal sensitivity, and attachment (Belsky & Jaffee, 2015). Maternal sensitivity, one of the most significant predictors of infant attachment (Madigan et al., 2024; Van IJzendoorn et al., 2023) and socio-emotional development (Cooke et al., 2022; Groh et al., 2014), has been extensively studied in relation to various child outcomes. However, while most research focused on how parenting affects the development of children, only a few studies have examined antecedents of maternal sensitivity (Madigan et al., 2024). Since parenting is affected by different

components and is a behavior that might change over the years, these studies explored whether and how maternal depression, stress, and the socioeconomic context may impact the way in which parents interact with their children (Cooke et al., 2022). Given the limited number of studies, some questions remain unexplored; for instance, does maternal sensitivity change over the first decade? If so, what trajectories can we identify, and what characterizes the parents within these different trajectories?

Since human development occurs through complex reciprocal interactions within the context of close relationships, the family plays a significant role in child development. However, does this influence manifest in a similar manner across different parts of the world? Studies have found a relationship between positive home environments and fewer children's mental health problems (Knauer et al., 2019; Li et al., 2023); however, there is still mixed evidence regarding the role of distal factors, such as the macrosystem (i.e., cultural beliefs and economic context). This assumption is based on the fact that normative parental behaviors have different values in one culture than in another; in other words, these values may differ in what is most relevant for parenting (Lansford et al., 2018; Putnick et al., 2018). Important insights from cross-cultural studies raise questions about the correspondence or differences between cultures, underscoring the importance of considering parenting and child development within a specific cultural context.

In summary, fully comprehending how we become the persons we are requires a complex and dynamic understanding that extends beyond examining a single variable at a specific time point. Instead, child development is driven by many different factors that interact over time. Prospective studies and in-depth assessments can enhance our understanding of this process. Epidemiological cohort studies have the advantages of assessing multiple pathways and outcomes simultaneously, enabling the identification of potential risk and protective factors, especially when these factors are studied across the life span from birth (Lawlor et al., 2009). This might help to further develop effective ways to decrease the impact of negative influences on child development and to enable prevention strategies in groups of individuals.

Objectives

The primary objective of this thesis is to examine the relationship between parental variables in early childhood and children's behavioral and emotional

problems during middle childhood and adolescence, with a focus on parenting and maternal characteristics, employing a longitudinal approach. To achieve this, the specific aims of this thesis are: (1) To identify early predictors of maternal sensitivity during the first 10 years of the child. (2) To investigate whether relational processes in infancy explain the association between maternal characteristics and children's well-being during childhood. (3) To investigate how parental variables influence children's well-being during adolescence by analyzing the association of maternal sensitivity and child BMI, and how maternal child maltreatment is associated with emotional and behavioral problems in adolescence. Finally, (4) we aim to explore how the cultural beliefs from Latin America, Asia and Europe can shape parenting through the home environment and emotional support, studied in two longitudinal studies.

The setting of this thesis

The current thesis was embedded in Generation R, a population-based cohort from fetal life onwards (Kooijman et al., 2016). The Generation R Study was designed to identify early biological and environmental factors that influence growth, development, and health. Pregnant women living in the study area in Rotterdam, the Netherlands, with an expected delivery date between April 2002 and January 2006 were invited to participate. In total 9,778 were enrolled initially. To explore the aims mentioned above, we utilized data obtained from the Generation R prenatal and postnatal phases in different waves (8 time points) from the prenatal stage up to age 13. Data collection ranged from questionnaires to observations. Additionally, data from the Chilean Longitudinal Study of Early Childhood (ELPI) was used. The ELPI Study recruited a nationally representative sample and collected data at three different time points in the years 2010, 2012 and 2017. The eligible criteria for participants in the first wave were children aged below 5 years (born between January 1, 2006, and August 31, 2009) selected based on birth records from the Chilean Civil Registry and Identification Service. In total, 15,175 families were enrolled in 2010, and participated in cognitive, socioemotional, and early childhood developmental measures. Finally, data from the Panel Study on Korean Children (PSKC) was used. The PSKC is a prospective longitudinal study of a representative national cohort that tracks the growth process of Korean children. The study followed 2,150 infants born in medical institutes nationwide from April to July 2008.

In-depth assessments

Since this thesis aimed to contribute to an improved understanding of how children develop, a comprehensive view was taken by observing core determinants of children's well-being, namely attachment, maternal sensitivity, self-regulation, and the home environment. In-depth assessments of children's self-regulation and in interaction with their caregivers provided a better understanding of the mechanisms behind regulatory behaviors in early childhood. In this thesis, attachment was observed in the laboratory using the Strange Situation Procedure (SSP; Ainsworth et al., 1978), the gold standard assessment for attachment, when the child was 1 year old. Maternal sensitivity was also observed in the laboratory by examining the interaction between mothers and children during various play activities at ages 1, 3, 4, and 10 years (e.g., Erickson scales (Egeland et al., 1990)). Self-regulation was assessed by several direct observations obtained during a laboratory visit when children were 3 years old (e.g. Gift Delay Task (Kochanska et al., 1996; Kochanska et al., 2000)). Finally, the home environment may offer a better overview of the context to understand the associations of risk factors with children's emotional and behavioral problems. The Home Observation for Measurement of the Environment (HOME) Inventory (Bradley & Caldwell, 1984) was used in this thesis, as it was measured in both Generation R and the ELPI study. The information extracted from the assessment included the provision of learning materials and toys, as well as the emotional responsiveness of the caregiver to the child.

Outline

Diving into the complexity of child development, we examined a set of variables over time, evaluating the roles of early and current experiences (Figure 1). The main focus of this thesis was to identify parental influences on children's socioemotional development over time, from pregnancy to adolescence, by integrating different kinds of predictors, mediators, and moderators of this relationship. This comprehensive approach enabled us to address the questions regarding how child characteristics and their most proximal environment interact over time. This thesis examines the early predictors of the caregiver system and offspring's well-being during childhood **(Chapter 2)**. To identify potential predictors of maternal sensitivity over time, we examined the association of maternal characteristics, child characteristics, and contextual variables with trajectories of maternal sensitivity during the first 10 years **(Chapter 2.1)**. Then, we analyzed whether the

association of maternal childhood maltreatment and children's well-being during childhood was explained by attachment, maternal sensitivity, and maternal psychopathology **(Chapter 2.2)**. Additionally, **Chapter 3** reveals how parental variables influence children's well-being during adolescence. To achieve this, we analyzed the association between maternal sensitivity and child BMI, and whether self-regulation mediates this association **(Chapter 3.1)**. Then, we addressed the question of whether maternal childhood maltreatment experiences influence the family in her adult life and the well-being of her offspring during adolescence **(Chapter 3.2)**. Finally, Chapter 4 focused on cross-cultural parenting and home environment, divided into two studies examining how cultural beliefs from Latin America **(Chapter 4.1)** and Asia **(Chapter 4.2)** can shape parenting through the home environment and emotional support, respectively, compared to the European context.

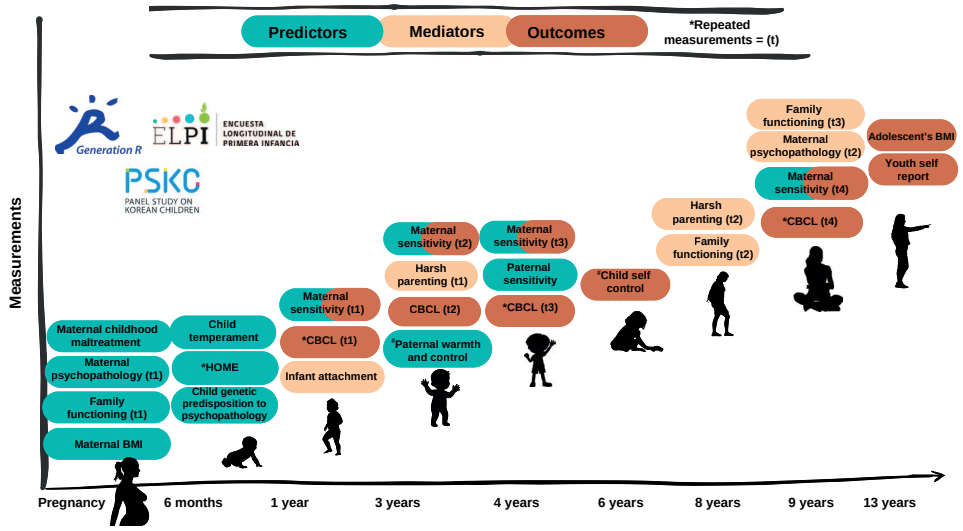


Figure 1. Overview of study variables.
Note: variables with (t) are repeated measurements over time. *HOME and CBCL variables were available for the ELPI and Generation R cohorts.#Child self-control, parental warmth, and control were available for the PSKC and Generation R cohorts.

References

Belsky, J., & Jaffee, S. (2015). The multiple determinants of parenting. In D. Cicchetti & D. Cohen (Eds.), Developmental psychopathology: Vol. 3. Risk, disorder, and adaptation (2nd ed., pp. 38–85). Wiley. https://doi.org/10.1002/9780470939406.ch2

Bradley, R. H., & Caldwell, B. M. (1984). The home inventory and family demographics. *Developmental Psychology*, *20*(2), 315-320. https://doi.org/10.1037/0012-1649.20.2.315

Cooke, J. E., Deneault, A. A., Devereux, C., Eirich, R., Fearon, R. M. P., & Madigan, S. (2022). Parental sensitivity and child behavioral problems: A meta-analytic review. *Child Development*, *93*(5), 1231-1248. https://doi.org/10.1111/cdev.13764

Egeland, B., Erickson, M. F., Clemenhagen-Moon, J., Hiester, M. K., & Korfmacher, J. (1990). 24 months tools coding manual: Project STEEP revised 1990 from mother–child project scales. *Unpublished manuscript, University of Minnesota, Minneapolis*.

Groh, A. M., Fearon, R. P., Bakermans-Kranenburg, M. J., Van IJzendoorn, M. H., Steele, R. D., & Roisman, G. I. (2014). The significance of attachment security for children's social competence with peers: a meta-analytic study. *Attachment & human development*, *16*(2), 103-136. https://doi.org/10.1080/14616734.2014.883636

Knauer, H. A., Ozer, E. J., Dow, W. H., & Fernald, L. C. H. (2019). Parenting quality at two developmental periods in early childhood and their association with child development. *Early Childhood Research Quarterly*, *47*, 396-404. https://doi.org/10.1016/j.ecresq.2018.08.009

Kochanska, G., Murray, K., Jacques, T. Y., Koenig, A. L., & Vandegeest, K. A. (1996). Inhibitory control in young children and its role in emerging internalization. *Child Development*, *67*(2), 490-507. https://doi.org/10.1111/j.1467-8624.1996.tb01747.x

Kochanska, G., Murray, K. T., & Harlan, E. T. (2000). Effortful control in early childhood: Continuity and change, antecedents, and implications for social development. *Developmental Psychology*, *36*(2), 220-232. https://doi.org/10.1037//0012-1649.36.2.220

Kooijman, M. N., Kruithof, C. J., van Duijn, C. M., Duijts, L., Franco, O. H., van IJzendoorn, M. H., de Jongste, J. C., Klaver, C. C. W., van der Lugt, A., Mackenbach, J. P., Moll, H. A., Peeters, R. P., Raat, H., Rings, E. H. H. M., Rivadeneira, F., van der Schroeff, M. P., Steegers, E. A. P., Tiemeier, H., Uitterlinden, A. G., . . . Jaddoe, V. W. V. (2016). The Generation R Study: design and cohort update 2017. *European Journal of Epidemiology*, *31*(12), 1243-1264. https://doi.org/10.1007/s10654-016-0224-9

Lansford, J. E., Godwin, J., Al-Hassan, S. M., Bacchini, D., Bornstein, M. H., Chang, L., Chen, B. B., Deater-Deckard, K., Di Giunta, L., Dodge, K. A., Malone, P. S., Oburu, P., Pastorelli, C., Skinner, A. T., Sorbring, E., Steinberg, L., Tapanya, S., Alampay, L. P., Tirado, L. M. U., & Zelli, A. (2018). Longitudinal associations between parenting and youth adjustment in twelve cultural groups: Cultural normativeness of parenting as a moderator. *Developmental Psychology*, *54*(2), 362-377. https://doi.org/10.1037/dev0000416

Lawlor, D. A., Andersen, A. M. N., & Batty, G. D. (2009). Birth cohort studies: past, present and future. *International Journal of Epidemiology*, *38*(4), 897-902. https://doi.org/10.1093/ije/dyp240

Li, S., Tang, Y., & Zheng, Y. (2023). How the home learning environment contributes to children's social–emotional competence: A moderated mediation model. *Frontiers in Psychology*, *14*. https://doi.org/10.3389/fpsyg.2023.1065978

Madigan, S., Deneault, A. A., Duschinsky, R., Bakermans-Kranenburg, M. J., Schuengel, C., Van IJzendoorn, M. H., Ly, A., Fearon, R. M. P., Eirich, R., & Verhage, M. L. (2024). Maternal and paternal sensitivity: Key determinants of child attachment security examined through meta-analysis. *Psychological Bulletin*, *150*(7), 839-872. https://doi.org/10.1037/bul0000433

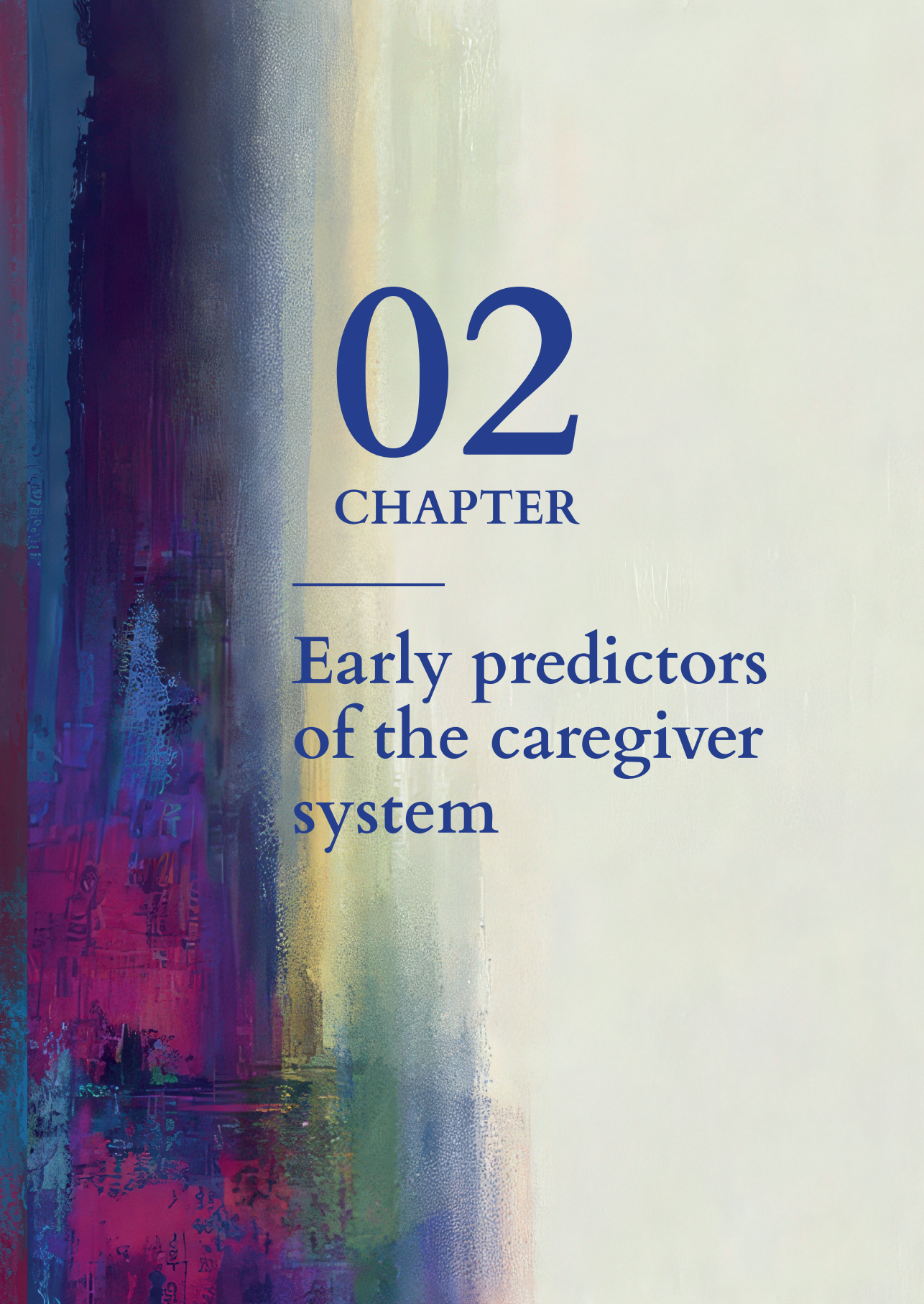
Putnick, D. L., Bornstein, M. H., Lansford, J. E., Chang, L., Deater-Deckard, K., Di Giunta, L., Dodge, K. A., Malone, P. S., Oburu, P., Pastorelli, C., Skinner, A. T., Sorbring, E., Tapanya, S., Tirado, L. M. U., Zelli, A., Alampay, L. P., Al-Hassan, S. M., Bacchini, D., & Bombi, A. S. (2018). Parental acceptance-rejection and child prosocial behavior: Developmental transactions across the transition to adolescence in nine countries, mothers and fathers, and girls and boys. *Developmental Psychology*, *54*(10), 1881-1890. https://doi.org/10.1037/dev0000565

Sroufe, L. A. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. *Attachment & human development*, *7*(4), 349-367. https://doi.org/10.1080/14616730500365928

Sroufe, L. A. (2009). The concept of development in developmental psychopathology. *Child Development Perspectives*, *3*(3), 178-183. https://doi.org/10.1111/j.1750-8606.2009.00103.x

Van IJzendoorn, M. H., Schuengel, C., Wang, Q., & Bakermans-Kranenburg, M. J. (2023). Improving parenting, child attachment, and externalizing behaviors: Meta-analysis of the first 25 randomized controlled trials on the effects of Video-feedback Intervention to promote Positive Parenting and Sensitive Discipline. *Development and Psychopathology*, *35*(1), 241-256. https://doi.org/10.1017/S0954579421001462


02
CHAPTER



02
CHAPTER

Early predictors of the caregiver system



2.1
CHAPTER

Predictors of maternal sensitivity to their children across the first 10 years of life: a prospective population-based study

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Abstract

Background: Maternal sensitive responsiveness to children's signals may be affected by a wide range of maternal, child, and contextual variables. In this longitudinal study, we examined how these variables associate with repeatedly assessed maternal sensitivity across childhood. **Methods**: Our study was part of a prospective population-based cohort (Generation R; n = 1,085 mother–child dyads). We assessed maternal history of childhood maltreatment, family functioning, and maternal psychopathology in pregnancy. Child characteristics included temperament and genetic predisposition to psychopathology. The included contextual factors were marital status, household income, and maternal education. Maternal sensitivity was observed repeatedly (at child ages: 1, 3, 4, and 10 years) and coded using the Ainsworth and Erickson scales. We used linear mixed-effects models to predict maternal sensitivity measures from all maternal, child, and contextual variables. **Results:** Maternal sensitivity declined across childhood. None of the predictors of maternal, child, or contextual characteristics were significantly associated with baseline levels or changes in maternal sensitivity after adjustment for multiple testing. **Conclusion:** Our findings suggest that maternal sensitivity tends to decrease during the first 10 years of life. However, these changes could not be predicted by background factors. Further replication is necessary to better understand predictors and correlates of maternal sensitivity beyond infancy.

Keywords: Maternal sensitivity, maternal health, family functioning, child characteristics, trajectories.

Introduction

Caregiver sensitivity is the ability of a caregiver to identify and interpret the signals of a child accurately and respond to them promptly and appropriately (Ainsworth, 1978). This caregiver ability has been shown to be key in promoting a broad range of developmental competences, including secure attachments (Madigan et al., 2024; Van IJzendoorn et al., 2023), socio-emotional development (Cooke et al., 2022; Groh et al., 2014), prosocial behavior (Van der Storm et al., 2022), and even cognitive and language development (Deneault et al., 2023). Also, more specific domains such as peer relationships (Ringoot et al., 2022), eating behaviours (Van Vliet et al., 2022), and physical health (Kunkel et al., 2022) are associated with maternal sensitivity. Likewise, children who experience low maternal sensitivity, exhibit on average more negative developmental outcomes throughout childhood, such as internalizing (Kok, Linting, et al., 2013) and externalizing problems (Scott et al., 2018).

The multiple determinants of maternal sensitivity

According to the Belsky model (1984), parenting is multi-determined by the individual parent, child characteristics, and the broader social context in which the parent–child relationship is embedded (Taraban & Shaw, 2018). This model indicates that parents' developmental histories and contexts influence their psychological well-being and, in turn, their parenting functioning and, ultimately, child development (Belsky & Jaffee, 2015). In particular, evidence on maternal sensitivity indicated that the same domains (parent, child, and contextual characteristics) each accounted for a significant and unique portion of the variance in the observed quality of maternal-child interaction (Bornstein et al., 2007). These findings revealed that several factors contribute to differences in maternal sensitivity, from personal to more distal factors (Gerlach et al., 2022).

Regarding personal factors associated with variability in maternal sensitivity, prior research has found that risk factors affecting caregivers' emotional availability may explain differences in parenting styles (Becker-Stoll et al., 2008; Waters et al., 2000). For instance, the experiences of stressful events, such as traumatic experiences (Pereira et al., 2012), have been linked to a decrease in maternal sensitivity, underscoring that stress may be one of the pathways through which maternal history of maltreatment affects sensitive responses. Additionally, high personal distress in mothers, characterized by the dysregulation of negative

emotions, undermines mothers' ability to focus on the needs of their children and to interpret their infants' signals (Leerkes et al., 2015). In addition, mental health problems, specifically depression (Bernard et al., 2018; Campbell et al., 2007; Mills-Koonce et al., 2008), may interfere with mothers' sensitive abilities through multiple mechanisms, as it was shown that mothers with high levels of depressive symptoms tended to respond less sensitively to their infants' cues (Dix et al., 2004).

Additionally, earlier prospective studies have pointed at the dynamic nature of the relationship between mothers and children, in which not only parents influence children's behaviour, but with child characteristics affecting parents' sensitivity responses as well. For instance, difficult child temperament has been found to have a negative impact on maternal parenting skills in early childhood (Weinfield et al., 2004). Likewise, mothers who perceived greater difficulty in soothing their infants were less sensitive, potentially because they found the baby's demands challenging and stretched their limits of sensitive responsiveness (Ghera et al., 2006). Another study showed that toddlers' externalizing behaviors were associated with less maternal sensitivity at a later time point (Miner & Clarke-Stewart, 2008; Wang et al., 2013). The same pattern was observed for early internalizing problems, which were associated with lower maternal sensitivity during the preschool period from 1.5 to 4 years (Kok et al., 2013). Moreover, regarding genetics, past research has found that a child's genetic predisposition to a higher educational attainment was also associated with higher maternal sensitivity during infancy, independently of maternal genetic predisposition, education, and cognitive ability (Runze et al., 2023).

Socio-ecological considerations must be taken into account as well (Tarabulsy et al., 2005). Indeed, evidence suggests that ecological stressors in the sociodemographic sphere have small-to-moderate, statistically significant associations with sensitivity (Booth et al., 2018). For instance, studies have found associations between family income and maternal sensitivity (Heng et al., 2018), pointing to a potential role of family stress deriving from economic disadvantage (Bakermans-Kranenburg et al., 2005; Mesman & Emmen, 2013). It has also been reported that lower maternal sensitivity among individuals with low socioeconomic status was associated with even poorer child outcomes (Cooke et al., 2022). Additionally, marital relationships may play a role in parental sensitivity (Zhu et al., 2025) and changes in family circumstances (Coe et al., 2020) could negatively affect parenting strategies.

The stability of maternal sensitivity throughout the years

Traditionally, studies on parental sensitivity have focused on the early childhood years (Kemppinen et al., 2006). However, longitudinal studies reveal that maternal sensitivity remains important beyond infancy, impacting later developmental stages (Beijersbergen et al., 2012; Jaffari-Bimmel et al., 2006; Van der Voort et al., 2014). The behaviors caregivers exhibit shape developmental trajectories, suggesting a continuous influence on a child's growth and development (Burchinal et al., 2014; Sroufe, 2005). These findings underscore the impact of parenting, including during adolescence (Kemmis-Riggs et al., 2020), across multiple child developmental outcomes, with stable associations over time (Foley et al., 2025).

Prior research supports the idea that maternal sensitivity remains consistent across child development (Belsky & Fearon, 2002), from early childhood (Bornstein et al., 2020; Kemppinen et al., 2006), until adolescence (Feldman, 2010; Schoenmaker et al., 2015). These findings indicate that individual differences in maternal sensitivity persist over time, suggesting that an enduring trait underlies parenting sensitivity, which exists throughout infancy and likely continues beyond (Bigelow et al., 2010). However, changes in the environment and in individual characteristics may affect parenting skills (Mowder, 2005), potentially resulting in small fluctuations in parental sensitivity levels over time (Chen et al., 2019). Especially under stress, changes in maternal sensitivity can appear (Pianta et al., 1989). For instance, among mothers with depressive symptoms, maternal sensitivity was relatively high during the child's first year, followed by a decline over the next five years (Campbell et al., 2007). In contrast, in the general population, a study found that during the first year of a child's life, the global maternal sensitivity is relatively stable, but some of the components of maternal sensitivity may change across time (increase or decrease) (Van Huisstede et al., 2019). Additionally, Manning (2023) found an increase in maternal sensitivity over the first 3 years of children's lives. Contrary to this, decreases in the first 3 years in sensitivity have also been found in other vulnerable groups, especially in dyads with a disorganized or insecure infant-mother attachment (Mills-Koonce et al., 2008).

The stability of maternal sensitivity and factors associated with changes, especially up to early adolescence, has rarely been explored. In particular, information on risk factors that predict continuity or increases in sensitive maternal behaviors across different stages of child development is largely missing. Addressing this gap is crucial as it can inform the development of targeted interventions aimed at

enhancing parenting practices and ultimately improving child outcomes.

The current study

The current study builds on Belsky's model on the multidetermined nature of parenting, focusing on parent, child, and social context characteristics as potential predictors of observed maternal sensitivity throughout the childhood years (Belsky & Jaffee, 2015). Additionally, according to the theory of parent development, parenting behavior evolves according to the stages of child development (Mowder, 2005). Hence, we expect subtle variations in the level of maternal sensitivity over time, as sensitivity may depend on context, timing, and a child's needs at certain ages (e.g., a toddler is already more developed than an infant). We deviated from our preregistered protocol by introducing a new hypothesis to account for developmental stage-based variations in maternal sensitivity over time. This hypothesis explicitly model how maternal sensitivity naturally shifts as a child transitions through different developmental milestones (e.g., infant to toddler), providing a more nuanced longitudinal baseline.

As discussed above, there is reliable, mostly cross-sectional evidence for an association of maternal, child, and contextual characteristics with maternal sensitivity in early childhood (Pereira et al., 2012; Leerkes et al., 2015; Ghera et al., 2006; Heng et al., 2018), which underscores that parenting is a multidetermined phenomenon. Therefore, it is important to examine these characteristics as predictors of the development of maternal sensitivity across the childhood years. As such, based on the available literature from early childhood (Bernard et al., 2018; Campbell et al., 2007; Mills-Koonce et al., 2008), we expect that mothers with a history of childhood maltreatment, with high levels of psychopathology and/or relatively high levels of interparental conflict during pregnancy, will demonstrate high levels of maternal sensitivity towards their infants and will show a slight decrease in sensitivity as the child ages. Moreover, we expect that mothers of children with a difficult temperament and/or with a genetic predisposition to child psychopathology demonstrate lower levels of maternal sensitivity at baseline and remain at similarly low levels of sensitivity as the child ages. Finally, we expect that a lower socioeconomic background is related to decreases in sensitivity as the child ages.

Methods

The current study's hypotheses, design, and analysis plan were preregistered on the Open Science Framework (see https://osf.io/32xvr). Throughout the manuscript, any deviations from the original methodology plan are indicated.

Design and study population

This study is part of the Generation R Study, a population-based cohort from fetal life onwards (Kooijman et al., 2016). Eligible participants were pregnant women living in the study area in Rotterdam, the Netherlands, with an expected delivery date between April 2002 and January 2006. In total, 9,778 mothers enrolled (response rate: 61%). The Medical Ethical Committee of the Erasmus University Medical Center, Rotterdam, approved the study (study reference number METC-2020-0401). All participants signed written informed consent.

The current study used measures of maternal sensitivity, which were collected in a subgroup of 1,236 children of Dutch national origin (i.e., the children, their parents and grandparents were all born in the Netherlands). From this subsample, 1,085 mother-child dyads had completed at least one maternal sensitivity measurement (at 1, 3, 4 or 10 years) and were included in the current analysis.

Measures

Observed maternal sensitivity

All maternal observational measures were administered and recorded by trained research assistants in the lab, except for the assessment at 4 years, which was conducted at home. The recordings were coded by research assistants who were extensively trained to reach intercoder reliability and were regularly supervised.
At child age 1 year, maternal sensitivity was observed during five minutes of free play. Maternal sensitivity was coded using Ainsworth's 9-point rating scales for *Sensitivity* and *Cooperation* (Ainsworth et al., 1974). The intraclass correlation (ICC) for intercoder agreement was .79 for Sensitivity scale and .69 for Cooperation scale (n = 24). In the study sample, the Sensitivity and Cooperation scales correlated strongly (r = .71).

At 3 and 4 years, maternal sensitivity was observed when mother-child dyads performed two 3-minute tasks that were too difficult for the child: building a tower

and an etch-a-sketch task. At 10 years, only the etch-a-sketch task was performed (6 minutes). Maternal sensitivity was coded using the revised Erickson 7-point rating scales for *Supportive Presence* and *Intrusiveness* (Egeland et al., 1990). At 3 years, the total ICCs for the subscales were .75 on average for the tower task (range .73 – .77, n = 53) and .79 on average for the etch-a-sketch task (range .65 – .93, n = 55). At 4 years, the ICCs on average for both tasks were .80 (range .63 – .87, n = 40) (Lucassen et al., 2015). At 10 years, the intercoder reliability was established in 60 cases, with an average ICC of .89 (range .86 – .91). In the study sample, the supportive presence and intrusiveness scales correlated moderately with each other (3y, 4y and 10y: r = .43, .51, and .40, respectively). In each wave, an overall score was calculated by summing the respective subscales. Specifically, at 1 year we summed the Sensitivity and Cooperation subscales, and at 3, 4 (for the two tasks), and 10 years the Supportive Presence and reverse-coded Intrusiveness subscales. Given the differences in the scale used for maternal sensitivity at 1 year (1-9 point Ainsworth scale) and the one used from 3 to 10 years (1-7 point Erikson scale), we harmonized the scores in all waves, by using an arithmetic equivalence between the scales with the 7-point scale as a reference (Verhage et al., 2022).

Predictors

Maternal characteristics

Maternal childhood maltreatment

To assess mothers' history of childhood maltreatment, the Childhood Trauma Questionnaire (CTQ) was used. This retrospective self-report consisting of 34 items was filled out by mothers during pregnancy to measure the extent to which she experienced maltreatment before age 18. Mothers rated the items on a 5-point Likert scale from 1 = "never true" to 5 = "very often true". The CTQ instrument is commonly used to measure maltreatment in retrospective studies as a valid screening questionnaire (Bernstein et al., 2003) and has demonstrated good test-retest reliability (Bernstein et al., 1997). In this sample, we used the overall score of maltreatment. The internal consistency was good (α = .80).

Maternal psychopathology

Maternal general psychopathology was self-reported in a questionnaire during pregnancy, using the Dutch version of the Brief Symptom Inventory (BSI) (De Beurs, 2009). This is a 53-item self-report questionnaire in which mothers rated the extent to which each item described her feelings in the past week. The rating

scale was 0 (not at all) to 4 (extremely). In this study, we used the overall global severity index. The internal consistency was good (α = .94).

Family Functioning

To measure family functioning during pregnancy, the maternal report on the Family Assessment Device was used (Byles et al., 1988; Epstein et al., 1983). The general functioning subscale consists of 12 items on a 4-point Likert scale ranging from "strongly disagree" to "strongly agree". Six items describe healthy functioning (e.g.,"In times of crisis, we can turn to each other for support"). The other six items describe unhealthy functioning (e.g., "There are a lot of unpleasant and painful feelings in our family"). To calculate the overall score, we reverse-coded the items about healthy functioning, summed all items and then divided them by twelve, with a total score ranging from 1 to 4. Higher scores indicate family dysfunction. In this sample, the internal consistency was good (α=.89).

Child predictors

Child temperament

At six months of age, the infant's temperament was assessed using an adapted version of the Infant Behavior Questionnaire-Revised (IBQ-R) (Gartstein & Rothbart, 2003). This version was composed of 74-item from the 191-item original scale. The parent rated the frequency of specific behaviors of the baby during the previous week on a 3-point scale ("never present" to "often present"). Of the six assessed subscales, four were included to calculate the negative affect score by summing Sadness (e.g. general low mood), Distress to Limitations (e.g. fussing or crying while in caretaking activities), Fear (e.g. startle or distress to novelty or sudden changes in stimulation), and Recovery from Distress (e.g. recovery from general arousal or ease of falling asleep; reverse-coded). Higher scores indicate a more difficult temperament (Bosquet Enlow et al., 2016). The internal consistency of the adapted IBQ-R scale was satisfactory (α = .77).

Child genetic predisposition to psychopathology

Since psychopathology is often difficult to diagnose and assess accurately in early childhood, we included a Polygenic Score (PGS) for neurodevelopment as a genetic marker of the potential for psychopathology. Lee et al. (2019) derived a latent factor based on modeling the genetic structure of eight psychiatric disorders, namely Attention Deficit Hyperactivity Disorder (ADHD), autism spectrum disorder (ASD), Tourette syndrome (TS), major depressive disorder

(MDD), anorexia nervosa, obsessive-compulsive disorder, schizophrenia, and bipolar disorder. One factor loaded primarily on ADHD, ASD, MDD and TS, referred here to as the neurodevelopmental factor. In previous research, PGS based on this neurodevelopmental factor showed the highest association with various child psychiatric problems and will therefore here be used to represent genetic predispositions for child psychiatric problems (Hughes et al., 2023). (A detailed description of the genetic processing and imputation is in the supplement text A).

To compute the PGS, we used LDpred2 to derive SNP weights using automated tuning of hyperparameters (Privé et al., 2020). For the Linkage Disequilibrium reference, we inputted correlation data between pairs of 1,054,330 HapMap3 genetic variants, based on European individuals from the UK Biobank (Privé et al., 2023). As children were genotyped in two data processing rounds, we standardized the PGS scores into z-scores and residualized the scores for 20 genomic components (obtained from MDS analysis) to control for potential population stratification within GENR3 and GENR4 separately before merging (See also the analysis code for a complete description of all steps: GitHub link).

Child sex

Information on child sex was retrieved from birth records. Female sex was coded as the effect category (0= boy; 1= girl).

Contextual factors

Sociodemographic information about family income and maternal education was obtained via self-report questionnaires during pregnancy. Family income was defined as the total monthly net income of the mother's household during the enrolment period of this cohort. The income was classified into two categories: "low" (≤€2200) and "high" (≥€2200), with high being the effect category. Maternal education was also included to characterize the sample. It was classified into three categories: "low" (no education, primary education, or secondary phase 1 finished), "intermediate" (secondary phase 2 finished), and "high" (higher vocational training or a university degree finished) (CBS, 2017), with high coded as the effect category. Moreover, beyond our preregistered plan, we included a new variable, marital status, to explore the potential influence of the family composition on the trajectory of maternal sensitivity as an important contextual variable. Marital status was assessed when the child was 5/6 months and recoded into two categories: "married/living together" (effect category) and "no partner".

Statistical analysis

To identify predictors of the developmental trajectories of maternal sensitivity, we used linear mixed-effects models with maximum likelihood estimation (West et al., 2022). The outcome in the model was the repeated assessment of maternal sensitivity at child ages 1, 3, 4, and 10 years. A random intercept on the subject level was included to account for the repeated nature of the outcome measures. Next, a random slope was added to model individual differences over time, allowing the association between child age and the outcome to vary between individuals. Random intercept and random slope were specified as uncorrelated to aid in model identification.

In our model, the predictors were maternal characteristics, child characteristics, contextual factors, and child age. Additionally, an interaction term between the predictors and child age was added to identify how these factors associate with changes over time in the outcome (see R code in Figure 1 for the equation and for a detailed equation in Supplemental text B). We centered child age to mean age at baseline, so that 0 represents the average child age at the first measurement. The specific predictor terms can therefore be interpreted as the association of the maternal, child, and contextual factors with maternal sensitivity at baseline, and child age represents the changes in maternal sensitivity over time, when all other predictors have a zero score/reference category. The product terms (predictor*child age) indicate the degree to which maternal sensitivity changes depend on the predictor.

Figure 1. R code for the linear mixed-effects model

$$\text{Maternal Sensitivity}_{j} \sim \text{child age}_{ij} * (\text{maternal_childhood_maltreatment} + \text{maternal_psychopathology} + \text{family_functioning} + \text{negative affect} + \text{PRS} + \text{child_sex} + \text{maternal_education} + \text{household_income} + \text{marital status}) + (1 + \text{child age} \mid\mid \text{i}) + \varepsilon_{ij}$$

Note. Linear mixed-effects model equation. The i subscript indicates the subject, and the j subscript indicates the time point. The main part of the model is the fixed effects, which includes all predictors. In the random effects part of the model, the term "1 + years || subject" indicates the random intercept for subject (i.e., adjusting for the individual differences in the mean across all time points) and the random slope for subject (i.e., adjusting for the individual differences in the effect of the predictor over time).

To compare the models with and without random effects, we used Akaike information criterion (AIC). Additionally, the fit was assessed using marginal and conditional R2 values to account for clustering in the sample (Nakagawa &

Schielzeth, 2013). We used the packages 'lme4' to fit the models, 'broom.mixed' to pool across imputed datasets and for p-value computation, and 'ggplot2' and 'SJplot' for visualisation. Aditionally to compute a power analysis we used the 'pwr' package. All analyses were performed using R Statistical Software (version 4.4.4).

Missing data on predictors and outcomes were handled with multiple imputations, using chained equations with the 'mice' package with 100 iterations. The estimation of missing values was performed by generating 30 imputed datasets. The results were pooled for all datasets using Rubin's rules (Little & Rubin, 2019; Rubin, 2004). Additionally, a non-response analysis was performed to explore potential selection bias. We tested for any potential differences between the non-selected and final selected samples using the chi-squared test for categorical variables and the two-sample t-test for continuous variables. We applied Benjamini–Hochberg correction as a method to correct for multiple testing, which controls the false discovery rate (FDR), in which q-values (the FDR-adjusted p-value) equal to or below 0.05 are considered as a significant result (Benjamini & Hochberg, 1995). We applied FDR across 21 predictor terms, treating the baseline association tests and associations with change as two separate families of hypotheses. Finally, we conducted a power analysis to determine the minimum effect size detected. Analysis can be found in Supplemental Text C.

Results

Table 1 presents the descriptive characteristics of the study population. The results showed that half of the children were boys (52.2%), and that the majority of families had above-average income (80.5%) and high educational level (65.2%). The correlation between sensitivity measures over time range from .12 to .37. All variables can be found in Figure S1. Results of the non-response analysis showed that non-response mothers (n = 184) were younger (mean difference = 2.17 years, df = 1266, $p < .001$) than included mothers. We found no differences regarding income (high reference 74,1% versus 80.5%, $\chi2 = 7.19$, df = 4, $p = .13$) or maternal educational level (high reference 98.3% versus 99.4%, $\chi2 = 3.13$, df = 1, $p = .08$).

Table 1. Descriptive study variables

Variables	M(SD) or *n(%)*	Boys	Girls
Maternal sensitivity outcome			
At 1 year	4.87 (0.86)	4.78 (0.86)	4.98 (0.85)
At 3 years	3.97 (0.97)	3.89 (0.97)	4.10 (0.97)

At 4 years	3.49 (0.97)	3.48 (0.93)	3.52 (1.02)
At 10 years	3.89 (1.16)	3.81 (1.20)	3.99 (1.11)
Maternal characteristics			
Maternal childhood maltreatment (CTQ score)	47.45 (13.04)	47.11 (12.79)	47.79 (13.30)
Family functioning (FAD score)	1.41 (0.39)	1.42 (0.37)	1.41 (0.42)
Maternal psychopathology (BSI score)	0.18 (0.22)	0.19 (0.26)	0.16 (0.17)
Child characteristics			
Child temperament (Negative affective score)	24.85 (10.04)	24.80 (10.42)	24.89 (9.64)
PRS child psychopathology	-0.56 (0.21)	-0.56 (0.21)	-0.56 (0.21)
Child sex (*n* boys)	546 (50.3)	-	-
Contextual factors			
Family Income (*n*)			
Low	197 (19.5)	107 (21.0)	90 (19.9)
High	815 (80.5)	402 (79.0)	413 (82.1)
Maternal education (*n)*			
Low	102 (9.6)	51 (9.6)	51 (9.6)
Intermediate	269 (25.3)	140 (26.2)	129 (24.3)
High	694 (65.2)	343 (64.2)	351 (66.1)
Marital status (*n)*			
Married/registered partnership	700 (73.0)	357 (73.9)	343 (72.1)
Unmarried/no registered partnership	259 (27.0)	126 (26.0)	133 (27.9)

Note: CQT= Childhood Trauma Questionnaire, FAD= Family Assessment Device, BSI= Brief Symptom Inventory, IBQ= Infant Behaviour Questionnaire.

We evaluated a model predicting maternal sensitivity from 1 to 10 years based on different numbers of fixed-effect predictors. We first tested the random-effect structure, specifically whether it is useful to allow the intercept and slope to vary between mothers, or whether a simpler "random intercept only" model suffices. Since the model fit improved with the addition of a random slope, as indicated by a reduction in AIC (10,289 to 10,270), the model with random effects in the intercept and slope was preferred, and subsequent results are based on models including both random effects. This preferred model suggests that there are meaningful individual differences in maternal sensitivity across time.

Maternal, child, and contextual characteristics during infancy as predictors of maternal sensitivity across childhood.

Our analysis showed the main and interaction effects of the predictors of maternal sensitivity. Table 2 showed that child age (β = -.12; SE = .04; p =.003; q = .042), child sex (β = .14; SE = .06; p =.031; q = .135) and maternal educational level (β = .26; SE = .12; p =.025 ; q = .135) were associated with maternal sensitivity at baseline. However, from these associations, only child age survived multiple testing correction. The other predictors were not significantly associated with maternal sensitivity at baseline. In sum, the model demonstrated a decrease in maternal sensitivity over time.

The analysis also found no significant interaction effects, suggesting that none of the examined predictors were related to the change in maternal sensitivity over time; rather, these associations remained temporally stable.

Table 2. Main and interaction effects of maternal, child, and contextual characteristics predicting maternal sensitivity.

Term	b-coefficient	SE	p-Value	q-Value
Fixed effects				
Intercept	4.308	.238	.000	
Child age	-.123	.041	**.003**	**.042**
Maternal childhood maltreatment	-.002	.003	.461	.749
Maternal psychopathology	.049	.162	.762	.929
Family functioning	-.140	.085	.099	.323
Negative affective	.001	.004	.676	.929
PRS child psychopathology	.016	.159	.920	.929
Child sex (female)	.135	.063	**.031**	.135
Marital status (married)	.061	.074	.406	.749
Maternal education (intermediate)	.118	.124	.344	.745
Maternal education (high)	.263	.117	**.025**	.135
Income (high)	.137	.092	.138	.359
Time * Maternal childhood maltreatment	.000	.000	.929	.929
Time * Maternal psychopathology	-.005	.029	.852	.929
Time * Family functioning	.011	.015	.454	.929
Time * Negative affective	.000	.001	.688	.929

Time * PRS child psychopathology	-.029	.028	.300	.929
Time * Gender (ref:girl)	.001	.011	.908	.929
Time * Marital status	-.003	.012	.785	.929
Time * Maternal education interme	.006	.021	.788	.929
Time * Maternal education high	.033	.020	.096	.929
Time * Income (ref:high)	-.017	.016	.301	.929
Random effects	**Variance**	**SD**		
Intercept	.08	.29		
Time (slope)	.003	.06		
Residual (within-mother)	.98	.98		

*p-value and q-value < .05 in bold. q-value = FRD correction. N= 1085

Discussion

This study aimed to identify intraindividual differences in maternal sensitivity in the first 10 years of children's lives. Our findings showed that maternal sensitivity decreased as children grew older. However, none of the maternal, child, and contextual predictors were associated with this change in maternal sensitivity over time.

Our results suggest a decrease in maternal sensitivity over time, revealing that sensitivity levels tend to be relatively high during the child's first year of life, followed by a decline over the childhood years. This pattern aligns with findings from Campbell et al. (2007) & Mills-Koonce et al. (2008), suggesting that maternal responsiveness is not static but rather evolves in relation to the child's developmental stages and context. We add to these studies by showing that these changes not only occur in vulnerable groups (mothers with depressive symptoms or dyads with a disorganized or insecure infant-mother attachment), but rather seem to reflect a generic process. Different aspects of the child-parent relationship may contribute to the observed decline in maternal sensitivity over time, including the active role children play in their own development during their school years (Wang et al., 2013) and the changes in the demands regarding the interaction between mothers and children (Ciciolla et al., 2013). For instance, a reduction in maternal sensitivity from middle childhood to early adolescence has been identified, especially in the presence of children's externalizing behavior (Pardini et al., 2008; Bradley & Corwyn, 2013), highlighting the influence of child behaviors on parenting from middle childhood onwards.

Additionally, the onset of puberty and changes in the socioemotional development may have an influence on the parent-child relationship. During middle childhood, children spend less time with their parents than younger children, in exchange for more time with their peers (Meldrum & Hay, 2012). The more independent children become, the less they may need from their parents in terms of sensitivity. Research has shown that the influence of caregiver sensitivity is strongest in early childhood versus later childhood (Madigan et al., 2024). These changes are partly related to children's need for self-regulation, with both parents' and children's expectations for increasing autonomy being reflected in the relationship (Kerns & Brumariu, 2016). These changes might reflect different needs of the child, including verbal feedback, and reinforcement of self-concept and self-esteem. Also, children begin to take more responsibility for communicating with their parents (Kerns et al., 2001). As children grow older, their needs evolve when they face different emotional and behavioral challenges, and mothers may adapt their parenting skills in response. In this way, parents balance the need for care and exploration as increasing autonomy occurs in middle childhood (Bosmans & Kerns, 2015).

In contrast to infancy, during middle childhood, children begin to assert more independence. Thus, sensitive care at this age also involves allowing them to express their own feelings and opinions (Kerns et al., 2001). Thus, although our findings suggest that sensitivity tends to decrease across childhood, it could also be that the current assessment is less equipped to measure maternal sensitivity at older ages, as conventional measures of sensitivity may not capture the described developmental changes well. It is also possible that other parenting dimensions become more important and salient in the relationship between mother and child as the child ages. Further research is needed to verify our findings and extend them into adolescence to determine whether the onset of the pubertal transition leads to further decreases in the display of maternal sensitivity.

Regarding predictors of maternal and contextual factors, past research reported that traumatic experiences and poor mental health interfere negatively with maternal sensitivity (Fuchs et al., 2015; Hughes & Cossar, 2016), findings that we could not confirm. The lack of significant predictors in our study might be explained by the fact that our sample represents a highly educated, rather healthy sample with relatively low levels of psychopathology and maltreatment experiences among mothers compared to other studies in low-income populations (Alto et al., 2021, 2023). The adverse circumstances measured in our study are potentially not

severe enough to impact a mother's sensitivity. However, protective factors may also be at play in our sample, mitigating adverse outcomes, as was also suggested by Hambleton et al. (2024) to explain their null finding on the association between trauma and maternal sensitivity.

Additionally, child variables such as temperament and the genetic predisposition to children's psychopathology did not predict trajectories of maternal sensitivity. Based on attachment theory, a possible explanation is that temperament and attachment are orthogonal constructs instead of moderators (Mangelsdorf et al., 2000; Sroufe, 1985). Our null finding supports the hypothesized absence of a relationship between parental sensitivity and the temperamental characteristics that the child brings into the relationship. Maternal sensitivity is defined as the ability of the caregiver to respond promptly and adequately to children's signals of distress and calls for support; this might be compatible with our results, in which parental sensitivity is a flexible ability that adapts to the child's temperamental tendencies. In other words, sensitive mothers have the competency to be sensitive regardless of the child's temperament (Paulussen-Hoogeboom et al., 2007). Future research including the differential susceptibility paradigm of child temperament may help to understand the child-parent dynamic, how specific child characteristics interact with varying environmental contexts (Van IJzendoorn & Bakermans-Kranenburg, 2012).

Strengths and limitations

The strengths of our study include the longitudinal design, the inclusion of different types of predictors (maternal, child, and contextual characteristics), and the use of observational assessments of mother-child relationships until age 10 years. Additionally, a growing topic in the field of parenting studies is the examination of genetic variables, particularly through the use of Polygenic Scores (PGS) (Wertz et al., 2019; Runze et al., 2023). The use of genetic instruments reduces the likelihood of false negative findings due to methodological constraints of measuring child psychopathology at young ages. However, our findings must be considered in the context of a few limitations. First, the analytic sample was restricted to families of Dutch origin, thus limiting the generalization to the context of Dutch families. Future work should continue examining multiple predictors of maternal sensitivity in low-risk as well as more diverse samples across different settings. Second, repeated assessments of paternal sensitivity were not available in this study. As a result, we cannot infer the development of fathers' sensitivity

over time. We recommend future studies to include both mothers and fathers, enabling the study of differences between caregivers, the contribution of each parent, and any potential spillover effects. Furthermore, integrating other relevant family members, such as grandparents and siblings, might allow for exploring the broader family context as a potential predictor for child development and family interactions. Third, the extent to which a child experiences stress or a lack thereof due to the demands of their environment and how parents respond to it, is a crucial factor in capturing the quality and complexity of parent-child interactions. Current observational measures of maternal sensitivity may not adequately reflect this important dynamic. Future research needs to account for factors that may explain subtle variability in maternal sensitivity over time, such as the difficulties of the task or broader contextual factors, including poverty, unemployment, or housing difficulties, that might impair mothers' responses to their child's needs. Fourth, the large gaps in between the maternal sensitivity assessments (from 4 to 10 years) might not capture enough variability. More research is needed to bridge the gap between middle childhood and beyond, including more frequent measures of parental sensitivity. Fifth, our lack of finding significant predictors might be explained by the inclusion of variables restricted to their availability in the prenatal phase. More research is needed to identify predictors across the childhood years.

Conclusions and implications

The findings of the present study suggest a decline in maternal sensitivity as the child develops. However, none of the examined predictors accounted for this change over time. Despite these null results, suggestive trends compatible with previous findings were observed, revealing that maternal sensitivity decreased overall, with the decrease appearing to be slightly higher for girls and among mothers with higher educational levels. Additionally, our findings did not find evidence for contextual, child, and maternal variables predicting changes in maternal sensitivity over time. Thus, there remains a need to examine a broader range of predictors over time, particularly by repeatedly measuring factors that may fluctuate, such as family functioning, stress, and psychopathology. Additionally, conducting both pre- and postnatal assessments will provide a more accurate representation of the child's environment.

Our study highlights a subtle change in maternal sensitivity over the first ten years of children's lives, the degree of which varies between mothers. However, our

understanding of factors influencing this variation remains limited. Consequently, some questions are worth exploring in future studies, including whether salient developmental changes in middle and later childhood interfere with maternal sensitivity. Are the transformations in development during middle childhood in line with the transformations in parenting? How do interactions with peers and significant others at certain stages of development affect the need for sensitivity from parents? And are sensitivity measures developed for young children valid for use in older age groups, such as middle childhood and adolescence? Clearly, while parenting research typically focuses on early childhood, our finding that maternal sensitivity decreases over time calls for further longitudinal research adequately capturing the complexity of changing parenting needs at older ages.

References

Ainsworth, M. D. S. (1978). Bowlby-Ainsworth attachment theory. *Behavioral and Brain Sciences*, *1*(3), 436-438. https://doi.org/10.1017/S0140525x00075828

Ainsworth, M. D. S., Bell, S. M., & Stayton, D. F. (1974). Infant-mother attachment and social development: Socialization as a product of reciprocal responsiveness to signals. In *The integration of a child into a social world* (pp. 99-135). Cambridge University Press.

Bakermans-Kranenburg, M. J., Van IJzendoorn, M. H., & Kroonenberg, P. M. (2005). Differences in attachment security between African-American and white children: ethnicity or socio-economic status? (vol 27, pg 417, 2004). *Infant Behavior & Development*, *28*(1), 96-96. https://doi.org/10.1016/j.infbeh.2004.11.002

Becker-Stoll, F., Fremmer-Bombik, E., Wartner, U., Zimmermann, P., & Grossmann, K. E. (2008). Is attachment at ages 1, 6 and 16 related to autonomy and relatedness behavior of adolescents in interaction towards their mothers? *International Journal of Behavioral Development*, *32*(5), 372-380. https://doi.org/10.1177/0165025408093654

Beijersbergen, M. D., Juffer, F., Bakermans-Kranenburg, M. J., & Van IJzendoorn, M. H. (2012). Remaining or becoming secure: parental sensitive support predicts attachment continuity from infancy to adolescence in a longitudinal adoption study. *Developmental Psychology*, *48*(5), 1277-1282. https://doi.org/10.1037/a0027442

Belsky, J. (1984). The determinants of parenting: A process model [doi:10.2307/1129836]. *Child Development*, *55*, 83-96. https://doi.org/10.2307/1129836

Belsky, J., & Fearon, R. M. P. (2002). Early attachment security, subsequent maternal sensitivity, and later child development: Does continuity in development depend upon continuity of caregiving? *Attachment & human development*, *4*(3), 361-387. https://doi.org/10.1080/14616730210167267

Belsky, J., & Jaffee, S. R. (2015). The Multiple Determinants of Parenting. In *Developmental Psychopathology* (pp. 38-85). https://doi.org/https://doi.org/10.1002/9780470939406.ch2

Benjamini, Y., & Hochberg, Y. (1995). Controlling the False Discovery Rate - a Practical and Powerful Approach to Multiple Testing. *Journal of the Royal Statistical Society Series B-Statistical Methodology*, *57*(1), 289-300. https://doi.org/10.1111/j.2517-6161.1995.tb0203.x

Bernard, K., Nissim, G., Vaccaro, S., Harris, J. L., & Lindhiem, O. (2018). Association between maternal depression and maternal sensitivity from birth to 12 months: a meta-analysis. *Attachment & human development*, *20*(6), 578-599. https://doi.org/10.1080/14616734.2018.1430839

Bernstein, D. P., Ahluvalia, T., Pogge, D., & Handelsman, L. (1997). Validity of the Childhood Trauma Questionnaire in an adolescent psychiatric population. *J Am Acad Child Adolesc Psychiatry*, *36*(3), 340-348. https://doi.org/10.1097/00004583-199703000-00012

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

Bigelow, A. E., MacLean, K., Proctor, J., Myatt, T., Gillis, R., & Power, M. (2010). Maternal

sensitivity throughout infancy: Continuity and relation to attachment security. *Infant Behavior & Development*, *33*(1), 50-60. https://doi.org/10.1016/j.infbeh.2009.10.009

Booth, A. T., Macdonald, J. A., & Youssef, G. J. (2018). Contextual stress and maternal sensitivity: A meta-analytic review of stress associations with the Maternal Behavior Q-Sort in observational studies. *Developmental Review*, *48*, 145-177. https://doi.org/10.1016/j.dr.2018.02.002

Bornstein, M. H., Hendricks, C., Haynes, O. M., & Painter, K. M. (2007). Maternal sensitivity and child responsiveness: Associations with social context, maternal characteristics, and child characteristics in a multivariate analysis. *Infancy*, *12*(2), 189-223. https://doi.org/10.1111/j.1532-7078.2007.tb00240.x

Bornstein, M. H., Putnick, D. L., Hahn, C. S., Tamis-LeMonda, C. S., & Esposito, G. (2020). Stabilities of infant behaviors and maternal responses to them. *Infancy*, *25*(3), 226-245. https://doi.org/10.1111/infa.12326

Bosmans, G., & Kerns, K. A. (2015). Attachment in Middle Childhood: Progress and Prospects. *Attachment in Middle Childhood: Theoretical Advances and New Directions in an Emerging Field*, *148*, 1-14. https://doi.org/10.1002/cad.20100

Bosquet Enlow, M., White, M. T., Hails, K., Cabrera, I., & Wright, R. J. (2016). The Infant Behavior Questionnaire-Revised: Factor structure in a culturally and sociodemographically diverse sample in the United States. *Infant Behavior & Development*, *43*, 24-35. https://doi.org/10.1016/j.infbeh.2016.04.001

Burchinal, M. R., Lowe Vandell, D., & Belsky, J. (2014). Is the prediction of adolescent outcomes from early child care moderated by later maternal sensitivity? Results from the nichd study of early child care and youth development. *Developmental Psychology*, *50*(2), 542. https://doi.org/10.1037/a0033709

Byles, J., Byrne, C., Boyle, M. H., & Offord, D. R. (1988). Ontario Child Health Study: reliability and validity of the general functioning subscale of the McMaster Family Assessment Device. *Fam Process*, *27*(1), 97-104. https://doi.org/10.1111/j.1545-5300.1988.00097.x

Campbell, S. B., Matestic, P., von Stauffenberg, C., Mohan, R., & Kirchner, T. (2007). Trajectories of maternal depressive symptoms, maternal sensitivity, and children's functioning at school entry. *Developmental Psychology*, *43*(5), 1202-1215. https://doi.org/10.1037/0012-1649.43.5.1202

CBS. (2017). *Education level*. https://www.cbs.nl/en-gb/news/2023/48/satisfaction-high-in-caribbean-nl-in-spite-of-low-material-well-being/education-level

Chen, X., McElwain, N. L., Berry, D., & Emery, H. T. (2019). Within-person fluctuations in maternal sensitivity and child functioning: Moderation by child temperament. *Journal of Family Psychology*, *33*(7), 857-867. https://doi.org/10.1037/fam0000564

Ciciolla, L., Crnic, K. A., & West, S. G. (2013). Determinants of change in maternal sensitivity: Contributions of context, temperament, and developmental risk. *Parenting-Science and Practice*, *13*(3), 178-195. https://doi.org/10.1080/15295192.2013.756354

Coe, J. L., Davies, P. T., Hentges, R. F., & Sturge-Apple, M. L. (2020). Understanding the nature of associations between family instability, unsupportive parenting, and children's externalizing symptoms. *Development and Psychopathology*, *32*(1), 257-269. https://doi.org/10.1017/S0954579418001736

Cooke, J. E., Deneault, A. A., Devereux, C., Eirich, R., Fearon, R. M. P., & Madigan, S. (2022).

Parental sensitivity and child behavioral problems: A meta-analytic review. *Child Development*, *93*(5), 1231-1248. https://doi.org/10.1111/cdev.13764

De Beurs, E. (2009). BSI: Brief symptom inventory. *Handleiding Addendum*.

Deneault, A.-A., Duschinsky, R., Van IJzendoorn, M. H., Roisman, G. I., Ly, A., Fearon, R. M. P., & Madigan, S. (2023). Does child-mother attachment predict and mediate language and cognitive outcomes? A series of meta-analyses. *Developmental Review*, *70*, 101093. https://doi.org/https://doi.org/10.1016/j.dr.2023.101093

Dix, T., Gershoff, E. T., Meunier, L. N., & Miller, P. C. (2004). The affective structure of supportive parenting: Depressive symptoms, immediate emotions, and child-oriented motivation. *Developmental Psychology*, *40*(6), 1212-1227. https://doi.org/10.1037/0012-1649.40.6.1212

Egeland, B., Erickson, M. F., Clemenhagen-Moon, J., Hiester, M. K., & Korfmacher, J. (1990). 24 months tools coding manual: Project STEEP revised 1990 from mother–child project scales. *Unpublished manuscript, University of Minnesota, Minneapolis*.

Epstein, N. B., Baldwin, L. M., & Bishop, D. S. (1983). The Mcmaster Family Assessment Device. *Journal of Marital and Family Therapy*, *9*(2), 171-180. https://doi.org/10.1111/j.1752-0606.1983.tb01497.x

Feldman, R. (2010). The relational basis of adolescent adjustment: trajectories of mother-child interactive behaviors from infancy to adolescence shape adolescents' adaptation. *Attachment & human development*, *12*(1-2), 173-192. https://doi.org/10.1080/14616730903282472

Foley, J. E., Olino, T. M., & Weinraub, M. (2025). On the Broader Significance of Maternal Sensitivity: Mothers' Early and Later Sensitive Parenting Matter to Children's Language, Executive Function, Academics, and Self-Reliance. *Dev Sci*, *28*(1), e13594. https://doi.org/10.1111/desc.13594

Fuchs, A., Möhler, E., Resch, F., & Kaess, M. (2015). Impact of a maternal history of childhood abuse on the development of mother-infant interaction during the first year of life. *Child Abuse & Neglect*, *48*, 179-189. https://doi.org/10.1016/j.chiabu.2015.05.023

Gartstein, M. A., & Rothbart, M. K. (2003). Studying infant temperament via the revised infant behavior questionnaire. *Infant behavior and development*, *26*(1), 64-86. https://doi.org/10.1016/S0163-6383(02)00169-8

Gerlach, J., Fössel, J. M., Vierhaus, M., Sann, A., Eickhorst, A., Zimmermann, P., & Spangler, G. (2022). Family risk and early attachment development: The differential role of parental sensitivity. *Infant Mental Health Journal*, *43*(2), 340-356. https://doi.org/10.1002/imhj.21964

Ghera, M. M., Hane, A. A., Malesa, E. E., & Fox, N. A. (2006). The role of infant soothability in the relation between infant negativity and maternal sensitivity. *Infant Behavior & Development*, *29*(2), 289-293. https://doi.org/10.1016/j.infbeh.2005.09.003

Groh, A. M., Fearon, R. P., Bakermans-Kranenburg, M. J., Van IJzendoorn, M. H., Steele, R. D., & Roisman, G. I. (2014). The significance of attachment security for children's social competence with peers: a meta-analytic study. *Attachment & human development*, *16*(2), 103-136. https://doi.org/10.1080/14616734.2014.883636

Hambleton, J. L., Aubuchon-Endsley, N. L., & Kurien, J. (2024). Associations among Maternal Trauma History, Postnatal Maternal Sensitivity, and Infant Temperament. *Children-Basel*, *11*(3). https://doi.org/10.3390/children11030301

Heng, J., Quan, J., Sim, L. W., Sanmugam, S., Broekman, B., Bureau, J. F., Meaney, M. J., Holbrook, J. D., & Rifkin-Graboi, A. (2018). The role of ethnicity and socioeconomic

status in Southeast Asian mothers' parenting sensitivity. *Attachment & human development*, *20*(1), 24-42. https://doi.org/10.1080/14616734.2017.1365912

Hughes, D. E., Kunitoki, K., Elyounssi, S., Luo, M. N., Bazer, O. M., Hopkinson, C. E., Dowling, K. F., Doyle, A. E., Dunn, E. C., Eryilmaz, H., Gilman, J. M., Holt, D. J., Valera, E. M., Smoller, J. W., Cecil, C. A. M., Tiemeier, H., Lee, P. H., & Roffman, J. L. (2023). Genetic patterning for child psychopathology is distinct from that for adults and implicates fetal cerebellar development. *Nature Neuroscience*, *26*(6), 959-969. https://doi.org/10.1038/s41593-023-01321-8

Hughes, M., & Cossar, J. (2016). The Relationship between Maternal Childhood Emotional Abuse/Neglect and Parenting Outcomes: A Systematic Review. *Child Abuse Review*, *25*(1), 31-45. https://doi.org/10.1002/car.2393

Jaffari-Bimmel, N., Juffer, F., van Ijzendoorn, M. H., Bakermans-Kranenburg, M. J., & Mooijaart, A. (2006). Social development from infancy to adolescence: longitudinal and concurrent factors in an adoption sample. *Developmental Psychology*, *42*(6), 1143-1153. https://doi.org/10.1037/0012-1649.42.6.1143

Kemmis-Riggs, J., Grove, R., McAloon, J., & Berle, D. (2020). Early Parenting Characteristics Associated with Internalizing Symptoms Across Seven Waves of the Longitudinal Study of Australian Children. *J Abnorm Child Psychol*, *48*(12), 1603-1615. https://doi.org/10.1007/s10802-020-00700-0

Kemppinen, K., Kumpulainen, K., Raita-Hasu, J., Moilanen, I., & Ebeling, H. (2006). The continuity of maternal sensitivity from infancy to toddler age. *Journal of Reproductive and Infant Psychology*, *24*(3), 199-212. https://doi.org/10.1080/02646830600821249

Kerns, K., & Brumariu, L. (2016). Attachment in middle childhood. In J. Cassidy & P. Shaver (Eds.), *Handbook of Attachment.* (Vol. 3, pp. 349–365). Guilford.

Kerns, K. A., Aspelmeier, J. E., Gentzler, A. L., & Grabill, C. M. (2001). Parent-child attachment and monitoring in middle childhood. *Journal of Family Psychology*, *15*(1), 69-81. https://doi.org/10.1037//0893-3200.15.1.69

Kok, R., Linting, M., Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., Jaddoe, V. W. V., Hofman, A., Verhulst, F. C., & Tiemeier, H. (2013). Maternal Sensitivity and Internalizing Problems: Evidence from Two Longitudinal Studies in Early Childhood. *Child Psychiatry & Human Development*, *44*(6), 751-765. https://doi.org/10.1007/s10578-013-0369-7

Kooijman, M. N., Kruithof, C. J., van Duijn, C. M., Duijts, L., Franco, O. H., van IJzendoorn, M. H., de Jongste, J. C., Klaver, C. C. W., van der Lugt, A., Mackenbach, J. P., Moll, H. A., Peeters, R. P., Raat, H., Rings, E. H. H. M., Rivadeneira, F., van der Schroeff, M. P., Steegers, E. A. P., Tiemeier, H., Uitterlinden, A. G., . . . Jaddoe, V. W. V. (2016). The Generation R Study: design and cohort update 2017. *European Journal of Epidemiology*, *31*(12), 1243-1264. https://doi.org/10.1007/s10654-016-0224-9

Kunkel, J. J., Magro, S. W., Bleil, M. E., Booth-LaForce, C., Vandell, D. L., Fraley, R. C., & Roisman, G. I. (2022). Early maternal sensitivity and markers of physical health: Enduring or transient associations from childhood to adulthood? *Developmental Psychology*, *58*(12), 2252-2263. https://doi.org/10.1037/dev0001430

Lee, P., Consortium., C.-D. G. o. t. P. G., & (2019). Genomic Relationships, Novel Loci, and Pleiotropic Mechanisms across Eight Psychiatric Disorders. *Cell*, *179*(7), 1469-1482 e1411. https://doi.org/10.1016/j.cell.2019.11.020

Leerkes, E. M., Supple, A. J., O'Brien, M., Calkins, S. D., Haltigan, J. D., Wong, M. S., & Fortuna, K.

(2015). Antecedents of Maternal Sensitivity During Distressing Tasks: Integrating Attachment, Social Information Processing, and Psychobiological Perspectives. *Child Development*, *86*(1), 94-111. https://doi.org/10.1111/cdev.12288

Little, R. J. A., & Rubin, D. B. (2019). *Statistical analysis with missing data* (Vol. 793). John Wiley & Sons.

Lucassen, N., Kok, R., Bakermans-Kranenburg, M. J., Van IJzendoorn, M. H., Jaddoe, V. W. V., Hofman, A., Verhulst, F. C., Lambregtse-Van den Berg, M. P., & Tiemeier, H. (2015). Executive functions in early childhood: The role of maternal and paternal parenting practices. *British Journal of Developmental Psychology*, *33*(4), 489-505. https://doi.org/10.1111/bjdp.12112

Madigan, S., Deneault, A. A., Duschinsky, R., Bakermans-Kranenburg, M. J., Schuengel, C., Van IJzendoorn, M. H., Ly, A., Fearon, R. M. P., Eirich, R., & Verhage, M. L. (2024). Maternal and paternal sensitivity: Key determinants of child attachment security examined through meta-analysis. *Psychological Bulletin*, *150*(7), 839-872. https://doi.org/10.1037/bul0000433

Mangelsdorf, S. C., McHale, J. L., Diener, M., Goldstein, L. H., & Lehn, L. (2000). Infant attachment: Contributions of infant temperament and maternal characteristics. *Infant Behavior & Development*, *23*(2), 175-196. https://doi.org/10.1016/S0163-6383(01)00035-2

Manning, L. B. (2023). The predictive relation of maternal sensitivity over time and child characteristics on early attachment [doi: 10.1080/03004430.2022.2106978]. *Early Child Development and Care*, *193*(3), 447-461. https://doi.org/10.1080/03004430.2022.2106978

Meldrum, R. C., & Hay, C. (2012). Do peers matter in the development of self-control? Evidence from a longitudinal study of youth. *J Youth Adolesc*, *41*(6), 691-703. https://doi.org/10.1007/s10964-011-9692-0

Mesman, J., & Emmen, R. A. (2013). Mary Ainsworth's legacy: a systematic review of observational instruments measuring parental sensitivity. *Attach Hum Dev*, *15*(5-6), 485-506. https://doi.org/10.1080/14616734.2013.820900

Mills-Koonce, W. R., Gariepy, J. L., Sutton, K., & Cox, M. J. (2008). Changes in maternal sensitivity across the first three years: are mothers from different attachment dyads differentially influenced by depressive symptomatology? *Attach Hum Dev*, *10*(3), 299-317. https://doi.org/10.1080/14616730802113612

Miner, J. L., & Clarke-Stewart, K. A. (2008). Trajectories of externalizing behavior from age 2 to age 9: Relations with gender, temperament, ethnicity, parenting, and rater. *Developmental Psychology*, *44*(3), 771-786. https://doi.org/10.1037/0012-1649.44.3.771

Mowder, B. A. (2005). Parent development theory: Understanding parents, parenting perceptions and parenting behaviors. *Journal of Early Childhood and Infant Psychology*, *1*, 46-64.

Nakagawa, S., & Schielzeth, H. (2013). A general and simple method for obtaining R2 from generalized linear mixed-effects models. *Methods in Ecology and Evolution*, *4*(2), 133-142. https://doi.org/10.1111/j.2041-210x.2012.00261.x

Pardini, D. A., Fite, P. J., & Burke, J. D. (2008). Bidirectional associations between parenting practices and conduct problems in boys from childhood to adolescence: The moderating effect of age and African-American ethnicity. *Journal of Abnormal Child Psychology*, *36*(5), 647-662. https://doi.org/10.1007/s10802-007-9162-z

Paulussen-Hoogeboom, M. C., Stams, G. J., Hermanns, J. M., & Peetsma, T. T. (2007). Child negative emotionality and parenting from infancy to preschool: a meta-analytic review. *Developmental Psychology*, *43*(2), 438-453. https://doi.org/10.1037/0012-1649.43.2.438

Pereira, J., Vickers, K., Atkinson, L., Gonzalez, A., Wekerle, C., & Levitan, R. (2012). Parenting stress mediates between maternal maltreatment history and maternal sensitivity in a community sample. *Child Abuse & Neglect*, *36*(5), 433-437. https://doi.org/10.1016/j.chiabu.2012.01.006

Pianta, R. C., Sroufe, L. A., & Egeland, B. (1989). Continuity and Discontinuity in Maternal Sensitivity at 6, 24, and 42 Months in a High-Risk Sample. *Child Development*, *60*(2), 481-487. https://doi.org/10.1111/j.1467-8624.1989.tb02729.x

Privé, F., Albinana, C., Arbel, J., Pasaniuc, B., & Vilhjálmsson, B. J. (2023). Inferring disease architecture and predictive ability with LDpred2-auto. *American Journal of Human Genetics*, *110*(12), 2042-2055. https://doi.org/10.1016/j.ajhg.2023.10.010

Privé, F., Arbel, J., & Vilhjálmsson, B. J. (2020). LDpred2: better, faster, stronger. *Bioinformatics*, *36*(22-23), 5424-5431. https://doi.org/10.1093/bioinformatics/btaa1029

Ringoot, A. P., Jansen, P. W., Kok, R., van IJzendoorn, M. H., Verlinden, M., Verhulst, F. C., Bakermans-Kranenburg, M., & Tiemeier, H. (2022). Parenting, young children's behavioral self-regulation and the quality of their peer relationships. *Social Development*, *31*(3), 715-732. https://doi.org/10.1111/sode.12573

Rubin, D. B. (2004). *Multiple imputation for nonresponse in surveys* (Vol. 81). John Wiley & Sons.

Runze, J., Bakermans-Kranenburg, M. J., Cecil, C. A. M., van IJzendoorn, M. H., & Pappa, I. (2023). The polygenic and reactive nature of observed parenting. *Genes Brain and Behavior*, *22*(6). https://doi.org/10.1111/gbb.12874

Schoenmaker, C., Juffer, F., van IJzendoorn, M. H., Linting, M., van der Voort, A., & Bakermans-Kranenburg, M. J. (2015). From maternal sensitivity in infancy to adult attachment representations: a longitudinal adoption study with secure base scripts. *Attachment & human development*, *17*(3), 241-256. https://doi.org/10.1080/14616734.2015.1037315

Scott, J. K., Nelson, J. A., & Dix, T. (2018). Interdependence Among Mothers, Fathers, and Children From Early to Middle Childhood: Parents' Sensitivity and Children's Externalizing Behavior. *Developmental Psychology*, *54*(8), 1528-1541. https://doi.org/10.1037/dev0000525

Sroufe, L. A. (1985). Attachment Classification from the Perspective of Infant-Caregiver Relationships and Infant Temperament. *Child Development*, *56*(1), 1-14. https://doi.org/10.1111/j.1467-8624.1985.tb00080.x

Sroufe, L. A. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. *Attachment & human development*, *7*(4), 349-367. https://doi.org/10.1080/14616730500365928

Taraban, L., & Shaw, D. S. (2018). Parenting in context: Revisiting Belsky's classic process of parenting model in early childhood. *Developmental Review*, *48*, 55-81. https://doi.org/10.1016/j.dr.2018.03.006

Tarabulsy, G. M., Bernier, A., Provost, M. A., Maranda, J., Larose, S., Moss, E., Larose, M., & Tessier, R. (2005). Another look inside the gap: Ecological contributions to the transmission of attachment in a sample of adolescent mother-infant dyads. *Developmental Psychology*, *41*(1), 212-224. https://doi.org/10.1037/0012-

1649.41.1.212

Van der Storm, L., van Lissa, C. J., Lucassen, N., Helmerhorst, K. O. W., & Keizer, R. (2022). Maternal and Paternal Parenting and Child Prosocial Behavior: A Meta-Analysis Using a Structural Equation Modeling Design. *Marriage and Family Review*, *58*(1), 1-37. https://doi.org/10.1080/01494929.2021.1927931

Van der Voort, A., Linting, M., Juffer, F., Bakermans-Kranenburg, M. J., Schoenmaker, C., &
Van IJzendoorn, M. H. (2014). The development of adolescents' internalizing behavior: longitudinal effects of maternal sensitivity and child inhibition. *J Youth Adolesc*, *43*(4), 528-540. https://doi.org/10.1007/s10964-013-9976-7

Van Huisstede, L., Winstone, L. K., Ross, E. K., & Crnic, K. A. (2019). Developmental Trajectories of Maternal Sensitivity across the First Year of Life: Relations among Emotion Competence and Dyadic Reciprocity. *Parent Sci Pract*, *19*(3), 217-243. https://doi.org/10.1080/15295192.2019.1615798

Van IJzendoorn, M. H., & Bakermans-Kranenburg, M. J. (2012). Integrating temperament and attachment: The differential susceptibility paradigm. In *Handbook of temperament* (pp. 403-424). The Guilford Press.

Van IJzendoorn, M. H., Schuengel, C., Wang, Q., & Bakermans-Kranenburg, M. J. (2023). Improving parenting, child attachment, and externalizing behaviors: Meta-analysis of the first 25 randomized controlled trials on the effects of Video-feedback Intervention to promote Positive Parenting and Sensitive Discipline. *Development and Psychopathology*, *35*(1), 241-256. https://doi.org/10.1017/S0954579421001462

Van Vliet, M. S., Mesman, J., Schultink, J. M., Vereijken, C. M. J. L., Martens, V. E. G., & van der Veek, S. M. C. (2022). Maternal sensitivity during mealtime and free play: Differences and explanatory factors. *Infancy*, *27*(3), 630-644. https://doi.org/10.1111/infa.12465

Verhage, M. L., Schuengel, C., Holopainen, A., Bakermans-Kranenburg, M. J., Bernier, A., Brown, G. L., Madigan, S., Roisman, G. I., Vaever, M. S., & Wong, M. S. (2022). Conceptual comparison of constructs as first step in data harmonization: Parental sensitivity, child temperament, and social support as illustrations. *Methodsx*, *9*. https://doi.org/10.1016/j.mex.2022.101889

Wang, F., Christ, S. L., Mills-Koonce, W. R., Garrett-Peters, P., & Cox, M. J. (2013). Association between maternal sensitivity and externalizing behavior from preschool to preadolescence. *Journal of Applied Developmental Psychology*, *34*(2), 89-100. https://doi.org/10.1016/j.appdev.2012.11.003

Waters, E., Merrick, S., Treboux, D., Crowell, J., & Albersheim, L. (2000). Attachment security in infancy and early adulthood: A twenty-year longitudinal study. *Child Development*, *71*(3), 684-689. https://doi.org/10.1111/1467-8624.00176

Weinfield, N. S., Whaley, G. J., & Egeland, B. (2004). Continuity, discontinuity, and coherence in attachment from infancy to late adolescence: sequelae of organization and disorganization. *Attach Hum Dev*, *6*(1), 73-97. https://doi.org/10.1080/14616730310001659566

Wertz, J., Belsky, J., Moffitt, T. E., Belsky, D. W., Harrington, H., Avinun, R., Poulton, R., Ramrakha, S., & Caspi, A. (2019). Genetics of Nurture: A Test of the Hypothesis That Parents' Genetics Predict Their Observed Caregiving. *Developmental Psychology*, *55*(7), 1461-1472. https://doi.org/10.1037/dev0000709

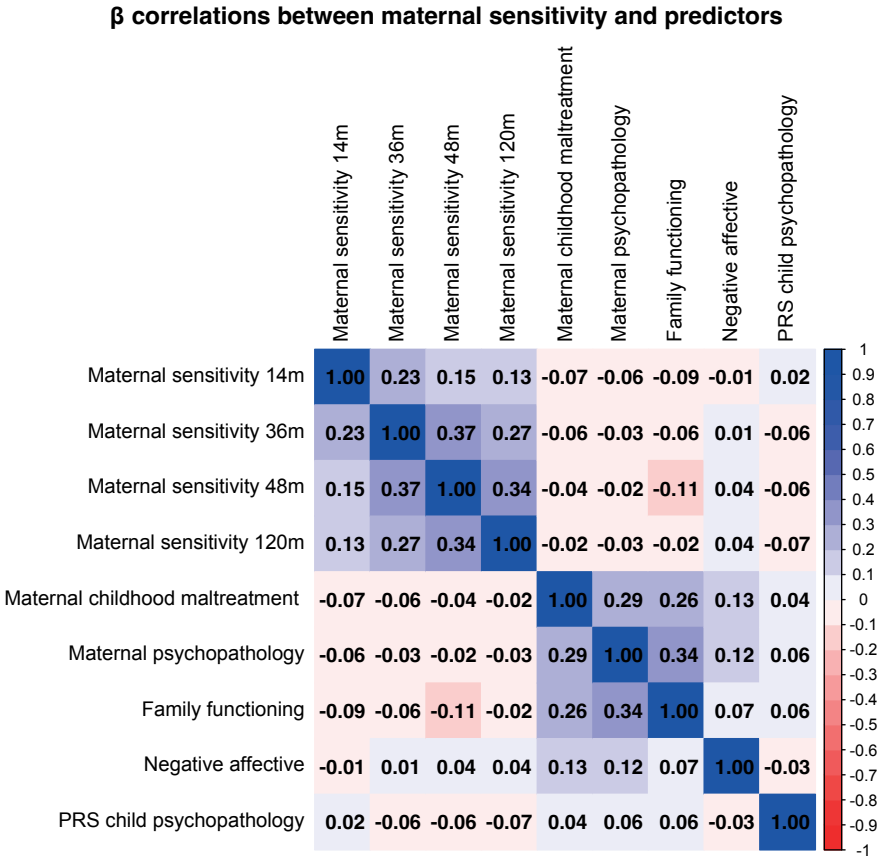
West, B. T., Welch, K. B., & Galecki, A. T. (2022). *Linear mixed models: a practical guide using*

statistical software. Chapman and Hall/CRC.

Zhu, J., Deneault, A. A., Seal, H., Lucchese-Lavecchia, G., Madigan, S., & Bureau, J. F. (2025). Examining the link between parental relationship functioning and parent sensitivity: a meta-analysis. *Attachment & human development*, *27*(3), 368-395. https://doi.org/10.1080/14616734.2024.2441146

Supplementary information

Figure S1: Correlation among the study variables



Supplementary text

A. Procedure of genotype processing and imputation

Children in Generation R were genotyped either with the Illumina 610k and 660k array (GENR3), or GSA-MD v2.0 SNP arrays (GENR4) (Illumina, San Diego, CA). Quality control included checks for sample/SNP call rates, excess heterozygosity, Hardy-Weinberg equilibrium, as well as for inconsistencies between genetically based and reported relatedness or sex. Imputation was performed using the 1000 Genomes Project reference (Phase 3, Version 5) (Delaneau et al., 2012; Howie et al., 2009). A detailed description of the genotype processing can be found elsewhere

(Ghatan et al., 2024; Medina-Gomez et al., 2015). For PGS calculations, we included only SNPs with good imputation quality (R2 ≥ 80%) and a minor allele frequency of 1% or more. This resulted in 7,673,245 (Illumina 610k, 660k) and 9,508,795 available SNPs (GSA-MD v2.0).

B. Equation linear mixed model specification

Figure 1B. R code in full for the linear mixed-effects model.

$$\text{Maternal Sensitivity}_j \sim \text{maternal_childhood_maltreatment} + \text{maternal_psychopathology} + \text{family_functioning} + \text{negative affect} + \text{PRS} + \text{child_sex} + \text{maternal_education} + \text{household_income} + \text{marital status} + \text{child age}_{ij} + \text{child age}_{ij} * \text{maternal_childhood_maltreatment} + \text{child age}_{ij} * \text{maternal_psychopathology} + \text{child age}_{ij} * \text{family_functioning} + \text{child age}_{ij} * \text{negative affect} + \text{child age}_{ij} * \text{PRS} + \text{child age}_{ij} * \text{child_sex} + \text{child age}_{ij} * \text{maternal_education} + \text{child age}_{ij} * \text{household_income} + \text{child age}_{ij} * \text{marital status}) + (1 + \text{child age} \mid\mid \text{i}) + \varepsilon_{ij}$$

Note. Linear mixed-effects model equation. The i subscript indicates the subject, and the j subscript indicates the time point. The main part of the model is the fixed effects, which includes all predictors. In the random effects part of the model, the term "1 + years || subject" indicates the random intercept for subject (i.e., adjusting for the individual differences in the mean across all time points) and the random slope for subject (i.e., adjusting for the individual differences in the effect of the predictor over time).

C. Power analysis for interaction effect in mixed-effects model

We conducted a power analysis to determine the minimum effect size observable in our models, given the sample size. We used the 'pwr' package in R, which conducts a power analysis by employing determined parameters to obtain the target power. As such, given the data with a sample of 1,085, an alpha of .05, and the minimum effect size we could detect for the interaction effect in our model, the analysis showed that the power is 0.79.



2.2 CHAPTER

Intergenerational pathways from maternal childhood maltreatment to offspring adjustment: Mediating roles of attachment, sensitivity, and maternal psychopathology

Manuscript under review

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Abstract

Background: Maternal childhood maltreatment might have long-lasting consequences, not only at the individual level but also within the family system. Yet, few studies have used observational mother-child interaction measures and assessments of children's emotional development over a longer period of time. This study examined the longitudinal links between maternal childhood maltreatment and offspring's emotional and behavioral problems in late childhood, and explored maternal psychopathology, infant attachment, and maternal sensitivity as potential mediators. **Methods:** Using data from a large study in the Netherlands, we included 832 mothers followed from pregnancy until their children were 10 years old. Mothers reported on childhood maltreatment experiences (Childhood Trauma Questionnaire), and mental health problems during pregnancy and at child age 10 years (Brief Symptom Inventory). Observational measures for attachment (Strange Situation Procedure) during the first year and maternal sensitivity at 1, 3, 4, and 10 years (Ainsworth and Erickson scales), as well as maternal reports of child internalizing and externalizing problems at 10 years (Child Behavior Checklist) were obtained. Structural equation modeling was used to test the direct and indirect effects. **Results:** The results showed a direct association between mothers' experiences of maltreatment and greater behavioral and emotional problems in offspring, and an indirect association via maternal psychopathology during pregnancy and at 10 years. Findings did not support mediation by infant attachment or maternal sensitivity. **Conclusion:** Mothers with a history of maltreatment experienced more mental health problems throughout their offspring's childhood, underscoring their need for mental health support. This may help alleviate the lifelong consequences of maltreatment experiences, ultimately reducing the intergenerational transmission of psychopathology.

Keywords: maternal childhood maltreatment, infant attachment, maternal sensitivity, maternal psychopathology, children's emotional and behavioral problems

Introduction

Child maltreatment has been identified as the most significant risk factor for current and later psychopathology (Cicchetti & Valentino, 2015). People who have experienced any form of maltreatment show elevated risks of depression, anxiety, and trauma (Hovens et al., 2015; LeMoult et al., 2020; Mandelli et al., 2015). Importantly, a mother's experience of childhood maltreatment (MCM) can have consequences for her child's well-being later on as well: studies reported that MCM is associated with adverse outcomes for both mother and child (Souch et al., 2022), such as hostile parenting (Savage et al., 2019), and an increased risk for psychopathology in offspring (Airikka et al., 2023; Plant et al., 2018; Su et al., 2022). However, although maltreatment experiences can have negative consequences for the next generation, the mechanisms of risk transmission are not fully clear (Madigan et al., 2019; Van IJzendoorn et al., 2020; Zuravin et al., 1996). In this study, we explore whether maternal mental health and mother-child interaction during infancy and middle childhood might explain the intergenerational transmission of maltreatment consequences.

From a developmental psychopathology perspective, a comprehensive framework of risk and protective factors helps explain how adverse life events and maltreatment can disrupt an individual's healthy developmental trajectory (Cicchetti & Toth, 2009; Masten & Cicchetti, 2010; Sroufe, 2007). Several potential mechanisms have been proposed to explain this developmental cascade, which cumulatively influence and shape development across multiple domains (Masten & Cicchetti, 2010). Most prominently, MCM may affect child outcomes through its influence on parenting behaviours, parent-child attachment, and maternal mental health (Loheide-Niesmann et al., 2024).

Parenting, parent-child attachment, and maternal mental health as mediation pathways

Systematic reviews revealed small but statistically significant associations between MCM and various parenting behaviors, including parenting stress (Lotto et al., 2023), harsh and intrusive discipline (Greene et al., 2020), disrupted mother-child interaction (Khoury et al., 2022), and dysfunctional caregiving represented by less warmth and more negative behavior of mothers towards offspring (Buisman et al., 2018). Mothers who experienced maltreatment also seem to have less positive parenting strategies (Greene et al., 2020), such as being supportive (Liu et al.,

2024) and being emotionally available, especially during the first years of the child's life (Fuchs et al., 2015; MacMillan et al., 2021). Studies using observational measures of mothers' sensitivity towards their offspring have shown that MCM was associated with a reduced capacity to respond sensitively to infants (Girod et al., 2023; Pereira et al., 2012). In addition, in a recent review, Leite Ongilio et al. (2023) reported how adverse childhood experiences, including maltreatment in childhood, across 29 studies negatively impact early mother–child interaction. Among those, most studies used observational measures, and 15 employed a longitudinal design. However, follow-up assessments were generally restricted to early childhood, included only one or few time points for repeated interaction assessments, and relied on relatively small samples.

Along the same line, recent research has increasingly examined how maltreatment experiences in one's childhood can affect parent-child attachment later on when transitioning into parenthood. A recent systematic review by Souch et al. (2022) reported on seven studies and indicated that MCM was associated with less optimal observed mother-infant interaction, although the findings were statistically significant in only two studies. However, these studies had relatively small sample sizes, with the largest comprising 255 mother-infant dyads (Juul et al., 2016). Indeed, the lack of power may have played a role, as a very recent meta-analysis combining the results of 25 studies on MCM (including one study that was also part of the review by Souch et al., 2022) found a weak but significant effect. Taken together, these studies suggest that MCM is associated with child attachment insecurity, although no significant associations were found for child attachment disorganization (Sirparanta et al., 2025).

Thus, although effect sizes are small, the experience of MCM can be seen as a risk factor for child outcomes by highlighting the roles of maternal sensitivity and infant-parent attachment as potential mediating pathways (Ma et al., 2022). A few studies dug further into the potential developmental cascade and showed that maternal mental health problems, particularly depression, may be one of the key mechanisms linking MCM with parenting and attachment (Khan & Renk, 2018). Indeed, maternal depression has been associated with impairments in mother–infant bonding (Carlone & Milan, 2021; Chau et al., 2023; Kolk et al., 2021), maternal sensitivity (Bodeker et al., 2019), less responsive parenting behaviors (Michl-Petzing et al., 2019), and greater maternal emotional dysregulation, which is also linked to insecure infant attachment (Langevin et al., 2023). Furthermore, a meta-analysis of Loheide-Niesmann et al. (2022) provided relatively robust

evidence for the mediating role of maternal depressive symptoms in explaining the long-lasting consequences of MCM in the next generation. Taken together, these studies suggest that the effects of maltreatment can extend to the next generation through a developmental cascade, in which family dynamics and parenting behaviors can be impaired by the mother's mental health. This has, however, hardly been comprehensively studied within one model yet.

Current study

Although there is a vast amount of evidence about the transmission of maltreatment, there is still an ongoing body of research focusing on how infant attachment and maternal sensitivity might be affected by maternal experiences of maltreatment during childhood. Most available evidence comes from cross-sectional studies conducted in early childhood (Leite Ongilio et al., 2023), even though the intergenerational transmission of consequences might persist into the school years. Past research suggests potential associations over time (Bravo et al., 2023; Enlow et al., 2018; Loheide-Niesmann et al., 2024; Moog et al., 2023). However, a developmental cascade framework on how maternal mental health can affect parenting and child well-being over time has hardly been examined before (Alto et al., 2021; Khan & Renk, 2018). Finally, among studies with observational measures, most examined early infancy in at risk samples (Vaillancourt et al., 2017), leaving open the question of whether the effects also hold within the general population and can be observed across the childhood years. The present study aimed to deepen the understanding of the association between mothers' childhood maltreatment experiences and their later quality of interaction with their offspring. Specifically, the current study examined the longitudinal links between maternal childhood maltreatment and children's emotional and behavioral problems until middle childhood, focusing on risk (maternal psychopathology) and observed protective factors (attachment and maternal sensitivity) as potential mechanisms. We hypothesize a direct positive association between maternal childhood maltreatment and children's emotional and behavioral problems at age 10. We also expect that infant attachment during the first year, maternal sensitivity (assessed at four time points between ages 1 and 10), and maternal psychopathology (measured during pregnancy and in middle childhood) explain part of this association.

Methods

Design and study population

The present study was part of the Generation R Study, a population-based cohort from fetal life onwards (Kooijman et al., 2016). The participants eligible for this study were pregnant women living in the study area in Rotterdam, the Netherlands, with an expected delivery date between April 2002 and January 2006. The Medical Ethical Committee of the Erasmus University Medical Center, Rotterdam, approved the study. For all participants, written informed consent was obtained. In total, 9,778 mothers were enrolled (response rate: 61%). The current study was conducted using the Generation R Focus Cohort, which is a subsample of children of Dutch national origin. In total 1,106 parent-child dyads enrolled in this sub-sample. The final sample included all children with available information on attachment and sensitivity, comprising 832 children. The measures were collected at different time points: Maternal history of maltreatment and maternal psychopathology were measured prenatally using a self-administered questionnaire; infant attachment was observed during lab visits when children were 1 year old; maternal sensitivity was observed during lab visits at child ages 1, 3, 4 and 10 years. Finally, at 10 years, mothers completed the Child Behavior Checklist and, again, the maternal psychopathology questionnaire.

Measures

Predictor

Maternal childhood maltreatment

The Childhood Trauma Questionnaire (CTQ) was used to assess mothers' history of childhood maltreatment. This retrospective self-report, consisting of 34 items, was filled out by mothers to measure the extent to which they experienced maltreatment before age 18. Mothers rated the items on a 5-point Likert scale from "never true" to "very often true". For this study, we created a dichotomous variable (moderate to severe = 1; not severe = 0) using the cut-off based on Bersntein et al. (2003) if a person scored above the cut-off on any of the five subscales of emotional abuse (score ≥ 13), physical abuse (score ≥ 10), sexual abuse (score ≥ 10), emotional neglect (score ≥ 30), and physical neglect (score ≥ 16), they were assigned a severity score of 1. Additionally, a co-occurrence score was created by summing the number of subscales above the cut-off, to describe the coexistence

of abuse types. The CTQ has demonstrated good test-retest reliability (Bernstein et al., 1997), and is commonly used to measure maltreatment in retrospective studies as a sensitive and valid screening questionnaire (Bernstein et al., 2003).

Mediators

Maternal psychopathology

Maternal general psychopathology was self-reported in a questionnaire during pregnancy and at the age of 10 years, using the validated Dutch version of the Brief Symptom Inventory (BSI; (De Beurs, 2009). This is a 53-item self-report questionnaire in which mothers rated the extent to which each item described her feelings in the past week. The rating scale of the items was 0 (not at all) to 4 (extremely). In this study we used the overall global severity index, by summing all 53 items. The internal consistency was excellent (α=.96).

Infant Attachment

At 14 months, the Strange Situation Procedure (SSP; Ainsworth et al., 1978) was used to measure the quality of attachment. The SSP consists of seven episodes of 1 to 3 minutes each and is designed to evoke mild stress in the infant to trigger attachment behavior. Four attachment behaviors towards the parent were coded in the reunions: (1) proximity and contact seeking, (2) contact maintaining, (3) avoidance of proximity and contact, and (4) resistance to contact and comforting (Ainsworth et al., 1978; Main & Solomon, 1990).

Infants' behavior was coded as secure, insecure-avoidant, or insecure-resistant based on whether children were able to find comfort in their parent when they returned (Ainsworth et al., 1978). Furthermore, children were coded as disorganized or non-disorganized. Children with a disorganized attachment style showed an inconsistent way of coping with the stress during the SSP, for example crying during separation, but avoiding the parent upon return (Main & Solomon, 1990). Reliable coders performed the coding of the infants' behavior; they were trained and qualified to code infant behavior from SSPs at the University of Minnesota. Coders were blind to results on all other measurements. Inter-coder agreement was calculated on 70 SSPs. For ABCD classification, inter-coder agreement was 77% (κ = .63), agreement on security vs insecurity was 83% (κ = .66), and agreement on disorganization was 87% (κ = .64) (Luijk et al., 2010).

Additionally, we calculated a continuous score for secure attachment based on

Richter's algorithm (Van IJzendoorn & Kroonenberg, 1990). The score was based on the child's interactive behaviors, as coded in the reunion episodes. For this study, we used the four attachment classifications (secure, insecure-avoidant, insecure-resistant and disorganized) to describe the sample and the continuous attachment security score for the model.

Observed maternal sensitivity

Maternal observational measures were collected at 4 time points. Namely, the assessments were administered and recorded by trained research assistants in the lab when children were 1, 3, 10 years, and at home at 4 years. The recordings were coded by research assistants who had extensive training to achieve intercoder reliability. All assistants were regularly supervised.

At child age 1 year, maternal sensitivity was observed during five minutes of free play. Maternal sensitivity was coded using Ainsworth's 9-point rating scales for Sensitivity and Cooperation (Ainsworth et al., 1974). The intraclass correlation (ICC) for intercoder agreement was .79 for Sensitivity scale and .69 for Cooperation scale (n = 24). In the study sample, the Sensitivity and Cooperation scales correlated strongly (r = .71).

At 3 and 4 years, maternal sensitivity was observed when mother-child dyads performed two 3-minute tasks that were too difficult for the child: building a tower and an Etch-a-Sketch task. At 10 years, only the Etch-a-Sketch task was performed (6 minutes). Maternal sensitivity was coded using the revised Erickson 7-point rating scales for Supportive Presence and Intrusiveness (Egeland et al., 1990). At 3 years, the total ICCs for the subscales were .75 on average for the tower task (range .73 – .77, n = 53) and .79 on average for the etch-a-sketch task (range .65 – .93, n = 55). At 4 years, the ICCs on average for both tasks were .80 (range .63 – .87, n = 40) (Lucassen et al., 2015). At 10 years, the intercoder reliability was established in 60 cases, with an average ICC of .89 (range .86 – .91). In the study sample, the supportive presence and intrusiveness scales correlated moderately with each other (3y, 4y, and 10y: r = .43, .51, and .40, respectively).

In each wave, a mean sensitivity score was computed by averaging the two scores for each subscale. Specifically, at 1 year, we summed the Sensitivity and Cooperation subscales, and at 3, 4, and 10 years, the Supportive Presence and reverse-coded Intrusiveness subscales.

Outcome

Emotional and behavioral problems

At 10 years, the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2000) was used to assess parent-reported internalizing (emotional) and externalizing (behavioral) problems. The CBCL version 6–18 years contains 112 items rated on a 3-point scale: 0 (not true), 1 (somewhat or sometimes true), and 2 (very true or often true). Raw scores for internalizing (32 items) and externalizing (35 items) problems were created by summing the items. The psychometric properties of the Dutch CBCL are well established (Verhulst & van der Ende, 2013). In this sample, the reliability for the internalizing scale was good (α = .84) as well as for the externalizing scale (α = .87).

Covariates

Birth records were used to determine child date of birth and sex. Maternal age was assessed by postal questionnaire at intake during pregnancy. In addition, because externalizing behavior tends to be higher with more siblings (Olson et al., 2020), we included a measure of the number of children in the model as a covariate.

Statistical analysis

Sample characteristics and bivariate correlations between core study variables were examined using the Statistical Package for the Social Sciences (SPSS) Version 20.0 (IBM Corporation). As a second step, we ran a structural equation model (SEM) to test the extent to which maternal history of childhood maltreatment was associated with offspring internalizing and externalizing problems at the age of 10 years. Besides, to examine whether infant attachment, maternal sensitivity, and maternal psychopathology mediated the association between maternal childhood maltreatment and internalizing and externalizing problems, we evaluated the specific indirect effects, total indirect effects, and total effects using the model indirect option in Mplus. The significance of the parameter estimates was tested with a bootstrap approach through bias corrected estimators (Bollen & Stine, 1992; Shrout & Bolger, 2002). To estimate the models, we used the full information maximum likelihood (FIML) with robust standard errors to account for non-normality and missing values in our data (Enders & Bandalos, 2001). In our sample, the missing data per variable was less than 35%. The SEM analyses were estimated using the MLR estimator. Model fit was evaluated with the

Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root-Mean-Square Error of Approximation (RMSEA). Good model fit was achieved if the TLI and CFI were ≥ .90 and RMSEA ≤ .08 (Hu & Bentler, 1999; Marsh et al., 2004).

Results

The characteristics of the sample are shown in Table 1. Half of the children were boys (50.1 %). Among the mothers, 84.3% never experienced abuse, while 9.7% of them experienced one type of abuse in the past. A small group of mothers (6%) experienced two or more types of abuse in their childhood. Correlations among the variables in the study are presented in Table 2. The different types of maternal childhood maltreatment were positively correlated with each other (e.g. Emotional and Physical abuse, r = 0.51). The different types of maternal childhood maltreatment were positively correlated with maternal psychopathology during pregnancy and at 10 years, as well as with child internalizing and externalizing problems, except for physical abuse with externalizing problems.

Table 1. Descriptives of the study sample

Variable	**N**	**M (SD) or N (%)**
Maternal age at intake (in years)	832	31.9 (3.8)
Siblings, % one or more	832	149 (17.8%)
Child age at different assessments (in years)		
Visit around 1 year	832	1.2 (0.9)
Questionnaire around 10 years	785	9.8 (0.4)
Child sex, % boys	832	421 (50.6%)
Child Behavior Checklist		
Internalizing problems mean score	679	4.5 (4.9)
Externalizing problems mean score	679	3.7 (4.4)
Infant attachment, %	832	
Avoidant		104 (12.5%)
Secure		417 (50.1%)
Resistant		121 (14.5%)
Disorganized		170 (20.4%)
Infant secure attachment score	832	0.27 (2.6)
*Maternal childhood maltreatment, % above cut-off**		
Emotional abuse	758	48 (6.3%)

Physical abuse	764	21 (2.7%)
Sexual abuse	758	26 (3.4%)
Emotional neglect	764	85 (11%)
Physical neglect	764	16 (2.1%)
Maternal childhood maltreatment, any abuse, % yes	765	120 (15.7%)
Co-occurrence of maternal childhood maltreatment types, %	764	
None		645 (84.3%)
One type		74 (9.7%)
Two types		27 (3.5%)
Three types		12 (1.6%)
Four types		3 (0.5%)
Five types		4 (0.5%)
Maternal sensitivity mean score (Ainsworth scale#) at 1 year	772	6.3 (1.1)
Maternal sensitivity mean score (Erickson scale#) at 3 years	718	4.0 (1.0)
Maternal sensitivity mean score (Erickson scale#) at 4 years	542	3.5 (1.0)
Maternal sensitivity mean score (Erickson scale#) at 10 years	707	3.9 (1.1)
Maternal psychopathology mean item score during pregnancy	775	0.18 (0.2)
Maternal psychopathology mean item score at 10 years	677	0.20 (0.2)

Note: *Based on Childhood Trauma Questionnaire. #range Ainsworth scale 19 pints; range Erickson scale 1-7 points.

Table 2. Bivariate correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Secure score (attachment)	1																
2. Emotional abuse	-.02	1															
3. Physical abuse	.02	.61**	1														
4. Sexual abuse	.00	.36**	.44**	1													
5. Emotional neglect	-.03	.57**	.37**	.23**	1												
6. Physical neglect	-.04	.48**	.39**	.36**	.40**	1											
7. Abuse (yes vs. no)	-.03	.63**	.41**	.44**	.68**	.41**	1										
8. Sensitivity at 1 year	.05	-.04	-.06	.00	-.05	.02	-.07	1									
9. Sensitivity at 3 years	.05	-.03	.01	-.03	-.11**	-.02	-.05	.20**	1								
10. Sensitivity at 4 years	.03	-.01	.02	.03	-.06	-.02	-.01	.14**	.37**	1							
11. Sensitivity at 10 years	.04	-.02	.00	-.01	-.02	-.03	.01	.11**	.27**	.31**	1						
12. Maternal psychopathology pregnancy	-.05	.28**	.20**	.18**	.23**	.21**	.19**	-.06	-.05	-.04	-.03	1					
13. Maternal psychopathology at 10 years	-.05	.18**	.10*	.10**	.17**	.14**	.15**	-.01	.02	.01	.00	.47**	1				
14. Internalizing problems at 10 years	-.05	.20**	.13**	.15**	.13**	.08*	.17**	.05	.00	.06	-.05	.28**	.36**	1			
15. Externalizing problems at 10 years	-.04	.18**	.07	.13**	.13**	.14**	.16**	-.02	-.08*	-.04	-.11**	.22**	.32**	.52**	1		
16. Child sex (boy vs. girl)	.04	-.01	.00	-.03	.02	.02	.01	.09*	.08*	.02	.07	-.09*	-.06	-.06	-.09*	1	
17. Siblings (yes vs. no)	.03	.04	.00	-.02	.00	-.02	.01	.04	.03	.03	.04	-.03	-.06	-.05	-.04	.04	1

P value: **. < 0.01; < *. 0.05

Structural model

The full model is shown in Figure 1. The model fit was good (CFI = .99; TLI = .98; RMSEA = .02). There was a significant direct link between maternal childhood maltreatment (MCM) and children's externalizing behavior (β= .11, SE = .04; p < .05), internalizing problems (β= .12, SE = .04; p < .05), as well as with maternal psychopathology during pregnancy (β= .19, SE = .07; p < .05). However, no significant links were found with attachment or maternal sensitivity. Additionally, higher levels of maternal psychopathology at 10 years were linked to more internalizing and externalizing problems (see Figure 1 and Table 3). Maternal sensitivity at 1 year was directly and positively related to externalizing problems (β= .07, SE = .04; p < .05), while maternal sensitivity at 10 years was negatively associated with internalizing problems (β= -.09, SE = .03; p < .05).

Additionally, we found a significant indirect effect from MCM to externalizing problems through the path that includes maternal psychopathology during pregnancy and at 10 years (β=.29, 95% CI [.16,.50]). A similar path via maternal psychopathology during pregnancy and at 10 years (β=.33, 95% CI [.18,.56]) was found for internalizing problems.

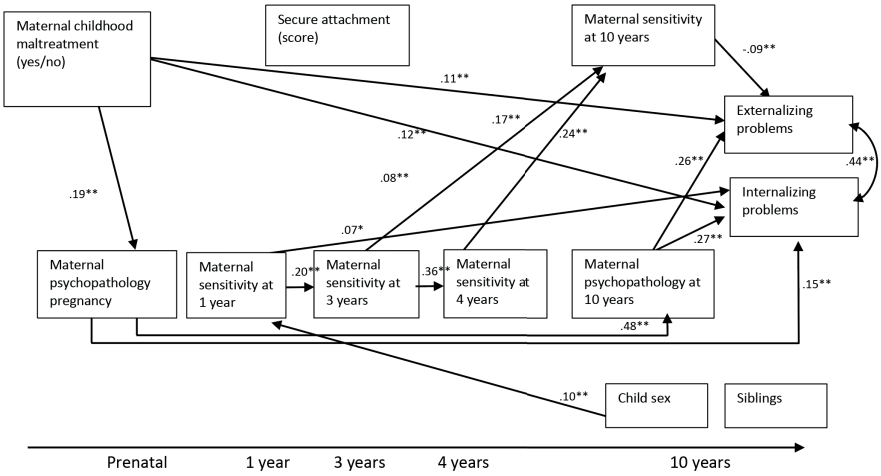

Figure 1. Model of MCM, parent-child mediators and children's emotional and behavioral problems
Notes: *p < .05; **<.01. Numeric values are standardized path regression coefficients. Non-significant paths are not shown in the figure. Child sex coded boys = 1, girls = 2.

Table 3. Standardized path coefficients for the model of maternal childhood maltreatment, parent-child mediators and children's internalizing and externalizing problems

Independent	Dependent	B	SE	p value
MCM	**Child externalizing problems**	**.11**	**.05**	**.03**
Maternal sensitivity at 1 year	Child externalizing problems	.01	.04	.79
Maternal sensitivity at 3 years	Child externalizing problems	-.05	.04	.25
Maternal sensitivity at 4 years	Child externalizing problems	-.00	.04	.95
Maternal sensitivity at 10 years	**Child externalizing problems**	**-.09**	**.04**	**.03**
Maternal psychopathology during pregnancy	Child externalizing problems	.09	.05	.09
Maternal psychopathology at 10 years	**Child externalizing problems**	**.26**	**.05**	**.00**
Secure attachment (score)	Child externalizing problems	-.01	.04	.84
Child sex	Child externalizing problems	-.05	.04	.32
Siblings	Child externalizing problems	-.04	.09	.65
MCM	**Child internalizing problems**	**.12**	**.05**	**.01**
Maternal sensitivity at 1 year	**Child internalizing problems**	**.07**	**.03**	**.04**
Maternal sensitivity at 3 years	Child internalizing problems	-.10	.04	.73
Maternal sensitivity at 4 years	Child internalizing problems	.08	.05	.11
Maternal sensitivity at 10 years	Child internalizing problems	-.07	.04	.08
Maternal psychopathology during pregnancy	**Child internalizing problems**	**.15**	**.06**	**.01**
Maternal psychopathology at 10 years	**Child internalizing problems**	**.27**	**.06**	**.00**
Secure attachment (score)	Child internalizing problems	-.02	.04	.53
Child sex	Child internalizing problems	-.03	.04	.42
Siblings	Child internalizing problems	-.07	.09	.46
MCM	**Maternal psychopathology during pregnancy**	**.19**	**.05**	**.00**
MCM	Maternal psychopathology at 10 years	.08	.05	.13
Maternal psychopathology during pregnancy	**Maternal psychopathology at 10 years**	**.48**	**.06**	**.00**
MCM	Secure attachment (score)	-.02	.04	.71
Maternal psychopathology during pregnancy	Secure attachment (score)	-.05	.03	.09
Maternal sensitivity at 1 year	Secure attachment (score)	.05	.03	.16
MCM	Maternal sensitivity at 1 year	-.06	.04	.15
Maternal psychopathology during pregnancy	Maternal sensitivity at 1 year	-.04	.04	.26
Child sex	**Maternal sensitivity at 1 year**	**.10**	**.04**	**.02**
Siblings	Maternal sensitivity at 1 years	.08	.09	.39
Maternal sensitivity at 1 year	**Maternal sensitivity at 3 years**	**.20**	**.04**	**.00**

MCM	Maternal sensitivity at 3 years	-.03	-04	.41
Maternal psychopathology during pregnancy	Maternal sensitivity at 3 years	-.06	.04	.16
Child sex	Maternal sensitivity at 3 years	.07	.04	.08
Siblings	Maternal sensitivity at 3 years	.60	.09	.55
Maternal sensitivity at 1 year	Maternal sensitivity at 4 years	.05	.04	.23
Maternal sensitivity at 3 year	**Maternal sensitivity at 4 years**	**.36**	**.04**	**.00**
MCM	Maternal sensitivity at 4 years	.02	.05	.64
Maternal psychopathology during pregnancy	Maternal sensitivity at 4 years	-.03	.05	.64
Child sex	Maternal sensitivity at 4 years	-.02	.40	.59
Siblings	Maternal sensitivity at 4 years	.04	.09	.71
Maternal sensitivity at 1 year	Maternal sensitivity at 10 years	.04	.04	.30
Maternal sensitivity at 3 year	**Maternal sensitivity at 10 years**	**.17**	**.04**	**.00**
Maternal sensitivity at 4 year	**Maternal sensitivity at 10 years**	**.24**	**.05**	**.00**
MCM	Maternal sensitivity at 10 years	.02	.04	.60
Maternal psychopathology during pregnancy	Maternal sensitivity at 10 years	-.01	.04	.79
Maternal psychopathology at 10 years	Maternal sensitivity at 10 years	.01	.05	.86
Child sex	Maternal sensitivity at 10 years	.05	.04	.22
Siblings	Maternal sensitivity at 10 years	.07	.10	.50
Internalizing problems	**WITH Externalizing problems**	**.45**	**.04**	**.00**

Note: #MCM: Maternal childhood maltreatment. Significant paths are in bold.

Discussion

This study investigated the longitudinal association of maternal childhood maltreatment and offsprings' emotional and behavioral problems in the first 10 years of life. We expected that early components of the child–parent relationship, such as attachment and maternal sensitivity, would mediate this relationship. However, our hypotheses were only partially supported, in which maternal psychopathology emerged as an important factor, whereas mother–child interaction played a comparatively more minor role.

Direct and indirect associations between MCN and emotional and behavioral problems

Our work extends prior research in several ways. The results indicated a direct association of maternal childhood maltreatment with children's emotional and behavioral problems in middle childhood. This finding is comparable with other studies pointing to the intergenerational effect of maltreatment experiences in

mothers (Airikka et al., 2023; Moog et al., 2023; Plant et al., 2018; Su et al., 2022). Moreover, we found higher levels of maternal psychopathology among mothers with maltreatment experiences, which in turn were associated with increased emotional and behavioral problems of their children. This finding, together with previous research (Greene et al., 2020; Loheide-Niesmann et al., 2024), highlights the relevance of maternal mental health as a long-lasting consequence of negative life events such as maltreatment experiences. Consistent with the longitudinal study by Clemens et al. (2024), it is important to note that our findings suggest that the effect of maternal mental health problems may be cumulative, as maternal psychopathology during pregnancy was strongly associated with maternal psychopathology at 10 years, and this pathway, in turn, mediated the association between MCM and child outcomes. As such, preventive interventions should start early. This is also supported by previous research, that for instance showed that postpartum depression from mother who experienced maltreatment in the past was associated with bonding between mother and child early in infancy (Vogel et al., 2025).

Infant attachment and maternal sensitivity

Contrary to our expectations, early relational processes such as infant attachment and maternal sensitivity did not explain the relationship between maternal childhood maltreatment and child emotional and behavioral problems. This finding aligns with the results from recent reviews (Souch et al., 2022; Leite Ongilio, et al.,2023) and a recent meta-analysis (Sirparanta et al., 2025), which together hint at a weak association between MCM and offspring attachment that was only statistically significant when combining the results of 25 different studies. Other studies have also found no significant association with maternal sensitivity (Bodeker et al., 2019; Stacks et al., 2014) and no significant mediation of infant insecure attachment (Ahlfs-Dunn et al., 2022) or disorganized attachment in the link between MCM and later child psychopathology (Alto et al., 2021).

We expected that MCM would be associated with mother-child attachment in our study with a relatively large sample size. One possible explanation for the lack of significance is that infant attachment in a high socioeconomic context, as in our study, may not be affected by MCM. This might suggest that past experiences of maltreatment in mothers are only a single (parent-related) risk factor, and in itself not enough to affect the development of an attachment relationship (Assink et al., 2018). A context of multiple risk factors might be associated with

more severe consequences, as past research has demonstrated in high-social-risk samples (Stacks et al., 2014). In addition, the limited number of mothers with maltreatment experiences in the past in our sample and the relatively healthy, affluent nature of our sample may explain why this association was not evident. In this way, maternal sensitivity and attachment seem to be affected by more than only the experience of maltreatment, or perhaps the effect of such experiences might be neutralized by the presence of certain protective factors. For instance, based on the findings of Swerbenski et al (2023), trauma resolution moderates the associations between maternal physical neglect and sensitive parenting, having a protective-enhancing impact on maternal sensitivity. Thus, the inclusion of more protective factors might enhance the understanding of the lack of significance in this sample, as in fact, breaking the intergenerational cycle of abuse is the most common outcome for mothers who survive to maltreatment experiences in their childhood (Morelen et al., 2018).

Past research has found that parenting practices displayed by mothers who experienced maltreatment in childhood may be key in buffering the consequences for the next generation (Riva Crugnola et al., 2019). Our null findings for maternal sensitivity might be explained by other parenting practices that were not included in this study, which may buffer the effect of maltreatment experiences and prevent the cycle of abuse from continuing. Consistent with recent evidence of a meta-analysis from Loheide-Niesman et al. (2024), mixed findings in the intergenerational transmission of the effects of maternal childhood maltreatment suggest that parenting is one component of a broader network of mediating and/or moderating factors involved in this transmission. Although we have already considered multiple factors, future research should ideally include additional potential mediating variables.

Despite the non-significant direct associations between maternal childhood maltreatment and relational outcomes such as attachment and maternal sensitivity, we found evidence of an association between maternal sensitivity during infancy and the presence of internalizing problems during middle childhood. However, the association was positive, indicating that higher levels of maternal sensitivity at 1 year were associated with the presence of internalizing problems at 10 years. This counterintuitive result may be related to the large gap between assessments, particularly given that maternal sensitivity at 10 years was negatively associated with externalizing problems. This finding underscores that parental sensitivity may change slightly over time and that it may serve as a

protective factor in child development, particularly in the presence of indirect risk factors like a mother's history of childhood maltreatment (Dryer et al., 2022).

Strengths and limitations

Our study has several strengths, including the use of observational measures to assess infant attachment and maternal sensitivity from infancy to middle childhood. Additionally, the longitudinal design enabled us to investigate the long-term effects of the MCM. Nevertheless, this study has several limitations that should be noted. First, this study is based on a subsample of mothers of Dutch origin with a relatively high socioeconomic status. Therefore, the generalizability and the interpretation of the results must be done with caution due to the sample characteristics. Second, this study did not include fathers. Thus, we could not infer whether maltreatment experiences, attachment, or paternal sensitivity among fathers are associated with children's well-being, or what the role of fathers might be in the intergenerational transmission of MCM consequences. As such, we were not able to identify the potential buffering role of paternal attachment and sensitivity, or if the joint effect of both parents dilutes the association between MCM and child outcomes. Third, the retrospective report of maltreatment experiences could be affected by the capacity of mothers to remember maltreatment events, potentially leading to under- or over-reporting those experiences. This could lead to a potential issue between objective and subjective measurements of maltreatment. However, even in the absence of an objective measure of maltreatment, the subjective experience provided by participants can explain the subsequent presence of psychopathology, thus making it a reliable tool to measure maltreatment in the past (Danese & Widom, 2023). Fourth, another limitation is that we did not include other variables that may explain the intergenerational transmission of maltreatment, such as genetic factors. Past research has found evidence for a moderating effect of genes in the association between a mother's history of abuse and offspring disorganized attachment (Ludmer et al., 2018). We cannot infer on the potential genetic effect in our study, and suggest future studies to use a prospective design including multiple variables to examine such complex interactions. Finally, this study did not include information on the broader social context. As indicated, it lacked information on the role of the child's father, but also lacked information on other social support systems, such as family, friends, or neighbors. Further research should expand the scope of mother-child interactions and include variables related to the immediate support network that the family system might have.

Conclusions

In conclusion, our study substantiates the long-term consequences of maternal childhood maltreatment on offspring's well-being up until middle childhood. Moreover, our results imply that the associations between maternal childhood maltreatment and children's well-being are mediated by maternal psychopathology. This finding suggests that one of the mechanisms to intervene on is maternal psychopathology, which can be addressed early, even before the child is born. In this line, this might offer preventive opportunities to break the intergenerational transmission of MCM and pre-existing maternal psychopathology consequences. Besides maternal psychopathology, we found no evidence that past maltreatment experiences affect the emotional attachment that mothers will build with their offspring. This may provide a message of hope and suggests that mothers with maltreatment experiences have the capacity to overcome that experience in their interactions with their offspring. This reflects the complexity of MCM and its potential consequences and suggests that multiple risk and protective factors, or at least more than we included, should be considered in conjunction to truly understand MCM consequences for the next generation.

References

Ahlfs-Dunn, S. M., Benoit, D., & Huth-Bocks, A. C. (2022). Intergenerational transmission of trauma from mother to infant: the mediating role of disrupted prenatal maternal representations of the child. *Attachment & Human Development*, *24*(2), 229-251. https://doi.org/10.1080/14616734.2021.1933769

Ainsworth, M. D. S., Bell, S. M., & Stayton, D. F. (1974). Infant-mother attachment and social development: Socialization as a product of reciprocal responsiveness to signals. In *The integration of a child into a social world* (pp. 99-135). Cambridge University Press.

Airikka, A., Lahti-Pulkkinen, M., Tuovinen, S., Heinonen, K., Lahti, J., Girchenko, P., Lahdepuro, A., Pyhala, R., Czamara, D., Villa, P., Laivuori, H., Kajantie, E., Binder, E. B., & Raikkonen, K. (2023). Maternal exposure to childhood maltreatment and mental and behavioral disorders in children. *Eur Child Adolesc Psychiatry*, *32*(12), 2463-2475. https://doi.org/10.1007/s00787-022-02090-8

Alto, M. E., Warmingham, J. M., Handley, E. D., Rogosch, F., Cicchetti, D., & Toth, S. L. (2021). Developmental pathways from maternal history of childhood maltreatment and maternal depression to toddler attachment and early childhood behavioral outcomes. *Attachment & Human Development*, *23*(3), 328-349. https://doi.org/10.1080/14616734.2020.1734642

Assink, M., Spruit, A., Schuts, M., Lindauer, R., van der Put, C. E., & Stams, G. J. J. M. (2018). The intergenerational transmission of child maltreatment: A three-level meta-analysis. *Child Abuse & Neglect*, *84*, 131-145. https://doi.org/10.1016/j.chiabu.2018.07.037

Bernstein, D. P., Ahluvalia, T., Pogge, D., & Handelsman, L. (1997). Validity of the Childhood Trauma Questionnaire in an adolescent psychiatric population. *Journal of the American Academy of Child and Adolescent Psychiatry*, *36*(3), 340-348. https://doi.org/10.1097/00004583-199703000-00012

Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., Stokes, J., Handelsman, L., Medrano, M., Desmond, D., & Zule, W. (2003). Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child Abuse & Neglect*, *27*(2), 169-190. https://doi.org/10.1016/S0145-2134(02)00541-0

Bodeker, K., Fuchs, A., Fuhrer, D., Kluczniok, D., Dittrich, K., Reichl, C., Reck, C., Kaess, M., Hindi Attar, C., Mohler, E., Neukel, C., Bierbaum, A. L., Zietlow, A. L., Jaite, C., Lehmkuhl, U., Winter, S. M., Herpertz, S., Brunner, R., Bermpohl, F., & Resch, F. (2019). Impact of Maternal Early Life Maltreatment and Maternal History of Depression on Child Psychopathology: Mediating Role of Maternal Sensitivity? *Child Psychiatry Hum Dev*, *50*(2), 278-290. https://doi.org/10.1007/s10578-018-0839-z

Bollen, K. A., & Stine, R. A. (1992). Bootstrapping Goodness-of-Fit Measures in Structural Equation Models. *Sociological Methods & Research*, *21*(2), 205-229. https://doi.org/10.1177/0049124192021002004

Bravo, P., Kim, Y., Xerxa, Y., Koopman-Verhoeff, M. E., Cárcamo, R., Oldehinkel, A., Hillegers, M., & Jansen, P. (2023). Maternal history of maltreatment and offspring's emotional and behavioral problems in adolescence: Do family factors contribute to the intergenerational risk transmission? *Child Abuse Negl*, *141*, 106228. https://doi.org/10.1016/j.chiabu.2023.106228

Buisman, R. S. M., Bakermans-Kranenburg, M. J., Pittner, K., Compier-de Block, L. H. C. G., van

den Berg, L. J. M., Van IJzendoorn, M. H., Tollenaar, M. S., Elzinga, B. M., Lindenberg, J., & Alink, L. R. A. (2018). Parents' experiences of childhood abuse and neglect are differentially associated with behavioral and autonomic responses to their offspring. *Developmental Psychobiology*, *61*(6), 888-902. https://doi.org/10.1002/dev.21822

Carlone, C., & Milan, S. (2021). Maternal Depression and Child Externalizing Behaviors: The Role of Attachment Across Development in Low-income Families. *Research on Child and Adolescent Psychopathology*, *49*(5), 603-614. https://doi.org/10.1007/s10802-020-00747-z

Chau, V., Dryer, R., & Brunton, R. (2023). Examining the relationship between maternal childhood abuse history and mother-infant bonding: The mediating roles of postpartum depression and maternal self-efficacy. *Child Abuse & Neglect*, *145*. https://doi.org/10.1016/j.chiabu.2023.106439

Cicchetti, D., & Toth, S. L. (2009). The past achievements and future promises of developmental psychopathology: the coming of age of a discipline. *J Child Psychol Psychiatry*, *50*(1-2), 16-25. https://doi.org/10.1111/j.1469-7610.2008.01979.x

Cicchetti, D., & Valentino, K. (2015). An Ecological-Transactional Perspective on Child Maltreatment: Failure of the Average Expectable Environment and Its Influence on Child Development. In *Developmental Psychopathology* (pp. 129-201). https://doi.org/https://doi.org/10.1002/9780470939406.ch4

Clemens, V., Wernecke, D., Fegert, J. M., Genuneit, J., Rothenbacher, D., & Braig, S. (2025). Maternal child maltreatment and trajectories of offspring behavioural and emotional difficulties from age 4 to 7 years - results from a prospective birth cohort study. *European Child & Adolescent Psychiatry*, *34*(3), 1039-1050. https://doi.org/10.1007/s00787-024-02534-3

Danese, A., & Widom, C. S. (2023). Associations between objective and subjective experiences of childhood maltreatment and the course of emotional disorders in adulthood. *Jama Psychiatry*, *80*(10), 1009-1016. https://doi.org/10.1001/jamapsychiatry.2023.2140

De Beurs, E. (2009). BSI: Brief symptom inventory. *Handleiding Addendum*.

Dryer, A., Zhang, X. T., -Mason, G. E., Atkinson, L., & Gonzalez, A. (2022). Maternal sensitivity moderates the association between maternal history of childhood maltreatment and child executive function. *Child Abuse & Neglect*, *134*. https://doi.org/10.1016/j.chiabu.2022.105933

Egeland, B., Erickson, M. F., Clemenhagen-Moon, J., Hiester, M. K., & Korfmacher, J. (1990). 24 months tools coding manual: Project STEEP revised 1990 from mother–child project scales. *Unpublished manuscript, University of Minnesota, Minneapolis*.

Enders, C. K., & Bandalos, D. L. (2001). The Relative Performance of Full Information Maximum Likelihood Estimation for Missing Data in Structural Equation Models. *Structural Equation Modeling-a Multidisciplinary Journal*, *8*(3), 430-457. https://doi.org/10.1207/S15328007sem0803_5

Enlow, M. B., Englund, M. M., & Egeland, B. (2018). Maternal Childhood Maltreatment History and Child Mental Health: Mechanisms in Intergenerational Effects. *Journal of Clinical Child and Adolescent Psychology*, *47*, S47-S62. https://doi.org/10.1080/15374416.2016.1144189

Fuchs, A., Mohler, E., Resch, F., & Kaess, M. (2015). Impact of a maternal history of childhood abuse on the development of mother-infant interaction during the first year of

life. *Child Abuse Negl*, *48*, 179-189. https://doi.org/10.1016/j.chiabu.2015.05.023

Greene, C. A., Haisley, L., Wallace, C., & Ford, J. D. (2020). Intergenerational effects of childhood maltreatment: A systematic review of the parenting practices of adult survivors of childhood abuse, neglect, and violence. *Clinical Psychology Review*, *80*. https://doi.org/10.1016/j.cpr.2020.101891

Hovens, J. G. F. M., Giltay, E. J., Spinhoven, P., van Hemert, A. M., & Penninx, B. W. J. H. (2015). Impact of Childhood Life Events and Childhood Trauma on the Onset and Recurrence of Depressive and Anxiety Disorders. *Journal of Clinical Psychiatry*, *76*(7), 931-938. https://doi.org/10.4088/JCP.14m09135

Hu, L. T., & Bentler, P. M. (1999). Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives. *Structural Equation Modeling-a Multidisciplinary Journal*, *6*(1), 1-55. https://doi.org/10.1080/10705519909540118

Juul, S. H., Hendrix, C., Robinson, B., Stowe, Z. N., Newport, D. J., Brennan, P. A., & Johnson, K. C. (2016). Maternal early-life trauma and affective parenting style: the mediating role of HPA-axis function. *Archives of Womens Mental Health*, *19*(1), 17-23. https://doi.org/10.1007/s00737-015-0528-x

Khan, M., & Renk, K. (2018). Understanding the pathways between mothers' childhood maltreatment experiences and patterns of insecure attachment with young children via symptoms of depression. *Child Psychiatry & Human Development*, *49*(6), 928-940. https://doi.org/10.1007/s10578-018-0808-6

Khoury, J. E., Dimitrov, L., Enlow, M. B., Haltigan, J. D., Bronfman, E., & Lyons-Ruth, K. (2022). Patterns of Maternal Childhood Maltreatment and Disrupted Interaction Between Mothers and Their 4-Month-Old Infants. *Child Maltreat*, *27*(3), 366-377. https://doi.org/10.1177/10775595211007567

Kolk, T. A., Nath, S., Howard, L. M., Pawlby, S., Lockwood-Estrin, G., & Trevillion, K. (2021). The association between maternal lifetime interpersonal trauma experience and perceived mother-infant bonding. *Journal of Affective Disorders*, *294*, 117-127. https://doi.org/10.1016/j.jad.2021.06.069

Kooijman, M. N., Kruithof, C. J., van Duijn, C. M., Duijts, L., Franco, O. H., Van IJzendoorn, M. H., de Jongste, J. C., Klaver, C. C. W., van der Lugt, A., Mackenbach, J. P., Moll, H. A., Peeters, R. P., Raat, H., Rings, E. H. H. M., Rivadeneira, F., van der Schroeff, M. P., Steegers, E. A. P., Tiemeier, H., Uitterlinden, A. G., . . . Jaddoe, V. W. V. (2016). The Generation R Study: design and cohort update 2017. *European Journal of Epidemiology*, *31*(12), 1243-1264. https://doi.org/10.1007/s10654-016-0224-9

Langevin, R., Gagné, M. E., Brassard, A., & Fernet, M. (2023). Intergenerational Continuity of Child Maltreatment: The Role of Maternal Emotional Dysregulation and Mother-Child Attachment. *Psychology of Violence*, *13*(1), 1-12. https://doi.org/10.1037/vio0000409

Leite Ongilio, F. L., Gaspardo, C. M., & Linhares, M. B. M. (2023). Maternal History of Adversity and Subsequent Mother-Child Interactions at Early Ages: A Systematic Review. *Trauma Violence & Abuse*, *24*(5), 3412-3432. https://doi.org/10.1177/15248380221130355

LeMoult, J., Humphreys, K. L., Tracy, A., Hoffmeister, J. A., Ip, E., & Gotlib, I. H. (2020). Meta-analysis: Exposure to Early Life Stress and Risk for Depression in Childhood and Adolescence. *Journal of the American Academy of Child and Adolescent Psychiatry*, *59*(7), 842-855. https://doi.org/10.1016/j.jaac.2019.10.011

Loheide-Niesmann, L., Riem, M. M. E., & Cima, M. (2024). The impact of maternal childhood

maltreatment on child externalizing behaviour and the mediating factors underlying this association: a three-level meta-analysis and systematic review. *European Child & Adolescent Psychiatry*, *33*(8), 2445-2470. https://doi.org/10.1007/s00787-022-02117-0

Lotto, C. R., Altafim, E. R. P., & Linhares, M. B. M. (2023). Maternal History of Childhood Adversities and Later Negative Parenting: A Systematic Review. *Trauma Violence & Abuse*, *24*(2), 662-683. https://doi.org/10.1177/15248380211036076

Lucassen, N., Kok, R., Bakermans-Kranenburg, M. J., Van IJzendoorn, M. H., Jaddoe, V. W. V., Hofman, A., Verhulst, F. C., Lambregtse-Van den Berg, M. P., & Tiemeier, H. (2015). Executive functions in early childhood: The role of maternal and paternal parenting practices. *British Journal of Developmental Psychology*, *33*(4), 489-505. https://doi.org/10.1111/bjdp.12112

Ludmer, J. A., Gonzalez, A., Kennedy, J., Masellis, M., Meinz, P., & Atkinson, L. (2018). Association between maternal childhood maltreatment and mother-infant attachment disorganization: Moderation by maternal oxytocin receptor gene and cortisol secretion. *Hormones and Behavior*, *102*, 23-33. https://doi.org/10.1016/j.yhbeh.2018.04.006

Luijk, M. P. C. M., Saridjan, N., Tharner, A., van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., Jaddoe, V. W. V., Hofman, A., Verhulst, F. C., & Tiemeier, H. (2010). Attachment, Depression, and Cortisol: Deviant Patterns in Insecure-Resistant and Disorganized Infants. *Developmental Psychobiology*, *52*(5), 441-452. https://doi.org/10.1002/dev.20446

Ma, X., Biaggi, A., Sacchi, C., Lawrence, A. J., Chen, P. J., Pollard, R., Matter, M., Mackes, N., Hazelgrove, K., Morgan, C., Harding, S., Simonelli, A., Schumann, G., Pariante, C. M., Mehta, M., Montana, G., Rodriguez-Mateos, A., Nosarti, C., & Dazzan, P. (2022). Mediators and moderators in the relationship between maternal childhood adversity and children's emotional and behavioural development: a systematic review and meta-analysis. *Psychol Med*, *52*(10), 1817-1837. https://doi.org/10.1017/S0033291722001775

MacMillan, K. K., Lewis, A. J., Watson, S. J., Jansen, B., & Galbally, M. (2021). Maternal trauma and emotional availability in early mother-infant interaction: findings from the Mercy Pregnancy and Emotional Well-being Study (MPEWS) cohort. *Attachment & Human Development*, *23*(6), 853-875. https://doi.org/10.1080/14616734.2020.1790116

Madigan, S., Cyr, C., Eirich, R., Fearon, R. M. P., Ly, A., Rash, C., Poole, J. C., & Alink, L. R. A. (2019). Testing the cycle of maltreatment hypothesis: Meta-analytic evidence of the intergenerational transmission of child maltreatment. *Development and Psychopathology*, *31*(1), 23-51. https://doi.org/10.1017/S0954579418001700

Main, M., & Solomon, J. (1990). Procedures for Identifying Infants as Disorganised/Disoriented during the Ainsworth Strange Situation. In M. Greenberg, D. Cicchetti, & E. Cummings (Eds.), *Attachment in the Preschool Years: Theory, Research, and Intervention* (pp. 121-160). The University of Chicago Press.

Mandelli, L., Petrelli, C., & Serretti, A. (2015). The role of specific early trauma in adult depression: A meta-analysis of published literature. Childhood trauma and adult depression. *European Psychiatry*, *30*(6), 665-680. https://doi.org/10.1016/j.eurpsy.2015.04.007

Marsh, H. W., Wen, Z. L., & Hau, K. T. (2004). Structural equation models of latent interactions:

Evaluation of alternative estimation strategies and indicator construction. *Psychological methods*, *9*(3), 275-300. https://doi.org/10.1037/1082-989x.9.3.275

Masten, A. S., & Cicchetti, D. (2010). Developmental cascades. *Development and Psychopathology*, *22*(3), 491-495. https://doi.org/10.1017/S0954579410000222

Michl-Petzing, L. C., Handley, E. D., Sturge-Apple, M., Cicchetti, D., & Toth, S. L. (2019). Re-Examining the "Cycle of Abuse": Parenting Determinants Among Previously Maltreated, Low-Income Mothers. *Journal of Family Psychology*, *33*(6), 742-752. https://doi.org/10.1037/fam0000534

Moog, N. K., Cummings, P. D., Jackson, K. L., Aschner, J. L., Barrett, E. S., Bastain, T. M., Blackwell, C. K., Enlow, M. B., Breton, C., Bush, N. R., Deoni, S. C. L., Duarte, C. S., Ferrara, A., Grant, T. L., Hipwell, A. E., Jones, K., Leve, L. D., Lovinsky-Desir, S., Miller, R. K., . . . Collaborators, E. (2023). Intergenerational transmission of the effects of maternal exposure to childhood maltreatment in the USA: a retrospective cohort study. *Lancet Public Health*, *8*(3), E226-E237. https://doi.org/10.1016/S2468-2667(23)00025-7

Morelen, D., Rosenblum, K. L., & Muzik, M. (2018). Childhood maltreatment and motherhood: implications for maternal well-being and mothering. In M. Muzik & K. L. Rosenblum (Eds.), *Motherhood in the Face of Trauma: Pathways Towards Healing and Growth* (pp. 23-37). Springer International Publishing. https://doi.org/10.1007/978-3-319-65724-0_2

Olson, S. L., Ip, K. I., Gonzalez, R., Beyers-Carlson, E. E. A., & Volling, B. L. (2020). Development of Externalizing Symptoms Across the Toddler Period: The Critical Role of Older Siblings. *Journal of Family Psychology*, *34*(2), 165-174. https://doi.org/10.1037/fam0000581

Plant, D. T., Pawlby, S., Pariante, C. M., & Jones, F. W. (2018). When one childhood meets another - maternal childhood trauma and offspring child psychopathology: A systematic review. *Clin Child Psychol Psychiatry*, *23*(3), 483-500. https://doi.org/10.1177/1359104517742186

Riva Crugnola, C., Ierardi, E., Bottini, M., Verganti, C., & Albizzati, A. (2019). Childhood experiences of maltreatment, reflective functioning and attachment in adolescent and young adult mothers: Effects on mother-infant interaction and emotion regulation. *Child Abuse & Neglect*, *93*, 277-290. https://doi.org/10.1016/j.chiabu.2019.03.024

Savage, L. E., Tarabulsy, G. M., Pearson, J., Collin-Vezina, D., & Gagne, L. M. (2019). Maternal history of childhood maltreatment and later parenting behavior: A meta-analysis. *Development and Psychopathology*, *31*(1), 9-21. https://doi.org/10.1017/S0954579418001542

Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological methods*, *7*(4), 422-445. https://doi.org/10.1037//1082-989x.7.4.422

Sirparanta, A. E., Touati, C. D., Cyr, C., & Miljkovitch, R. (2025). Parental history of childhood maltreatment and offspring attachment insecurity and disorganization: Two meta-analyses. *Trauma Violence & Abuse*, *26*(3), 420-435. https://doi.org/10.1177/15248380241282995

Souch, A. J., Jones, I. R., Shelton, K. H. M., & Waters, C. S. (2022). Maternal childhood maltreatment and perinatal outcomes: A systematic review. *J Affect Disord*, *302*, 139-159. https://doi.org/10.1016/j.jad.2022.01.062

Sroufe, A. (2007). The place of development in developmental psychopathology. In A. S. Masten (Ed.), *Multilevel dynamics in developmental psychopathology: The Minnesota Symposia on Child Psychology* (Vol. 34, pp. 285-299). Lawrence Erlbaum Associates.

Stacks, A. M., Muzik, M., Wong, K., Beeghly, M., Huth-Bocks, A., Irwin, J. L., & Rosenblum, K. L. (2014). Maternal reflective functioning among mothers with childhood maltreatment histories: links to sensitive parenting and infant attachment security. *Attachment & Human Development*, *16*(5), 515-533. https://doi.org/10.1080/14616734.2014.935452

Su, Y. Y., D'Arcy, C., & Meng, X. F. (2022). Intergenerational effect of maternal childhood maltreatment on next generation's vulnerability to psychopathology: A systematic review with meta-analysis. *Trauma Violence & Abuse*, *23*(1), 152-162. https://doi.org/10.1177/1524838020933870

Swerbenski, H. G., Sturge-Apple, M. L., Messina, G., Toth, S. L., Rogosch, F., & Cicchetti, D. (2024). Maternal childhood maltreatment trauma resolution: Development of a novel narrative coding measure and implications for intergenerational parenting processes. *Development and psychopathology, 36*(4), 1916-1931. https://doi.org/10.1017/S0954579423001256

Vaillancourt, K., Pawlby, S., & Fearon, R. M. (2017). History of Childhood Abuse and Mother-Infant Interaction: A Systematic Review of Observational Studies. *Infant Ment Health J*, *38*(2), 226-248. https://doi.org/10.1002/imhj.21634

Van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., Coughlan, B., & Reijman, S. (2020). Annual Research Review: Umbrella synthesis of meta-analyses on child maltreatment antecedents and interventions: differential susceptibility perspective on risk and resilience. *J Child Psychol Psychiatry*, *61*(3), 272-290. https://doi.org/10.1111/jcpp.13147

Van IJzendoorn, M. H., & Kroonenberg, P. M. (1990). Cross-Cultural Consistency of Coding the Strange Situation. *Infant Behavior & Development*, *13*(4), 469-485. https://doi.org/10.1016/0163-6383(90)90017-3

Verhulst, F. C., & van der Ende, J. (2013). *Handleiding ASEBA: vragenlijsten voor leeftijden 6 t/m 18 jaar: CBCL/6-18, YSR, TRF*. ASEBA Nederland.

Vogel, L., Lux, U., Deliens, T., Ehring, T., Henning, C., Opitz, A., Schoemann, N., Seiferth, C., Terhorst, Y., Wittekind, C. E., & Löchner, J. (2025). Understanding the link between maternal childhood maltreatment and mother-infant bonding: postpartum depressive symptoms as a mediator. *European Journal of Psychotraumatology*, *16*(1). https://doi.org/10.1080/20008066.2025.2567722

Zuravin, S., McMillen, C., DePanfilis, D., & Risley-Curtiss, C. (1996). The intergenerational cycle of child maltreatment: Continuity versus discontinuity. *Journal of Interpersonal Violence*, *11*(3), 315-334. https://doi.org/10.1177/088626096011003001


03
CHAPTER



03
CHAPTER

Maternal characteristics and adolescent wellbeing



3.1
CHAPTER

Maternal sensitivity in early childhood and body mass index in adolescence: A population-based study on the role of self-regulation as a mediator

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Abstract

Background: Maternal sensitivity has been implicated in various aspects of child health and development, including overweight. However, long-term effects, the role of paternal sensitivity and the explanatory pathways are unclear. This study examined whether maternal sensitivity in early childhood is prospectively associated with adolescent body mass index and whether children's self-regulation mediates this relation. **Methods:** Data from 540 children and their mothers were available from a large cohort study in the Netherlands. Maternal sensitivity was assessed at child ages 1, 3, and at 4 years paternal sensitivity was also included. Children's self-regulation skills were observed at age 3, eating behaviour was assessed at 10 years, and child BMI was measured at 13 years. Longitudinal structural equation modelling was applied. **Results:** The cross-sectional association between maternal sensitivity and child self-regulation was significant, while lower levels of self-regulation and higher levels of food responsiveness and restrained eating predicted a higher child BMI at 13 years. Furthermore, a direct association of paternal sensitivity at 4 years with BMI at 13 years was found, but only in girls. Maternal sensitivity was not directly associated with child BMI after adjusting for covariates. **Conclusion:** Our findings showed the importance of self-regulation in the early years for subsequent weight development. Nevertheless, as self-regulation could not explain the relationship between parenting and child weight, research should focus on the contribution of other contextual factors, such as feeding styles and the social environment, to this relationship.

Keywords: maternal sensitivity, paternal sensitivity, child body mass index, sex differences, self-regulation

Introduction

It is broadly acknowledged that overweight in children has multiple consequences for development and health (Chu et al., 2018; Rankin et al., 2016). Given that the foundations for a healthy weight are already laid in early childhood, it is important to identify early predictors of a trajectory towards a high body mass index (BMI) (Wu et al., 2011). For young children, the most important context is the caregiving environment. Parents are the primary caregivers in the first few years of life, shaping behaviours and habits of young children in various ways (Patrick et al., 2013; Powell et al., 2017; Rhee et al., 2006). In addition, studies have found that the emotional quality of the mother-child relationship is associated with obesity risk in young children (Anderson & Keim, 2016) and also prospectively throughout middle and late childhood (Jansen et al., 2013). Various studies support the relevance of different parenting styles for children's weight development and obesogenic behaviours (Parletta et al., 2012; Patrick et al., 2013; Sleddens et al., 2011), with most evidence regarding mothers' parenting practices, as fathers were often not included in research. In the current study, we aim to determine whether maternal and paternal sensitivity in early childhood predict BMI in adolescence and if emotion regulatory skills mediate this association.

Among all parenting practices, parental sensitivity reflects one of the most fundamental aspects of parent-child interaction, influencing the child's physical, psychological, and cognitive development (Meins et al., 2001). It has been shown that poor quality of the early maternal-child relationship can impair emotional and cognitive development and also may affect physical characteristics such as weight development (Deans, 2020). For instance, less sensitive mothers had infants who gained more weight in the first year of life (Worobey et al., 2009). Additionally, a study reported that children of authoritarian mothers (low sensitivity combined with high expectations for self-control) had the greatest odds of later overweight (Rhee et al., 2006). It has been suggested that the association is conditional on child sex, as parenting may impact BMI more in girls than boys, increasing the odds of overweight in girls (Wendland et al., 2014).

There are several mechanisms through which parental sensitivity may be associated with children's weight development. A prominent potential explanation comes from various studies showing that the quality of the caregiver-child relationship is associated with the development of emotional and regulatory skills in children (Carreras et al., 2019; Köhler-Dauner et al., 2019; Leerkes et al.,

2009; Song & Trommsdorff, 2016). Maternal sensitivity may influence children's weight development by affecting children's, particularly girls', capacity for self-regulation (Anderson et al., 2012; Song & Trommsdorff, 2016). In turn, children with self-regulation difficulties early in life have a significantly higher BMI in early adolescence (Duckworth et al., 2010; Francis & Susman, 2009; Graziano et al., 2013; Tsukayama et al., 2010). This may reflect a direct effect, but previous studies indicated that general regulatory skills could also influence eating behaviour, in which a maladaptive regulation strategy may lead to poor regulation of food consumption and overeating to modulate negative affect (Evers et al., 2010; Graziano et al., 2010), resulting in excessive weight gain. Additionally, both general and food-specific parenting, for instance by non-sensitive, controlling feeding practices, may lead to restrained eating in offspring, which could ultimately frustrate the ability to self-regulate offspring's own eating (Birch & Fisher, 1998; Kral & Rauh, 2010). Adolescents are especially prone to restrained eating when they have an avid appetite or relatively high BMI (Snoek et al., 2013; Snoek et al., 2008). So far, however, a comprehensive model including parenting, children's self-regulation, eating behaviour, and BMI has not been studied.

Thus, while previous research suggested an association between maternal sensitivity and child BMI in the preschool and school period, little is known about the long-lasting impact later in adolescence and the pathways explaining how parenting influences children's food consumption or BMI via children's emotion regulation. Moreover, since studies focused mostly on maternal parenting, the role of fathers remains unclear. Therefore, the first aim of the study was to examine the association of maternal sensitivity in early life with BMI in adolescence and investigate whether this association is mediated by children's self-regulation and inclination towards (emotional) overeating. The second aim was to investigate whether the association between parental sensitivity in both mothers and fathers and child BMI depends on child gender. In line with previous theoretical and empirical work, we hypothesised that both lower maternal and paternal sensitivity levels predict a higher BMI in adolescents, with stronger associations in girls than boys.

Methods

Design

This study was embedded in the Generation R Study, a prospective cohort from fetal life onwards (Kooijman et al., 2016). Pregnant women living in the study area in Rotterdam, the Netherlands, with an expected delivery date between April 2002 and January 2006 were invited to participate. The study was approved by The Medical Ethical Committee of the Erasmus Medical Center. Written informed consent was obtained from all participants in the study.

Study population

The current study was conducted in a subsample of children of Dutch national origin who participated in the Generation R Focus Cohort. In total, 1,106 enrolled in this Focus cohort (see Figure 1 for a flow chart). Maternal sensitivity was observed during lab visits at child ages 1 and 3 years. Children's self-regulation skills were also observed at 3 years, using measures of ability to Delay Gratification, Compliance, and Task Persistence. Data from both visits was available for 715 children and their mothers. At 13 years, participants visited our research center again to obtain data on BMI. For 175 participants, the BMI measurement was not done at 13 years. The final sample included all children with information on at least one maternal sensitivity observation, one self-regulation measure and the BMI measurement at 13 years, which were available in 540 children. Finally, in order to address the second aim of this study, a sample including sensitivity of both parents was observed; data on paternal and maternal sensitivity at 4 years and child BMI at 13 years was available for 582 children.

Non-responding families (n = 566) had younger mothers at baseline (31.1 versus 31.9 years old, $t(1,104) = 3.38$, $p < .01$) with more often a low educational level $\chi^2(1, N= 1,104) = 20.92$, $p <. 01$, but with similar levels of high family income $\chi^2(1, N= 913) = 861$, $p = .35$ as families included in the analyses. There were no differences between responders and non-responders in maternal sensitivity at 1 or 3 years, in any of the self-regulation variables, eating behaviours variables, nor BMI at 13 years (e.g. 19.6 versus 19.2, $t(750) = -1.64$, $p =.10$).

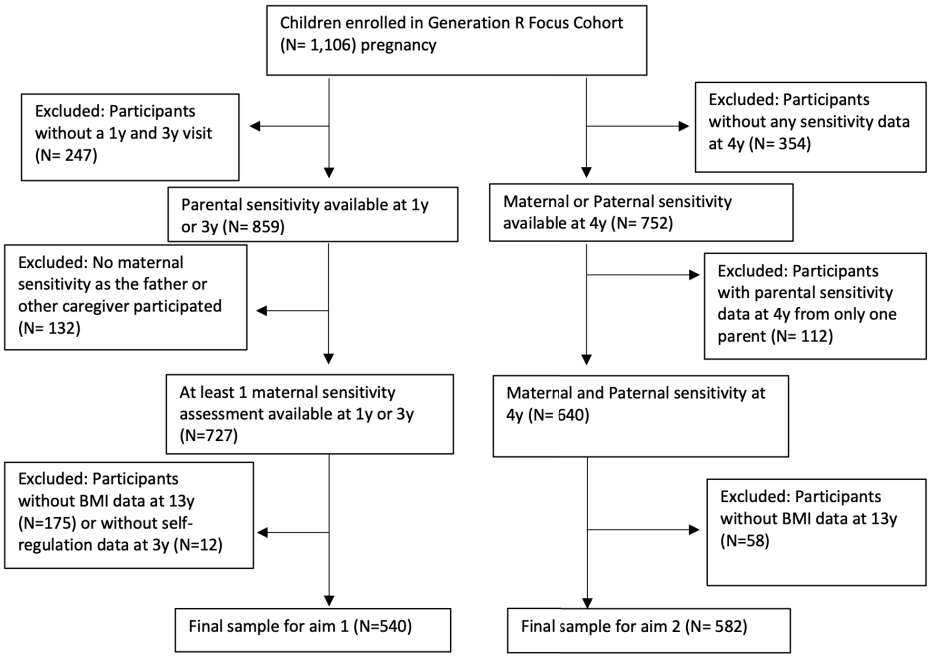


Figure 1. Flowchart of sample selection

Measures

Observed maternal and paternal sensitivity

During the lab visit at child age 1-year, maternal sensitivity was observed during 5 minutes of free play. Maternal sensitivity was coded from DVD recordings with the Ainsworth's 9-point rating scales for *Sensitivity* and *Cooperation* (Ainsworth et al., 1974). The intraclass correlation (ICC) for intercoder agreement was .79 for Sensitivity and .69 for Cooperation (n = 24). In the study sample, the Sensitivity and Cooperation scales correlated strongly (r = .84). A mean sensitivity score was created by standardising the two scores and computing the average.

Additionally, at 3 years, maternal sensitivity was observed when mother-child dyads performed two 3-minute tasks that were too difficult for the child: building a tower and an etch-a-sketch task. Maternal sensitivity was coded for each task from DVD recordings with the revised Erickson 7-point rating scales for Supportive Presence and Intrusiveness (Egeland et al., 1990). The two tasks were independently coded by 13 coders, who were extensively trained and regularly supervised. Total ICCs for the subscales were .75 on average for the tower task (range .73 - .77, n = 53) and .79 on average for the etch-a-sketch task (range .65 -

.93, n = 55). The Supportive Presence scale correlated weakly between both tasks (r = .23), just as the Intrusiveness scale (r = .34). An overall sensitivity score was created by reversing the Intrusiveness scales, standardising the scores on the subscales, and creating an average over both subscales and both tasks (Lucassen et al., 2015).

Maternal and paternal sensitivity at child age 4 years was observed when mother/father-child dyads performed the same tasks (building a tower and an etch-a-sketch task) as during the 3-years visit. Similar Erickson 7-point rating scales for Supportive Presence and Intrusiveness (Egeland et al., 1990) were used. The Supportive Presence scale correlated weakly in both tasks (r = .20, for mothers; r = .26 for fathers), just as the Intrusiveness scale (r = .28, for mothers; r = .31 for fathers). Again, overall sensitivity scores were created, averaging both subscales and tasks for maternal and paternal sensitivity separately. Intercoder reliability was established in 40 cases. The average intraclass correlation coefficient for both tasks was .80 (range .63 – .87) (Lucassen et al., 2015).

Child Body Mass Index (BMI)

At age 13 years, the body mass index was measured when the children visited the Generation R research center. On this occasion, child height was measured in a standing position using a Harpenden stadiometer, and weight was measured using a personal mechanical scale (SECA) without shoes and heavy clothing. The BMI was calculated in kg/m2 and sex and age-specific based on Dutch national reference data (www.growthanalyzer.org) (Fredriks et al., 2000).

Child eating behaviour

Child eating behaviour was assessed when children were 10 years old using the mother reported Child Eating Behaviour Questionnaire (CEBQ). The CEBQ is a 35-item instrument developed by Wardle et al. (2001) that assesses variation in eating behaviours among children using seven subscales. For this study, we selected two subscales focused on general overeating and overeating related to emotions. The subscale Emotional Overeating assesses the regulation of emotions through food consumption and consists of 4 items (i.e., "My child eats more when he/she is upset"). The Food Responsiveness subscale is a 5 item-subscale assessing children's sensitivity to external cues (i.e., "Given the choice, my child would eat most of the time"). Both subscales showed good internal consistency in the Generation R sample, as reflected in Cronbach's alpha of .92 and .87, respectively (Derks et al., 2019).

Additionally, we assessed children's dietary restraint using the Restrained Eating scale of Dutch Eating Behaviour Questionnaire (DEBQ) – parent version (Braet & Van Strien, 1997). This scale assesses the tendency to eat less than desired to lose or maintain body weight. Mothers indicated on nine items whether the described behaviors occurred in their children, on a five-point Likert scale from 1 = never to 5 = always (i.e., "Does your child deliberately eat foods that are slimming?"). One item of the original scale (regarding eating in the evening after dinner) was not assessed as we deemed it less relevant for 9-year old children. In our sample, Cronbach's alpha was .87, indicating a good internal consistency.

Observed self-regulation

In this study, children's self-regulation was assessed by several direct observations obtained during a laboratory visit when children were 3 years old. These tasks are described below.

The ability to delay gratification was evaluated using an adapted version of the Gift Delay Task (Kochanska et al., 1996; Kochanska et al., 2000). This recorded procedure was done by a trained experimenter who brought a paper bag containing a wrapped gift and placed the bag on the table in front of the child. Then the experimenter asked the child to wait in their chair and not to touch the bag until a sticker was brought in, which was a part of the gift. Finally, the experimenter left the room and returned after 180 seconds. Afterwards, the recordings were coded, with scores given for: the gift behaviour dimension, from 1 (opens the gift) to 3 (touches the gift), to 6 (does neither touch the bag nor the gift), and for the time the child stayed seated: scores for the time in seat ranged from 1 (less than 15 seconds) to 3 (30–59 seconds), to 6 (remains seated all the time) (Henrichs et al., 2011). In the study sample, the gift behaviour and seating time scores correlated moderately ($r = .45$, $p < .001$) and were therefore averaged into a total gift delay score. The internal consistency of the gift delay scores was .51.

Committed Compliance was assessed in a two-minute disciplinary context (Don't task). During the task, the parent allowed the child to play with an unattractive teddy bear and prohibited the child from touching or playing with a set of attractive toys displayed in front of the child. Child behaviour was coded every 20 seconds using a coding system (Kochanska & Aksan, 1995; Kuczynski et al., 1987). Compliance was coded into different categories: committed compliance (i.e., the child did not attempt to touch/play with toys, did not need prompting), situational compliance (i.e., the child needed regular prompting/showed difficulties complying), passive

non-compliance (i.e., the child ignored requests) and resistant non-compliance (i.e., active resistance, protesting, whining). The average intercoder reliability (ICC) was .87 (n = 53). An overall compliance score was obtained through a categorical principal components analysis in which the factor scores were extracted by a regression method. A one-dimensional structure explained 50% of the variance. The factor score was log-transformed to approach normality (Kok et al., 2013).

Persistence on a task was measured through an Impossible Puzzle Task, following Harris's (1986) example. In this task, children were instructed to assemble a wooden puzzle in which one piece was intentionally made too big so that it would never fit. The experimenter and the caregiver were required not to help the child during the procedure. The task was recorded and coded from a DVD in which the child's persistence on the task was scored on a 7-point scale, ranging from 1 (quits playing with the major piece immediately) to 7 (plays with the major piece continuously). The average intercoder reliability (ICC) of the persistence score was .75 (n = 76 sessions).

Covariates

The variables selected as covariates in this study were child sex, family income, and BMI of the mother. The selection of these potential confounders was based on past research on the association between maternal sensitivity and child BMI (Song & Trommsdorff, 2016; Wendland et al., 2014). The information on family income was obtained by parental questionnaire at child age 6 years and defined by the total net monthly income of the household; it was classified as low family income (< 2,000 euros) and modal to high income (more than 2,000 euros). BMI of the mother was measured at intake at the research center.

Data analysis

First, the data were explored using the Statistical Package for the Social Sciences (SPSS) version 22.0 (IBM Corporation, 2013). Descriptive statistics were calculated for all variables, using independent sample t-test for continuous variables and $\chi 2$-tests for categorical variables to compare the descriptive variables between boys and girls. Second, bivariate correlations were conducted to explore the relations among the study variables, using Pearson correlation coefficients. Third, Confirmatory Factor Analysis (CFA) was conducted to evaluate the measurement model of maternal sensitivity, including sensitivity at 1 and 3 years, as well as to evaluate the measurement model of observed self-regulation (including

committed compliance, gift delay, and persistence). For each latent variable (i.e. maternal sensitivity and child self-regulation), the variance was set to 1. The maternal sensitivity factor has only 2 indicators (overall scores at 1 and 3 years); consequently, the number of parameters is equal to the number of observed variances/covariances, meaning that the model fit cannot be assessed. However, when this factor was included as part of the larger model, the latent variable seemed acceptable as it correlated with at least one other factor without error terms being correlated with each other (Wang & Wang, 2019). Fourth, for our first aim, structural equation modelling (SEM) was employed to test the extent to which maternal sensitivity in early childhood (1 and 3 years) was associated with BMI at the age of 13 years and whether these associations were mediated by children's self-regulation at 3 years and eating behaviour at 10 years. To examine the mediated effect of maternal sensitivity on BMI through self-regulation, we evaluated the specific indirect effects, total indirect effects, and total effects using the model indirect option in Mplus. The significance of the parameter estimates was tested with a bootstrap approach (Bollen & Stine, 1992; Shrout & Bolger, 2002).

Furthermore, to ensure that the latent variable self-regulation evaluated the same construct across groups (boys and girls); we tested measurement invariance with the multiple group CFA approach. The different levels of measurement invariance were tested in several steps. First, we tested configural measurement invariance, which defined the same number of factors and the same patterns of free and fixed factor loadings across groups. Second, we tested metric invariance of factor loadings across group. Third, we tested scalar invariance of both factor loadings and intercepts across the groups. After measurement invariance was examined, we analysed structural invariance of the entire model by testing the invariance of structural parameters, such as factor variance, covariance, and factor means across groups by using the Satorra-Bentler Scaled Chi-Square Difference Test (Wang & Wang, 2019).

The CFA and SEM analyses were estimated using full information maximum likelihood (FIML) estimation with robust standard errors to account for non-normality in our data (Enders & Bandalos, 2001). Model fit was evaluated with the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root-Mean-Square Error of approximation (RMSEA). Good model fit was achieved if the TLI and CFI were ≥.90 and RMSEA ≤.08 (Marsh et al., 2004). We also adjusted the analyses for the covariates listed above, as modification indices suggested meaningful improvements. Both CFA and SEM were conducted using Mplus version 7.4

(Muthén & Muthén, 1998).

Finally, for our second aim, using the parenting observations at age 4 years, we applied multivariable linear regression analyses to examine whether parental sensitivity was associated with child BMI at 13 years. This analysis was done twice, for maternal and paternal sensitivity separately. Analyses were adjusted for covariates. We also examined interactions by child sex. In case of a significant interaction, analyses were presented separately for boys and girls.

Results

Population characteristics and bivariate correlations

The sample characteristics are presented by child sex in Table 1. In this sample, half of the children were boys, and about 7% of the families had a relatively low family income (<= 2,000 euros net per month). Boys experienced less maternal sensitivity at 1 year ($t(457) = -2.87$, $p = .01$, $d = .27$), had lower scores on each self-regulation task (e.g. Gift Delay: $t(515) = -2.74$, $p = .01$, $d = .24$), had a lower BMI at 13 years ($t(514) = -4.07$, $p < .01$, $d = .35$) and also had lower scores on emotional eating at 10 years ($t(483) = -2.47$, $p = .01$, $d = .22$) than girls.

Table 1. Sample characteristics

		Total		**Boys**		**Girls**	
	n	Mean	(*SD*)	Mean	(*SD*)	Mean	(*SD*)
Child characteristics							
Sex (% boys)	540	51.3(%)					
Age at assessment:							
Sensitivity at 1y	540	14.6	(0.9)	14.6	(0.8)	14.6	(0.9)
Sensitivity and self-regulation at 3y	540	37.5	(1.5)	37.4	(1.3)	37.6	(1.6)
Sensitivity at 4y	520	51.4	(1.3)	51.4	(1.3)	51.4	(1.3)
Eating behaviour at 10y	485	9.8	(0.3)	9.8	(0.3)	9.8	(0.3)
BMI at 13y	540	13.6	(0.3)	13.6	(0.3)	13.6	(0.3)
BMI at 13y, kg/m^2	540	19.2	(2.9)	18.7	(2.6)	19.7	(3.0)***
Gift delay score	517	5.4	(0.8)	5.3	(1.0)	5.5	(0.7)**
Committed Compliance score	539	0.7	(0.2)	0.7	(0.2)	0.8	(0.2)**
Persistence score	505	4.7	(1.3)	4.5	(1.3)	4.8	(1.3)*
Emotional overeating score	485	6.0	(2.7)	5.7	(2.5)	6.3	(2.8)*
Food responsiveness score	485	9.2	(3.9)	8.9	(3.4)	9.5	(4.3)

Restrained eating score	492	11.6	(3.9)	11.5	(4.1)	11.7	(3.7)
Parental characteristics							
Maternal sensitivity z-score at 1y	459	-0.02	(0.8)	-0.13	(0.8)	0.10	(0.8)**
Maternal sensitivity z- score at 3y	538	-0.01	(0.7)	-0.07	(0.7)	0.06	(0.7)
Maternal sensitivity z-score at 4y	402	-0.01	(0.7)	-0.01	(0.6)	-0.01	(0.7)
Paternal sensitivity z- score at 4y	440	-0.01	(0.7)	-0.03	(0.6)	0.03	(0.7)
Maternal BMI, kg/m^2	533	24.3	(4.3)	24.2	(4.4)	24.5	(4.2)
Household Income (% <=2000)	540	6.9 (%)		8.1(%)		5.7(%)	

Note. All values represent raw values except maternal sensitivity variables (standardised)
*p≤ .05, **≤.01, ***≤.001 for difference between boys and girls, derived from independent sample t-tests for continuous variables and chi-square tests for categorical variables

Correlations among the variables in the study are presented in Table 2. The maternal sensitivity variables were correlated with each other over time. Higher levels of maternal sensitivity at 3 years were correlated with all child self-regulation variables. Of all sensitivity measures, only maternal sensitivity at 4 years was (negatively) related to BMI at 13 years. Finally, higher levels of the different child self-regulation variables were correlated with a lower BMI at 13 years.

Table 2. Correlations among the study variables

	1	2	3	4	5	6	7	8	9	10	11	12
1. Maternal sensitivity at 1y	1											
2. Maternal sensitivity at 3y	.23**	1										
3. Maternal sensitivity at 4y	.15**	.38**	1									
4. Paternal sensitivity at 4y	.13*	.20**	.23**	1								
5. Gift delay	.05	.08*	.12*	.10*	1							
6. Committed compliance	.07	.08*	.06	.04	.15**	1						
7. Persistence	.05	.11**	.07	.03	.14**	.06	1					
8. Food responsiveness at 10y	.02	-.03	.08	-.02	.04	.01	.01	1				
9. Emotional overeating at 10y	-.04	-.04	-.09	.06	.04	-.03	.01	.38**	1			
10. Restrained eating at 10 y	-.01	-.06	-.01	.03	.01	-.02	-.01	.25**	.19**	1		
11. BMI at 13y	.02	-.05	-.11*	-.06	-.10*	-.09*	-.09*	.41**	.24**	.27**	1	
12. Maternal BMI at intake	-.10*	-.05	-.10*	-.14**	-.05	.03	-.08	.15**	.06	.07	.31**	1

** p< 0.01, * p <0.05 Note. Variables are child characteristics unless otherwise indicated

Predictive models

First, we tested the measurement models for the child self-regulation latent variable: the scores of 3 indicators were used, namely Gift Delay, Don't Task and Persistence of the Task. We found a good fit of this model (CFI = 1; TLI = 1; RMSEA = 0). Moreover, we tested measurement invariance in the self-regulation latent variable across child sex. The metric invariance model fitted just as well as the configural invariance model and the scalar invariance model (see Supplementary Table 1). Thus, measurement invariance holds for the self-regulation factor. However, when we compared the scalar invariance model (most parsimonious model with more degrees of freedom) with the residual invariance model, we found significant differences (TRd = 16,74, Δdf = 1, p < .001). The residuals were not equal and the latent means for the self-regulation factor were different between boys and girls, indicating that girls scored higher on self-regulation than boys (ΔM = .78, SE = .31, p < .001).

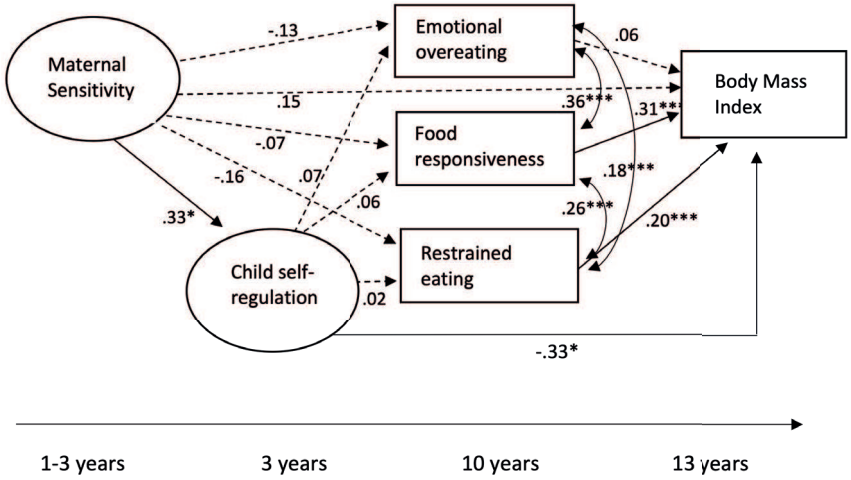
Then, we examined the association of maternal sensitivity with child BMI at 13 years, and whether this was mediated by self-regulation and eating behaviours (see Figure 2 and Supplementary Table 2). This path model had a good fit (CFI = .97; TLI = .95; RMSEA = .02). Moreover, 18.4% of the self-regulation variable was explained by its predictors (maternal sensitivity and covariates), while a 37.9% of the variance in BMI at 13 years was explained by the predictor variables in the model (mediators and covariates). There was a significant positive association between maternal sensitivity and self-regulation at age 3 years (β = .33, SE = .16; p = .02. Furthermore, lower levels of self-regulation (β = -.33, SE = .13; p = .00) and higher levels of food responsiveness (β = .31, SE = .06; p < .01) and restrained eating (β = .20, SE = .05; p < .01) predicted a higher child BMI. We did not find a significant direct association between maternal sensitivity and later BMI, thus no significant variance in BMI was explained by the main predictor, and also no statistically significant indirect association via self-regulation (β = -.11 (95% CI = -.28, .06)), emotional overeating (β = -.01 (95% CI =- .03, .02)), food responsiveness (β = -.02 (95% CI=-.08, .04)) and restrained eating (β = -.03 (95% CI=-.07, .01)). We found no significant sex differences (TRd = 33.06, Δdf = 35, p = .56).

Table 3. Linear regression coefficients of maternal and paternal sensitivity with BMI at 13 years

Independent variable	Sample	Model	β for BMI at 13y	Standard Error	P-value
Maternal sensitivity#	All (n=582)	Model 1	-.13	.22	.01*
		Model 2	-.06	.20	.14
Paternal sensitivity#	All (n=582)	Model 1	-.07	.22	.14
		Model 2	-.03	.20	.54
		Regression with parental sensitivity by child sex			
Maternal Sensitivity	Boys (n=290)	Model 1	-.05	.26	.47
		Model 2	-.03	.24	.63
	Girls (n=292)	Model 1	-.19	.30	.01*
		Model 2	-.08	.30	.23
Paternal Sensitivity	Boys (n=290)	Model 1	.04	.25	.55
		Model 2	.08	.24	.21
	Girls (n=292)	Model 1	-.18	.32	.01*
		Model 2	-.13	.31	.04*

Notes. Model 1: unadjusted model. Model 2: adjusted model for child sex, SES, child age, and maternal BMI. #For mothers and fathers, the child sex was significant in the model 2. Therefore, analyses were performed in boys and girls separately. *Represents p value <.05, ** < .001.

Figure 2: Structural equation model of maternal sensitivity with observed child self-regulation and BMI.



Notes. Numeric values are standardised path regression coefficients. Covariates (child sex, household income and maternal BMI) are included, but paths are not shown to improve readability. The bold lines denote significant associations. The dotted lines denote non-significant associations. Model fit was good (CFI = .97; TLI = .95; RMSEA = .02).

Maternal sensitivity and paternal sensitivity at 4 years and child BMI

We examined the association of maternal and paternal sensitivity at child age 4 years with child BMI at 13 years, and whether this association was different between boys and girls. Neither maternal nor paternal sensitivity was significantly associated with child BMI. However, because child sex was a significant predictor in both models, the analyses were performed stratified by sex. After adjusting the model for covariates, analyses showed that only paternal sensitivity, but not maternal sensitivity, was a significant predictor of child BMI at 13 years but only in girls (β = -.13, SE = .31; p = .04). In boys, the association was not significant (see Table 3).

Discussion

The present study aimed to determine whether parental sensitivity in early childhood was associated with adolescents' body mass index and whether self-regulation and eating behaviour explained this relationship. We found evidence that early maternal sensitivity was positively associated with child self-regulation, while in turn, higher levels of self-regulation in early childhood predicted a lower BMI ten years later. Yet, maternal sensitivity was not directly associated with BMI in adolescence and no mediation through self-regulation and eating behaviour was found. In contrast, higher levels of paternal sensitivity were associated with a lower BMI, but only in girls.

Our findings are not in line with our expectations regarding a direct association between early maternal sensitivity and later child BMI. This expectation was based on past prospective research in population-based samples in early in life with a follow-up period of at most three years, reporting that children of less sensitive mothers had a higher risk of later overweight (Wendland et al., 2014; Worobey et al., 2009). On the other hand, our findings are in line with the study of Anderson et al. (2014), which had a follow-up of 5.5 years and showed that early maternal-infant interaction was not associated with later obesity risk.

Besides these studies, research on maternal sensitivity with a longer follow-up or beyond the preschool period is scarce. Only one study reported evidence of a direct relationship between maternal sensitivity (measured in adolescence) and obesogenic risk at age 15 years (Davis et al., 2011). Two other studies found a significant relationship between early maternal sensitivity and BMI in

adolescence, but only in interaction with child temperament (Wu et al., 2011) or insecure attachment (Anderson et al., 2012). This suggests that sensitivity may have a long-lasting impact, but only under certain conditions.

An explanation for the lack of finding associations for maternal sensitivity may be that in our study maternal sensitivity in the first few years of life was too distal to directly impact child BMI nine years later. Indeed, the small association of the latest paternal sensitivity assessment (at 4 years) with later BMI, support the idea that the follow-up was perhaps too long to detect associations. Alternatively, a small effect of parental sensitivity on child BMI may only become visible when children grow older. Considering the strong sensitivity–child self-regulation and self-regulation–BMI associations, an effect of parental sensitivity on offspring BMI (via self-regulation) seems conceivable and is already reported by Davis and colleagues (2011), but may only become apparent later in a child's life. Unfortunately, there are hardly any studies on parental sensitivity beyond the preschool period to test this hypothesis. Even studies on sensitivity around age 4 years, like our study, are scarce. Yet, around this age, children become more active agents in the interaction with their parents through vocalisation and approach towards the caregiver (Kok et al., 2013). Therefore, being sensitive to the child's wishes and behaviours becomes more manifest in the interaction. In this way, the mother-child interaction might have a different impact on child weight development depending on the stage of children's lives, i.e., early childhood vs. adolescence (Blewitt et al., 2016).

Furthermore, our results showed that early maternal sensitivity is associated with child self-regulation in the early stages of children's development. These findings are in line with previous studies showing that the quality of the caregiver-child relationship is associated with individual differences in the development of emotional control and regulatory skills in children (Carreras et al., 2019; Köhler-Dauner et al., 2019; Leerkes et al., 2009). In this way, maternal sensitivity influences children's capacity for self-regulation, which in turn may impact children's weight development by affecting the way in which a child regulates his/her own emotions (Anderson & Keim, 2016).

Moreover, our findings are consistent with a cross-sectional study that found that self-regulation was associated with lower odds of developing overweight at age 3 years (Anzman & Birch, 2009; Miller et al., 2016). Prospective studies also reported a longer-term effect of self-regulation on children's weight status. These studies

found that the ability to delay gratification at 4 years of age can impact the weight status seven years later (Seeyave et al., 2009) and later on in adulthood (Schlam et al., 2013). Moreover, poorer self-regulation skills of toddlers, such as emotion regulation and inhibitory control, predicted higher BMI at age 5.5 years (Graziano et al., 2010) and in early adolescence (Francis & Susman, 2009; Graziano et al., 2013). Similarly, difficulties in self-control in late childhood predicted weight gain in the transition to adolescence (Duckworth et al., 2010; Tsukayama et al., 2010). Consistent with this, we found that children who showed more ability to regulate themselves have a lower BMI in adolescence. However, in this study, we did not find a mediation effect of self-regulation. Given the absence of a mediation effect, other mechanisms contributing to the association between parental sensitivity and child BMI should also be considered. Such mechanisms may include a shared genetic vulnerability for later child BMI, considering that in our results, when we included maternal BMI, the contribution of maternal sensitivity at 4 years was diluted. Moreover, other mechanism could be the impact of parents' own self-regulation skills on both parenting and child self-regulation. Past research identified that parental self-regulation is key in the context of reading and effective caregiving that promotes child development (Bridgett et al., 2015). More research is needed to further understand in the dynamics of parent-child relationships including the bi-directional contributions on that relationship.

Regarding our second hypothesis, about whether the association between sensitivity and child BMI depends on the parents' sex, we only found that after adjusting the model for covariates, paternal sensitivity at 4 years was associated directly with child BMI at 13 years, but this association was only observed in girls and not in boys. Maternal sensitivity was also directly associated with girls' BMI, but this association disappeared when the model was adjusted for covariates. This finding is in line with the study from Turner et al. (2005) showing that female adolescents with overweight reported that their fathers, but not their mothers, were less caring and more overprotective as compared to normal weight peers. Moreover, Wake et al. (2007) found that fathers parenting but not maternal control was associated with pre-schooler overweight and obesity. The authors suggested that warm and firm paternal parenting may partly protect against preschool overweight and obesity in the family environment, as such behaviour may be supportive of children's attempts to lose weight.

On the other hand, previous studies also suggested that for maternal sensitivity, this association with child BMI is conditional on child sex, with maternal

sensitivity increasing the odds of overweight in girls (Schlensog-Schuster et al., 2022; Wendland et al., 2014). Studies on fathers are scarce, but the findings from research focusing on maternal parenting suggest that girls seem more sensitive to the impact of parenting variables than boys. In accordance with the present results, previous studies have demonstrated that child sex contributes to the nature of maternal sensitivity as a function of the situational demands of the interaction (Ciciolla et al., 2013). For instance, mothers were more sensitive with their daughters than with their sons, and girls were more involved and responsive to their mothers than were boys (Bornstein et al., 2008). It is possible that this child sex variation may be explained by the theory of gender role socialisation between boys and girls. Girls tend to engage in more relational and less autonomous types of play than boys (Ruble et al., 2006). Moreover, girls tend to seek more close relationships, whereas boys may need more autonomy from their caregivers (Fukkink, 2022). However, as evidence regarding the association of paternal sensitivity and child BMI is limited, further research in this field is needed to better understand the role of gender-specific effects.

Strengths and limitations

Several potential strengths and limitations of the study need to be considered. First, one of the significant strengths of this study was the longitudinal evaluation of early parenting variables and their impact on the child's emotional and physical development. In addition, the use of observational assessment related to parental sensitivity and child self-regulation allows us to evaluate these constructs more accurately instead of using self-reports. Last, we included observations in fathers, which is not frequently done in population-based studies related to parental sensitivity and BMI. However, several limitations should be considered as well. First, we assessed only paternal sensitivity at 4 years and not before, limiting our conclusions on any potential timing effects. Second, our population consisted of relatively highly educated families of Dutch origin only; therefore, this limits the generalisation of our results towards the general population. Finally, although none of the variance was explained by maternal sensitivity, the hypothesized mediators and covariates in the model were able to explain a substantial part of the variance in BMI. However, despite the available information on potential confounding variables, residual confounding due to unmeasured lifestyle variables (e.g. physical activity) and factors related to the parental context might still be an issue explaining some of the differences in self-regulation and its relationship with BMI.

Conclusions

Results from this population-based study suggest that maternal sensitivity is related to self-regulation, while self-regulation was associated with BMI at the age of 13 years. Although we did not find a mediation, our findings highlight the importance of self-regulation in the early years for subsequent weight and the importance of parenting in the development of self-regulation. These findings could be an important aspect to consider in terms of interventions focused on healthy diets and eating behaviours. In this context, it seems relevant to expand the nutritional or medical interventions for obesity prevention that have a broader focus than diet and physical activity, as emotional components also play a role in children's weight development.

Finally, further research is needed to better understand the father's role in child development and should incorporate other contextual variables that may contribute to this relation. Besides, while the current study focused on parental behaviour and self-regulation variables at early stages, future studies on weight development could benefit from repeated measures of parenting, child self-regulation and BMI within a shorter timeframe (e.g., every two years) to closely monitor development and mutual influences from early childhood until late adolescence in order to unravel any potential age-specific processes.

Supplementary tables

Supplementary Table 1. Measurement invariance in the self-regulation latent variable

Models Compared	Chi-Square	Degrees of Freedom	P-Value
Metric against Configural	.80	2	.67
Scalar against Configural	2.79	4	.59
Scalar against Metric	1.99	2	.37

Supplementary Table 2. Structural model of maternal sensitivity with observed child self-regulation and BMI (all latent constructs) as graphically displayed in Figure 2

Independent variables	β for self-regulation at 4y	Standard Error	P-value
Maternal sensitivity	.33	.14	.02*
	β for emotional overeating at 10y		
Maternal sensitivity	-13	.11	.24
	β for food responsiveness at 10y		
Maternal sensitivity	-.07	.09	.50
	β for restrained eating at 10y		
Maternal sensitivity	-.15	.09	.08
	β for BMI at 13y	**Standard Error**	**P-value**
Maternal sensitivity	.15	.10	.24
Child self-regulation	-.33	.13	.00**
Child food responsiveness	.31	.06	<.001**
Child emotional overeating	.06	.06	.31
Child restrained eating	.20	.05	<.001**
Child sex	.19	.04	<.001**
Household income (<=2000)	.10	.06	.09
Maternal BMI	.23	.05	<.001**

Note: B are standardised path regression coefficients
*Represents p value <.05, ** < .001.

References

Ainsworth, M. D. S., Bell, S. M., & Stayton, D. F. (1974). Infant-mother attachment and social development: Socialization as a product of reciprocal responsiveness to signals. In *The integration of a child into a social world* (pp. 99-135). Cambridge University Press.

Anderson, S. E., Gooze, R. A., Lemeshow, S., & Whitaker, R. C. (2012). Quality of early maternal-child relationship and risk of adolescent obesity. *Pediatrics*, *129*(1), 132-140. https://doi.org/10.1542/peds.2011-0972

Anderson, S. E., & Keim, S. A. (2016). Parent-Child Interaction, Self-Regulation, and Obesity Prevention in Early Childhood. *Curr Obes Rep*, *5*(2), 192-200. https://doi.org/10.1007/s13679-016-0208-9

Anderson, S. E., Lemeshow, S., & Whitaker, R. C. (2014). Maternal-infant relationship quality and risk of obesity at age 5.5 years in a national US cohort. *Bmc Pediatrics*, *14*. https://doi.org/10.1186/1471-2431-14-54

Anzman, S. L., & Birch, L. L. (2009). Low Inhibitory Control and Restrictive Feeding Practices Predict Weight Outcomes. *Journal of Pediatrics*, *155*(5), 651-656. https://doi.org/10.1016/j.jpeds.2009.04.052

Birch, L. L., & Fisher, J. O. (1998). Development of eating behaviors among children and adolescents. *Pediatrics*, *101*(3), 539-549.

Blewitt, C., Bergmeier, H., Macdonald, J. A., Olsson, C. A., & Skouteris, H. (2016). Associations between parent-child relationship quality and obesogenic risk in adolescence: a systematic review of recent literature. *Obesity Reviews*, *17*(7), 612-622. https://doi.org/10.1111/obr.12413

Bollen, K. A., & Stine, R. A. (1992). Bootstrapping Goodness-of-Fit Measures in Structural Equation Models. *Sociological Methods & Research*, *21*(2), 205-229. https://doi.org/10.1177/0049124192021002004

Bornstein, M. H., Putnick, D. L., Heslington, M., Gini, M., Suwalsky, J. T. D., Venuti, P., de Falco, S., Giusti, Z., & de Galperín, C. Z. (2008). Mother-child emotional availability in ecological perspective:: Three countries, two regions, two genders. *Developmental Psychology*, *44*(3), 666-680. https://doi.org/10.1037/0012-1649.44.3.666

Braet, C., & Van Strien, T. (1997). Assessment of emotional, externally induced and restrained eating behaviour in nine to twelve-year-old obese and non-obese children. *Behav Res Ther*, *35*(9), 863-873. https://doi.org/10.1016/s0005-7967(97)00045-4

Bridgett, D. J., Burt, N. M., Edwards, E. S., & Deater-Deckard, K. (2015). Intergenerational Transmission of Self-Regulation: A Multidisciplinary Review and Integrative Conceptual Framework. *Psychological Bulletin*, *141*(3), 602-654. https://doi.org/10.1037/a0038662

Carreras, J., Carter, A. S., Heberle, A., Forbes, D., & Gray, S. A. O. (2019). Emotion Regulation and Parent Distress: Getting at the Heart of Sensitive Parenting among Parents of Preschool Children Experiencing High Sociodemographic Risk. *Journal of Child and Family Studies*, *28*(11), 2953-2962. https://doi.org/10.1007/s10826-019-01471-z

Chu, D. T., Nguyet, N. T. M., Dinh, T. C., Lien, N. V. T., Nguyen, K. H., Ngoc, V. T. N., Tao, Y., Son, L. H., Le, D. H., Nga, V. B., Jurgonski, A., Tran, Q. H., Tu, P. V., & Pham, V. H. (2018). An update on physical health and economic consequences of overweight and obesity. *Diabetes & Metabolic Syndrome-Clinical Research & Reviews*, *12*(6), 1095-

1100. https://doi.org/10.1016/j.dsx.2018.05.004
Ciciolla, L., Crnic, K. A., & West, S. G. (2013). Determinants of change in maternal sensitivity: Contributions of context, temperament, and developmental risk. *Parenting-Science and Practice*, *13*(3), 178-195. https://doi.org/10.1080/15295192.2013.756354
Corp, I. B. M. (2013). IBM SPSS statistics for windows, version 22.0. In. Armonk, NY: IBM corp.
Davis, R. N., Ashba, J., Appugliese, D. P., Kaciroti, N., Corwyn, R. F., Bradley, R. H., & Lumeng, J. C. (2011). Adolescent obesity and maternal and paternal sensitivity and monitoring. *International Journal of Pediatric Obesity*, *6*(2-2), E457-E463. https://doi.org/10.3109/17477166.2010.549490
Deans, C. L. (2020). Maternal sensitivity, its relationship with child outcomes, and interventions that address it: a systematic literature review. *Early Child Development and Care*, *190*(2), 252-275. https://doi.org/10.1080/03004430.2018.1465415
Derks, I. P. M., Bolhuis, K., Sijbrands, E. J. G., Gaillard, R., Hillegers, M. H. J., & Jansen, P. W. (2019). Predictors and patterns of eating behaviors across childhood: Results from The Generation R study. *Appetite*, *141*. https://doi.org/10.1016/j.appet.2019.05.026
Duckworth, A. L., Tsukayama, E., & Geier, A. B. (2010). Self-controlled children stay leaner in the transition to adolescence. *Appetite*, *54*(2), 304-308. https://doi.org/10.1016/j.appet.2009.11.016
Egeland, B., Erickson, M. F., Clemenhagen-Moon, J., Hiester, M. K., & Korfmacher, J. (1990). 24 months tools coding manual: Project STEEP revised 1990 from mother–child project scales. *Unpublished manuscript, University of Minnesota, Minneapolis*.
Enders, C. K., & Bandalos, D. L. (2001). The Relative Performance of Full Information Maximum Likelihood Estimation for Missing Data in Structural Equation Models. *Structural Equation Modeling-a Multidisciplinary Journal*, *8*(3), 430-457. https://doi.org/10.1207/S15328007sem0803_5
Evers, C., Stok, F. M., & de Ridder, D. T. D. (2010). Feeding Your Feelings: Emotion Regulation Strategies and Emotional Eating. *Personality and Social Psychology Bulletin*, *36*(6), 792-804. https://doi.org/10.1177/0146167210371383
Francis, L. A., & Susman, E. J. (2009). Self-regulation and Rapid Weight Gain in Children From Age 3 to 12 Years. *Archives of Pediatrics & Adolescent Medicine*, *163*(4), 297-302. https://doi.org/10.1001/archpediatrics.2008.579
Fredriks, A. M., Van Buuren, S., Burgmeijer, R. J. F., Meulmeester, J. F., Beuker, R. J., Brugman, E., Roede, M. J., Verloove-Vanhorick, S. P., & Wit, J. M. (2000). Continuing positive secular growth change in the Netherlands 1955-1997. *Pediatric Research*, *47*(3), 316-323. https://doi.org/10.1203/00006450-200003000-00006
Fukkink, R. G. (2022). Caregiver-child relationships in after-school care: the role of gender and the gender match. *Early Child Development and Care*, *192*(16), 2665-2678. https://doi.org/10.1080/03004430.2022.2046565
Graziano, P. A., Calkins, S. D., & Keane, S. P. (2010). Toddler self-regulation skills predict risk for pediatric obesity. *International Journal of Obesity*, *34*(4), 633-641. https://doi.org/10.1038/ijo.2009.288
Graziano, P. A., Kelleher, R., Calkins, S. D., Keane, S. P., & Brien, M. O. (2013). Predicting weight outcomes in preadolescence: the role of toddlers' self-regulation skills and the temperament dimension of pleasure. *International Journal of Obesity*, *37*(7), 937-942. https://doi.org/10.1038/ijo.2012.165

Harris, K. R. (1986). The Effects of Cognitive-Behavior Modification on Private Speech and Task-Performance during Problem-Solving among Learning-Disabled and Normally Achieving Children. *Journal of Abnormal Child Psychology*, *14*(1), 63-76. https://doi.org/10.1007/Bf00917222

Hu, L. T., & Bentler, P. M. (1999). Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives. *Structural Equation Modeling-a Multidisciplinary Journal*, *6*(1), 1-55. https://doi.org/10.1080/10705519909540118

Jansen, P. W., Giallo, R., Westrupp, E. M., Wake, M., & Nicholson, J. M. (2013). Bidirectional Associations Between Mothers' and Fathers' Parenting Consistency and Child BMI. *Pediatrics*, *132*(6), E1513-E1520. https://doi.org/10.1542/peds.2013-1428

Kochanska, G., & Aksan, N. (1995). Mother-Child Mutually Positive Affect, the Quality of Child Compliance to Requests and Prohibitions, and Maternal Control as Correlates of Early Internalization. *Child Development*, *66*(1), 236-254. https://doi.org/10.2307/1131203

Kochanska, G., Murray, K., Jacques, T. Y., Koenig, A. L., & Vandegeest, K. A. (1996). Inhibitory control in young children and its role in emerging internalization. *Child Development*, *67*(2), 490-507. https://doi.org/10.1111/j.1467-8624.1996.tb01747.x

Kochanska, G., Murray, K. T., & Harlan, E. T. (2000). Effortful control in early childhood: Continuity and change, antecedents, and implications for social development. *Developmental Psychology*, *36*(2), 220-232. https://doi.org/10.1037//0012-1649.36.2.220

Köhler-Dauner, F., Roder, E., Krause, S., Buchheim, A., Gündel, H., Fegert, J. M., Ziegenhain, U., & Waller, C. (2019). Reduced caregiving quality measured during the strange situation procedure increases child's autonomic nervous system stress response. *Child and Adolescent Psychiatry and Mental Health*, *13*(1). https://doi.org/10.1186/s13034-019-0302-3

Kok, R., Bakermans-Kranenburg, M. J., Van IJzendoorn, M. H., Velders, F. P., Linting, M., Jaddoe, V. W., Hofman, A., Verhulst, F. C., & Tiemeier, H. (2013). The role of maternal stress during pregnancy, maternal discipline, and child COMT Val158Met genotype in the development of compliance. *Dev Psychobiol*, *55*(5), 451-464. https://doi.org/10.1002/dev.21049

Kok, R., Linting, M., Bakermans-Kranenburg, M. J., Van IJzendoorn, M. H., Jaddoe, V. W. V., Hofman, A., Verhulst, F. C., & Tiemeier, H. (2013). Maternal Sensitivity and Internalizing Problems: Evidence from Two Longitudinal Studies in Early Childhood. *Child Psychiatry & Human Development*, *44*(6), 751-765. https://doi.org/10.1007/s10578-013-0369-7

Kooijman, M. N., Kruithof, C. J., van Duijn, C. M., Duijts, L., Franco, O. H., Van IJzendoorn, M. H., de Jongste, J. C., Klaver, C. C. W., van der Lugt, A., Mackenbach, J. P., Moll, H. A., Peeters, R. P., Raat, H., Rings, E. H. H. M., Rivadeneira, F., van der Schroeff, M. P., Steegers, E. A. P., Tiemeier, H., Uitterlinden, A. G., . . . Jaddoe, V. W. V. (2016). The Generation R Study: design and cohort update 2017. *European Journal of Epidemiology*, *31*(12), 1243-1264. https://doi.org/10.1007/s10654-016-0224-9

Kral, T. V. E., & Rauh, E. M. (2010). Eating behaviors of children in the context of their family environment. *Physiology & Behavior*, *100*(5), 567-573. https://doi.org/10.1016/j.physbeh.2010.04.031

Kuczynski, L., Kochanska, G., Radke-Yarrow, M., & Girnius-Brown, O. (1987). A developmental

interpretation of young children's noncompliance [doi:10.1037/0012-1649.23.6.799]. *Developmental Psychology*, *23*(6), 799-806. https://doi.org/10.1037/0012-1649.23.6.799

Leerkes, E. M., Blankson, A. N., & O'Brien, M. (2009). Differential effects of maternal sensitivity to infant distress and nondistress on social-emotional functioning. *Child Development*, *80*(3), 762-775. https://doi.org/10.1111/j.1467-8624.2009.01296.x

Lucassen, N., Kok, R., Bakermans-Kranenburg, M. J., Van IJzendoorn, M. H., Jaddoe, V. W. V., Hofman, A., Verhulst, F. C., Lambregtse-Van den Berg, M. P., & Tiemeier, H. (2015). Executive functions in early childhood: The role of maternal and paternal parenting practices. *British Journal of Developmental Psychology*, *33*(4), 489-505. https://doi.org/10.1111/bjdp.12112

Marsh, H. W., Hau, K. T., & Wen, Z. L. (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Bentler's (1999) findings. *Structural Equation Modeling-a Multidisciplinary Journal*, *11*(3), 320-341. https://doi.org/10.1207/s15328007sem1103_2

Meins, E., Fernyhough, C., Fradley, E., & Tuckey, M. (2001). Rethinking maternal sensitivity: Mothers' comments on infants' mental processes predict security of attachment at 12 months. *Journal of Child Psychology and Psychiatry*, *42*(5), 637-648. https://doi.org/10.1111/1469-7610.00759

Miller, A. L., Rosenblum, K. L., Retzloff, L. B., & Lumeng, J. C. (2016). Observed self-regulation is associated with weight in low-income toddlers. *Appetite*, *105*, 705-712. https://doi.org/10.1016/j.appet.2016.07.007

Muthén, L., & Muthén, B. (1998). *Mplus: The comprehensive modeling program for applied researchers: User's guide*. Muthén & Muthén.

Parletta, N., Peters, J., Owen, A., Tsiros, M. D., & Brennan, L. (2012). Parenting styles, communication and child/adolescent diets and weight status: let's talk about it. *Early Child Development and Care*, *182*(8), 1089-1103. https://doi.org/10.1080/03004430.2012.678597

Patrick, H., Hennessy, E., McSpadden, K., & Oh, A. (2013). Parenting styles and practices in children's obesogenic behaviors: scientific gaps and future research directions. *Child Obes*, *9 Suppl*(Suppl 1), S73-86. https://doi.org/10.1089/chi.2013.0039

Powell, E. M., Frankel, L. A., & Hernandez, D. C. (2017). The mediating role of child self-regulation of eating in the relationship between parental use of food as a reward and child emotional overeating. *Appetite*, *113*, 78-83. https://doi.org/10.1016/j.appet.2017.02.017

Rankin, J., Matthews, L., Cobley, S., Han, A., Sanders, R., Wiltshire, H. D., & Baker, J. S. (2016). Psychological consequences of childhood obesity: psychiatric comorbidity and prevention. *Adolescent Health Medicine and Therapeutics*, *7*, 125-146. https://doi.org/10.2147/Ahmt.S101631

Rhee, K. E., Lumeng, J. C., Appugliese, D. P., Kaciroti, N., & Bradley, R. H. (2006). Parenting styles and overweight status in first grade. *Pediatrics*, *117*(6), 2047-2054. https://doi.org/10.1542/peds.2005-2259

Ruble, D. N., Martin, C. L., & Berenbaum, S. A. (2006). Gender Development. In *Handbook of child psychology: Social, emotional, and personality development, Vol 3, 6th ed* (pp. 858-932). John Wiley & Sons, Inc.

Schlam, T. R., Wilson, N. L., Shoda, Y., Mischel, W., & Ayduk, O. (2013). Preschoolers' Delay of

Gratification Predicts their Body Mass 30 Years Later. *Journal of Pediatrics*, *162*(1), 90-93. https://doi.org/10.1016/j.jpeds.2012.06.049

Schlensog-Schuster, F., Klein, A. M., Biringen, Z., von Klitzing, K., & Bergmann, S. (2022). Maternal sensitivity and intrusiveness in early childhood as predictors of children's weight at school age. *Pediatric Obesity*, *17*(1). https://doi.org/10.1111/ijpo.12842

Seeyave, D. M., Coleman, S., Appugliese, D., Corwyn, R. F., Bradley, R. H., Davidson, N. S., Kaciroti, N., & Lumeng, J. C. (2009). Ability to Delay Gratification at Age 4 Years and Risk of Overweight at Age 11 Years. *Archives of Pediatrics & Adolescent Medicine*, *163*(4), 303-308. https://doi.org/10.1001/archpediatrics.2009.12

Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods*, *7*(4), 422-445. https://doi.org/10.1037//1082-989x.7.4.422

Sleddens, E. F. C., Gerards, S. M. P. L., Thijs, C., De Vries, N. K., & Kremers, S. P. J. (2011). General parenting, childhood overweight and obesity-inducing behaviors: a review. *International Journal of Pediatric Obesity*, *6*(2-2), E12-E27. https://doi.org/10.3109/17477166.2011.566339

Snoek, H. M., Engels, R. C. M. E., van Strien, T., & Otten, R. (2013). Emotional, external and restrained eating behaviour and BMI trajectories in adolescence. *Appetite*, *67*, 81-87. https://doi.org/10.1016/j.appet.2013.03.014

Snoek, H. M., van Strien, T., Janssens, J. M., & Engels, R. C. (2008). Restrained eating and BMI: a longitudinal study among adolescents. *Health Psychol*, *27*(6), 753-759. https://doi.org/10.1037/0278-6133.27.6.753

Song, J. H., & Trommsdorff, G. (2016). Linking Maternal Emotion Socialisation to Boys' and Girls' Emotion Regulation in Korea. *Child Studies in Asia-Pacific Context*, *6*(2), 47-57. https://doi.org/10.5723/csac.2016.6.2.047

Tsukayama, E., Toomey, S. L., Faith, M. S., & Duckworth, A. L. (2010). Self-control as a Protective Factor Against Overweight Status in the Transition From Childhood to Adolescence. *Archives of Pediatrics & Adolescent Medicine*, *164*(7), 631-635. https://doi.org/10.1001/archpediatrics.2010.97

Turner, H. M., Rose, K. S., & Cooper, M. J. (2005). Schema and parental bonding in overweight and nonoverweight female adolescents. *International Journal of Obesity*, *29*(4), 381-387. https://doi.org/10.1038/sj.ijo.0802915

Wake, M., Nicholson, J. M., Hardy, P., & Smith, K. (2007). Preschooler obesity and parenting styles of mothers and fathers: Australian National Population Study. *Pediatrics*, *120*(6), E1520-E1527. https://doi.org/10.1542/peds.2006-3707

Wang, J., & Wang, X. H. (2019). *Structural equation modeling: Applications using Mplus* (J. W. Sons., Ed.). https://doi.org/10.1002/9781119422730

Wardle, J., Guthrie, C. A., Sanderson, S., & Rapoport, L. (2001). Development of the children's eating behaviour questionnaire. *Journal of Child Psychology and Psychiatry*, *42*(7), 963-970. https://doi.org/10.1111/1469-7610.00792

Wendland, B. E., Atkinson, L., Steiner, M., Fleming, A. S., Pencharz, P., Moss, E., Gaudreau, H., Silveira, P. P., Arenovich, T., Matthews, S. G., Meaney, M. J., Levitan, R. D., & Team, M. S. (2014). Low maternal sensitivity at 6 months of age predicts higher BMI in 48 month old girls but not boys. *Appetite*, *82*, 97-102. https://doi.org/10.1016/j.appet.2014.07.012

Worobey, J., Lopez, M. I., & Hoffman, D. J. (2009). Maternal Behavior and Infant Weight Gain in the First Year. *Journal of Nutrition Education and Behavior*, *41*(3), 169-175.

https://doi.org/10.1016/j.jneb.2008.06.005
Wu, T., Dixon, W. E., Jr., Dalton, W. T., 3rd, Tudiver, F., & Liu, X. (2011). Joint effects of child temperament and maternal sensitivity on the development of childhood obesity. *Matern Child Health J*, *15*(4), 469-477. https://doi.org/10.1007/s10995-010-0601-z





3.2 CHAPTER

Maternal history of maltreatment and offspring's emotional and behavioural problems in adolescence: Do family factors contribute to the intergenerational risk transmission?

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Abstract

Background: A history of childhood maltreatment often has a negative and long-lasting impact across different domains in life. A childhood maltreatment experience in parents may even affect the next generation. So far, the effects of family factors have been considered in the intergenerational transmission of adversity across the childhood years, but whether the effects remain until adolescence is less clear. **Objective:** Using data from a large population-based study in the Netherlands, including both mother and child reports, we examined whether maternal childhood maltreatment history is associated with increased mental health problems in offspring and the role of family functioning and harsh parenting as a potential pathway. **Methods:** Participants were 4,912 adolescents (aged 13 years) and their mothers were recruited in the Generation R Study. Mothers reported childhood maltreatment experiences using the Childhood Trauma Questionnaire (CTQ), and adolescents reported on their mental health using the Youth Self Report (YSR). Structural equation modelling (SEM) was used to test the association of maternal childhood maltreatment on mental health problems in offspring and family functioning and harsh parenting as mechanisms to explain this association. **Results:** Adolescents of mothers with a history of maltreatment had greater internalizing ($\beta = .07$, $p < .01$) and externalizing problems ($\beta = .08$, $p < .01$). Moreover, we found an indirect effect via family functioning over time and harsh parenting at ages 3 and 8 years which mediated this association. **Conclusion:** We concluded an intergenerational effect of maternal childhood maltreatment on adolescents internalizing and externalizing problems. The findings might enable earlier intervention within the family context to mitigate the consequences of maternal childhood maltreatment.

Introduction

In the life of a person, a history of childhood maltreatment has several potential long-lasting consequences (Buss et al., 2017). Those who experienced adverse events in early life are at increased risk for negative outcomes in different domains across the lifespan (Cicchetti & Toth, 2005; Norman et al., 2012), such as negative adult relationships and poorer mental health (Caldwell et al., 2011). The consequence of experiencing adverse life events may even affect the next generation (Roberts et al., 2014). Evidence suggests associations between maternal history of maltreatment and child mental health outcomes during childhood and adolescence, namely externalizing problems (Pasalich et al., 2016; Plant et al., 2018) as well as an increased risk of depression and internalizing problems among offspring (Su et al., 2022).

Prior research has identified some key mechanisms contributing to the intergenerational transmission of early life adversities to the next generation, but mainly focused on poor maternal mental health (Choi et al., 2019; Letourneau et al., 2019; Madigan et al., 2015; Meller et al., 2016; Pereira et al., 2018). However, maternal mental health alone cannot explain this transmission; instead, it might be multidetermined by different risk factors (Belsky, 1993; Cicchetti & Valentino, 2015). For instance, mothers who were exposed to maltreatment are at a greater risk of experiencing difficulties in the parent-child interactions with their offspring (Ozcan et al., 2016; Pasalich et al., 2016; Savage et al., 2019), which increases the likelihood of a risky caregiver system (Dixon et al., 2005; Russotti et al., 2021). Consequently, a potential mechanism underlying this intergenerational transmission might be the family context, which could be affected through the maladaptive patterns experienced during childhood that repeat itself and are displayed in the current family (Adams et al., 2019; Belsky, 1984; St-Laurent et al., 2019). Although these findings have examined the family context as a potential mechanism, the persistence of an unhealthy family context across childhood and into adolescence has not been comprehensively examined to understand the cycle of maltreatment (Alink et al., 2019; Madigan et al., 2019). Thus, based on an ecological framework, we explored how maternal childhood maltreatment might shape the offspring's environment and, as such, potentially be associated with the development of offspring, revealing a multifactorial process from which child psychopathology emerges (Belsky, 1980; Cicchetti & Toth, 2016). Therefore, the current study focuses on two specific potential mechanisms within the family context, namely family functioning, which relates to both healthy and unhealthy

interactions and relationships (e.g. quality of communication, level of conflict and cohesion) within families (Byles et al., 1988). Additionally, we included harsh parenting, which is defined as coercive strategies of parents directed towards children using psychical or verbal violence (Chang et al., 2003). These mechanisms were selected as they are risk factors for offspring psychopathology and because a mother's history of child maltreatment might affect family relations and parenting. The following section will give an overview of harsh parenting and poor family functioning as potential risk mechanisms explaining the intergenerational transmission of adversity.

Parenting

Previous studies highlighted that a maternal history of maltreatment negatively affected parenting skills (Greene et al., 2020; Martinez-Torteya et al., 2014; Moehler et al., 2007; Plant et al., 2017; Savage et al., 2019). For instance, a mother's history of sexual and physical abuse was associated with less confidence and higher control in the parental role (DiLillo, 2001), less parental competence (Banyard et al., 2003), and less maternal emotional availability towards offspring (Kluczniok et al., 2016). Likewise, evidence suggests that mothers with a history of neglect and emotional abuse are more likely to respond in a negative way to their children (Wright et al., 2017), by exerting high psychological control towards the child (Zalewski et al., 2013), showing low reactivity to infant crying (Reijman et al., 2014), or exhibiting signs of hostility during interactions (Bailey et al., 2012). Moreover, parents exposed to physical abuse are at risk of using the same strategies with their children (Simons et al., 1994). Indeed, in the same cohort as the current study is embedded in, a history of maternal childhood maltreatment was associated with behavioral problems in early childhood up to age 6 via maternal hostility and maternal harsh discipline (Rijlaarsdam et al., 2014). Hence, harsh parenting could be a key mechanism that explains the intergenerational risk transmission of maternal childhood maltreatment and child emotional and behavioral problems.

Family functioning

In line with the ecological framework of childhood maltreatment (Belsky, 1980), an interplay at different levels of the child's environment is relevant to consider. The evidence, as mentioned earlier, suggests that maternal childhood maltreatment negatively influences the caregiving context through parenting and maternal

mental health problems. However, it may also influence the family environment more broadly, for example, via higher levels of stress (Ammerman et al., 2013; Yoon et al., 2019), which in turn potentially negatively influences the caregiving context and, thus emotional and behavioral problems might arise in the next generation (Bosquet Enlow et al., 2018). This cascade of risk factors might put a strain on families and negatively affect the family's functioning, by presenting high levels of conflict, disorganization and poor communication quality among and between the family members (Alderfer et al., 2007). According to a recent study, poor family functioning from pregnancy onwards predicts child problem behavior up to preadolescence (5 and 9 years) (Xerxa et al., 2020). Therefore, it seems that the maladaptive pathways of poor family functioning appear early in the child's life and tend to be stable over time, highlighting the chronic strains that may compromise healthy child development.

The current study

Altogether, these studies provided evidence regarding the impact of maternal childhood maltreatment on offspring behavioral problems and how family environment can negatively affect child development. Nevertheless, some key gaps remain that prevent us from better understanding the consequences of maternal childhood maltreatment for the next generation. First, studies on the intergenerational effects focused on the association of maternal history of maltreatment with child problems in early and middle childhood. As a result, it is not clear whether the reported associations also extend or emerge in adolescence. Although behavioral problems may track from childhood into adolescence, some individuals only start developing problems in adolescence (Blok et al., 2021). Thus, adolescence seems to be a key phase for the onset of certain psychopathologies, such as mood, eating and personality disorders (Sroufe et al., 2009). Besides, previous studies relied on maternal reports of both maltreatment history and child behavior, ignoring the possibility of reporter bias. However, from previous studies, we know that mothers with elevated depressive symptoms often tend to overestimate child behavioral problems (Bodeker et al., 2019; Krain & Kendall, 2000; Richters, 1992; Ringoot et al., 2015; Xerxa et al., 2021). Therefore, it is crucial to include multiple informants of child behavior, including the children themselves. Finally, many mechanistic studies focused on the pathway of maternal mental health as mediator of the association between maternal history of maltreatment and offspring problems, but the broader role of the family functioning has remained less explored: up to date, the effects of poor family functioning across

childhood have not been considered in the intergenerational transmission of adversity.

In this study, we examine the relation between maternal history of maltreatment and offspring internalizing and externalizing problems in adolescence. In particular, if family risk factors, such as poor family functioning and harsh parenting, mediate this association. For this, we will use data from a large population-based study, using both mother and child self-reports, to avoid potential reporter bias. In line with previous research, we hypothesize that poor family functioning and harsh parenting explain part of the association between maternal childhood maltreatment and offspring's emotional and behavioral problems.

Method

Design and study population

The present study was embedded in the Generation R Study, a population-based cohort from fetal life onwards (Kooijman et al., 2016). The participants eligible for this study were pregnant women living in the study area in Rotterdam, the Netherlands, with an expected delivery date between April 2002 and January 2006. In total, 9,778 mothers were enrolled (response rate: 61%). The study was approved by the Medical Ethical Committee of the Erasmus University Medical Center, Rotterdam. For all participants, a written informed consent was obtained. The measures were collected at different times points. Maternal history of maltreatment was measured in the prenatal period (mean= 14.64 weeks of gestation, SD= 3.60) using a self-administered questionnaire. In total, 6,553 mothers completed a questionnaire assessing past physical, emotional, and sexual maltreatment. Of these, 4,912 mothers and offspring gave consent for participation until the age of 13 years (see figure 1). Those with incomplete questionnaires (mediators or outcome, n = 1,489) were retained in the analyses, with missing data being handled with multiple imputation procedures (see statistical analysis section). For further clarification of the different time points of the study variables see supplementary material (Figure S1).

Non-responding families at the 13 years assessment (n = 3,130) had younger mothers at baseline (28.5 versus 31.3 years old, t = 22.5, p < .001), and the mothers were more often from non-Dutch origin (45.8% versus 23.3%, 2 = 362.836, p < .001), and had a lower educational level (34.3% versus 14%, x2 = 360.016, p <

.001) and family income (34.4% versus 15.3%, x2 = 203.249, p < .001) than families included in the analyses (n=4,912).

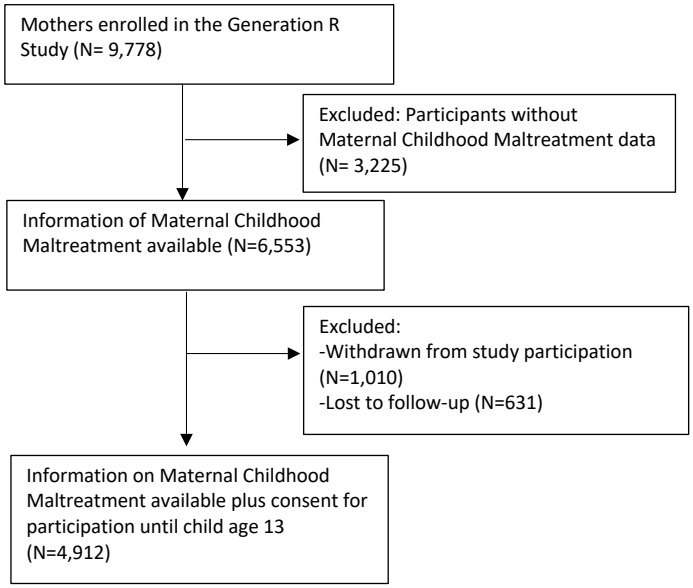


Figure 1. Flowchart of sample selection

Measures

Maternal childhood maltreatment

The Childhood Trauma Questionnaire (CTQ) was used to assess mothers' history of childhood maltreatment. This retrospective self-report consisting of 34 items was filled out by mothers to measure the extent to which she experienced maltreatment before age 18. Mothers rated the items on a 5-point Likert scale from "never true" to "very often true". We created a latent variable of childhood maltreatment, composed of the five subscales of the instrument, namely emotional abuse (5 items, α=.87), physical abuse (5 items, α=.86), sexual abuse (6 items, α=.82), emotional neglect (10 items, α=.93), and physical neglect (8 items, α=.58). The CTQ instrument has demonstrated good test-retest reliability (Bernstein et al., 1997b), and it is commonly used to measure maltreatment in retrospective studies as a sensitive and valid screening questionnaire (Bernstein et al., 2003).

Externalizing and Internalizing problems

The Youth Self Report (YSR; Achenbach & Rescorla, 2001), a prominent and widely

used self-report measure for youth aged 11 to 18, was used to assess externalizing and internalizing problems (Achenback & Rescorla, 2001). The instrument consists of 119 items which are rated as 0 (not true), 1 (somewhat or sometimes true), or 2 (very true or often true). The Internalizing Problems score was based on the sum of the three subscales anxious/depressed, somatic complaints and withdrawn. The internal consistency (Cronbach's alpha) was .88. The Externalizing Problems score is the sum of the scales aggressive behavior and rule-breaking behavior, with an internal consistency (Cronbach's alpha) of .82. Besides, a good validity of the Dutch version of the YSR was confirmed (Verhulst et al., 1997). Besides the YSR, we included the parallel mother-reported Child Behavior Checklist (CBCL) as a sensitivity analysis. The CBCL version 6–18 years consists of 112 items, with a three-point Likert scale (0 = not true, 1 = somewhat true, 2 = very true). Again, in this sample we used the Internalizing and Externalizing Problems scale with a good internal consistency (Cronbach's alpha) of .87 and .88, for both scales respectively.

Potential Mediators:

Family Functioning

Maternal reports on the Family Assessment Device (Byles et al., 1988; Epstein et al., 1983) were used to measure general family functioning as perceived by mothers. The general functioning subscale consists of 12 items on a 4-point Likert scale ranging from "strongly disagree" to "strongly agree". Six items describe healthy functioning such as "In times of crisis, we can turn to each other for support" and the other half of the items describe unhealthy functioning, "There are a lot of unpleasant and painful feelings in our family". An overall mean item score for family functioning was calculated after reverse-coding the items on healthy functioning. The sum was divided by twelve, resulting in a total score ranging from 1 to 4. Higher scores indicate poorer family functioning (Byles et al., 1988; Epstein et al., 1983). The FAD was measured at three-time points, prenatally and when the child was 5 and 9 years old. In this sample, the internal consistencies were .90 (during pregnancy), .89 (at 5 years), and .90 (at 9 years).

Harsh Parenting

The disciplinary style of the mother was assessed using an adapted version of the Parent-Child Conflict Tactics Scale (CTS-PS; Straus et al., 1998). Mothers rated their use of discipline tactics during the past 2 weeks on a 6-point Likert scale rating from "never" to "five times or more". This scale was measured when the child was 3 years

old. In this adapted version, excluding the three items on physical punishment (e.g., hit the child with an object), since corporal punishment has been illegal in the Netherlands since 2007. Additionally, one item that was less age-appropriate ("Said you would kick the child out of the house") was also removed. This leaves 10 items as a final version, which was analyzed by factor analysis in a previous study from this cohort (Jansen et al., 2012). A two-factor structure was found, including six items in the first factor with factor loadings >0.50 that matched the construct and definition of harsh parenting, namely: "Shook my child", "Shouted or screamed angrily at my child", "Called my child names", "Threatened to give a slap, but still, I didn't do it", "Angrily pinched my child's arms", and "Called my child stupid, lazy, or something like that". The six items of the harsh parenting measure showed good model fit (Jansen et al., 2012). The internal consistency (Cronbach's alpha) of the two items in our study was .60.

At child age 8 years, we assessed harsh parenting with two items of the Alabama Parenting Questionnaire (APQ; Shelton et al., 1996). Mothers' reported on two items how often they utilized physical punishment on a 5-point scale ranging from "never" to "very often". The items asked about tendencies to spank or slap the child when he/she did something wrong. The internal consistency (Cronbach's alpha) of the two items in our study was .64.

Covariates

The potential confounders were selected based on previous studies that showed a relation between maternal childhood maltreatment and behavioral problem in adolescents. Sociodemographic information was obtained via self-report in questionnaires during pregnancy. Maternal ethnicity was classified into Dutch and non-Dutch origin: if one or both of a mothers' parents were born outside the Netherlands, she was classified as non-Dutch. Family income was defined as the total monthly net income of the mother's household. The income was classified into low (below social security level, ≤ €1.200), middle (€1200- €2000) and high (above modal, ≥ €2000). Maternal general psychopathology was self-reported in a questionnaire during pregnancy, using the Dutch version of the Brief Symptom Inventory (BSI). This is a 53-item self-report questionnaire in which mothers rated the extent to which each item described her feelings in the past week. The rating scale was 0 (not at all) to 4 (extremely). In this study we used the overall global severity index. The internal consistency was good (α=.96). Finally, birth records were used to determine maternal age, child date of birth and gender.

Statistical analysis

Missing values on the outcome (Youth Self Report), covariates and mediators were imputed using multiple imputations, which were generated from a Markov Chain Monte Carlo (MCMC) simulation in Mplus version 8.6 (Muthén & Muthén, 1998). For that, Mplus runs 100 MCMC iterations and then stores the generated missing data values. The process is repeated until the 50 imputed data sets created have been stored (Asparouhov & Muthén, 2010). All variables were included in the imputation model and were imputed except for maternal history of childhood maltreatment, for which we selected participants with available data only. Although data was not completely missing at random, we relied on multiple imputation methods to partially restore lost power due to missingness and because the use of auxiliary variables in the imputation model can reduce the impact of data not missing at random (Pedersen et al., 2017; Woods et al., 2021)

Sample characteristics and bivariate correlations between maternal history of childhood maltreatment and emotional and behavioral problems in adolescents were examined using the Statistical Package for the Social Sciences (SPSS) Version 22 (IBM Corporation, 2013). As a second step, a confirmatory factor analysis (CFA) was conducted to evaluate the measurement model of maternal childhood maltreatment, including the five types of maltreatment as indicators. Then, we ran a structural equation modelling (SEM) to test the extent to which maternal history of childhood maltreatment was associated with offspring self-reported internalizing and externalizing problems at the age of 13 years. Besides, to examine whether harsh parenting and family functioning mediated the effect of maternal childhood maltreatment on internalizing and externalizing problems, we evaluated the specific indirect effects, total indirect effects, and total effects using the model indirect option in Mplus. The significance of the parameter estimates was tested with a bootstrap approach through bias corrected estimator (Bollen & Stine, 1992; Shrout & Bolger, 2002).

The CFA and SEM analyses were estimated using full information maximum likelihood (FIML) estimation with robust standard errors to account for non-normality in our data (Enders & Bandalos, 2001). Model fit was evaluated with the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root-Mean-Square Error of Approximation (RMSEA). Good model fit was achieved if the TLI and CFI were $\geq .90$ and RMSEA $\leq .08$ (Hu & Bentler, 1999; Marsh, Wen, & Hau, 2004). The CFA and SEM analyses were estimated using MLR estimator in conjunction with full

information maximum likelihood (FIML), with robust standard errors to account for non-normality and missing values in our data (Enders & Bandalos, 2001).

In all the analyses, the covariates were included in the models as predictors of all endogenous variables in the model. The analyses were conducted in Mplus (Muthén & Muthén, 1998). As a sensitivity analysis, we repeated the SEM analysis by using the mother-reported (CBCL) scales as outcome variables instead of the Youth Self Report scales. In a second sensitivity analysis, we repeated the SEM analysis within the sample with full data available (without multiple imputations).

Results

The non-imputed characteristics of the sample are shown in Table 1. In this sample, half of the children were boys (48%), and about 86% of the families had a relatively high family income (>= 2000 euros net per month) and 84.7 % high maternal education. Besides, 76.5% of the mothers were from western origin. Information about imputed sample is display in Table S1 (see supplementary tables). Although all the variables were used continuously in the analyses, for descriptive purposes, the prevalence of moderate to severe maltreatment of each type of maltreatment is also presented in Table 1 (cut-offs based on Rijlaarsdam et al., 2014).

Table 1. Descriptive characteristics of the study sample (N = 3,422)

Sample characteristics	**N**	**Mean (SD)**
Maternal childhood maltreatment scores		
Emotional abuse score	3405	6.97 (3.39)
Physical abuse score	3422	5.98 (2.40)
Sexual abuse score	3407	6.64 (2.19)
Emotional neglect score	3411	20.28 (8.40)
Physical neglect score	3422	9.01 (2.10)
Total maltreatment score	3422	48.86 (14.24)
*Maternal childhood maltreatment categories**		
Emotional abuse, %	3405	7.60
Physical abuse, %	3422	5.50
Sexual abuse, %	3407	5.10
Emotional neglect, %	3411	14.40
Physical neglect, %	3422	2.00
Child age (in years)		
Child age at harsh parenting assessment (CTS-PS)	2612	3.05 (1.19)
Child age at harsh parenting assessment (APQ)	2786	8.16 (.24)
Weeks' of gestation FAD pregnancy assessment	3148	14.65 (3.59)
Child age at FAD 5 years assessment	3148	5.99 (4.75)
Child age at FAD 9 years assessment	3073	9.68 (.26)

Child age at YSR assessment	3422	13.60 (.41)
Child age at CBCL assessment	3400	13.53 (.37)
Mediators		
Harsh parenting score at 3 years	2558	2.07 (1.83)
Harsh parenting score at 8 years	2765	2.53 (.93)
FAD score prenatal	3373	1.51 (.46)
FAD score at 5 years	3090	1.49 (.41)
FAD score at 9 years	2948	1.51 (.44)
Outcome		
YSR total score	3411	31.41 (19.01)
YSR externalizing problems	3405	7.04 (5.35)
YSR internalizing problems	3415	8.87 (7.27)
CBCL total score	3354	18.00 (16.11)
CBCL externalizing problems	3349	4.10 (5.08)
CBCL internalizing problems	3355	5.53 (5.77)
Covariates		
GSI maternal psychopathology score	3353	.24 (.31)
Mother's age at intake	3422	31.34 (4.49)
Child gender, % boys	3422	48.00
Marital status, % married & cohabiting	3328	50.50
Ethnicity, % Dutch	2979	68.00
Maternal education	3352	
% high		56.80
% middle		28.94
% low		4.50
Family income	2979	
< € 1200, %		11.10
€1200-€2000, %		23.30
> €2000, %		65.60

Note: FAD: Family Assessment Device; YSR: Youth Self Report; CBCL: Child Behavior Checklist; GSI: Global Severity Index; CTS: Conflict Tactics Scales. *The cut-offs were based on the adapted 34-item version used before in the same study sample by Rijlaarsdam et al. (2014). Emotional abuse (score ≥ 13), physical abuse (score ≥ 10), sexual abuse (score ≥ 10), emotional neglect (score ≥ 30), and physical neglect (score ≥ 16).

Table 2. Correlations among the variables in the study

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Emotional abuse	1															
2. Physical abuse	.67**	1														
3. Sexual abuse	.48**	.47**	1													
4. Emotional neglect	.53**	.39**	.27**	1												
5. Physical neglect	.44**	.42**	.40**	.40**	1											
6. CTQ Total	.80**	.70**	.57**	.88**	.60**	1										
7. Maternal psychopathology (GSI)	.23**	.21**	.23**	.23**	.19**	.29**	1									
8. Harsh parenting 3 years	.09**	.10**	.07**	.08**	.06**	.11**	.18**	1								
9. FAD Pregnancy	.21**	.17**	.16**	.37**	.18**	.35**	.36**	.15**	1							
10. FAD 5 years	.14**	.11**	.07**	.25**	.13**	.23**	.21**	.12**	.39**	1						
11. FAD 9 years	.12**	.10**	.06**	.25**	.11**	.22**	.21**	.14**	.38**	.53**	1					
12.Harsh parenting 8 years	.05*	.13**	.08**	.07**	.07**	.10**	.13**	.31**	.14**	.13**	.14**	1				
13. YSR internalizing problems	.10**	.08**	.11**	.04*	.05**	.09**	.13**	.09**	.07**	.08**	.11**	.02	1			
14. YSR externalizing problems	.11**	.07**	.08**	.03	.06**	.08**	.10**	.16**	.07**	.08**	.10**	.12**	.48**	1		
15. CBCL internalizing problems	.17**	.11**	.15**	.10**	.09**	.15**	.22**	.10**	.14**	.15**	.21**	.07**	.53**	.27**	1	
16. CBCL externalizing problems	.15**	.09**	.09**	.08**	.09**	.12**	.14**	.18**	.14**	.15**	.19**	.18**	.26**	.53**	.52**	1

Note: *p < .05;**<.01. CTQ: Childhood Trauma Questionnaire; GSI: Global Severity Index; FAD: Family Assessment Device; YSR: Youth Self Report; CBCL: Child Behavior Checklist.

Correlations among the variables in the study are presented in Table 2. The maternal childhood maltreatment types were positively correlated with each other (e.g. Emotional and Physical abuse, r=.67). Maternal childhood maltreatment was positively correlated with internalizing and externalizing problems at 13 years and with harsh parenting, and poor family functioning over time (e.g. family functioning at pregnancy, r=.35) Moreover, all assessments of poor family functioning were positively related with more internalizing and externalizing problems at 13 years. Finally, harsh parenting at 3 years was correlated positively with internalizing and externalizing problems at 13 years, and harsh parenting at 9 years was related to internalizing problems at 13 years.

Measurement model

As a first step, we tested the measurement model for the latent maltreatment variable. The results from the Confirmatory Factor Analysis (CFA) showed a good fit of the model (CFI=.98; TLI=.93; RMSEA=.06). Moreover, the factor loadings of the latent variable showed statistically significant estimates, namely: emotional abuse (.86), physical abuse (.77), sexual abuse (.59), emotional neglect (.52), physical neglect (.60). Therefore, the CFA indicated that the latent variable was acceptable to be included in the structural model.

Structural model of maternal childhood maltreatment, family context, and adolescent-reported internalizing and externalizing problems

Direct effect

For both internalizing and externalizing problems, the model had an acceptable fit (CFI=.96; TLI=.83; RMSEA=.06 and CFI=.91; TLI=.82; RMSEA=.06, respectively). There was a significant positive association between maternal childhood maltreatment and internalizing and externalizing problems at age 13 years. Furthermore, higher levels of maternal childhood maltreatment directly predicted a higher level of poor family functioning in pregnancy at 5 years and at 9 years, as well as more harsh parenting at age 3. Besides, we found that higher levels of poor family functioning at 9 years and harsh parenting at 3 years predicted higher levels of both internalizing and externalizing problems at 13 years, respectively. Finally, harsh parenting at 8 years predicted higher levels of externalizing problems at 13 years (see Figure 2 and Figure 3, respectively). These associations were

independent of maternal psychopathology, maternal age, ethnicity, and income.

Indirect effect

For the association between childhood maltreatment and internalizing problems, we found an indirect effect via harsh parenting at 3 years (Bias corrected z =.005, p =.02) and through the path of poor family functioning over time, namely at pregnancy, 5 and 9 years (Bias corrected z =.002, p <.001), the path from family functioning at 5 and 9 years (Bias corrected z =.003, p =.01) as well as family functioning at 9 years (Bias corrected z =.004, p =.04). For externalizing problems, we found an indirect effect of maternal childhood maltreatment via harsh parenting at 3 years (Bias corrected z =.008, p <.001) as well as through the path of harsh parenting at 3 and 8 years (Bias corrected z=.008, p =.03). Moreover, an indirect effect was found through the path of poor family functioning over time, namely at pregnancy, 5 and 9 years (Bias corrected z =.002, p <.001) as well as the path from family functioning at 5 and 9 years (Bias corrected z =.002, p =.02). Again, these associations were adjusted for maternal psychopathology, maternal age, ethnicity, and income.

Figure 3. Maternal childhood maltreatment, poor family functioning, harsh parenting and YSR internalizing problems at 13 years (child self-report)

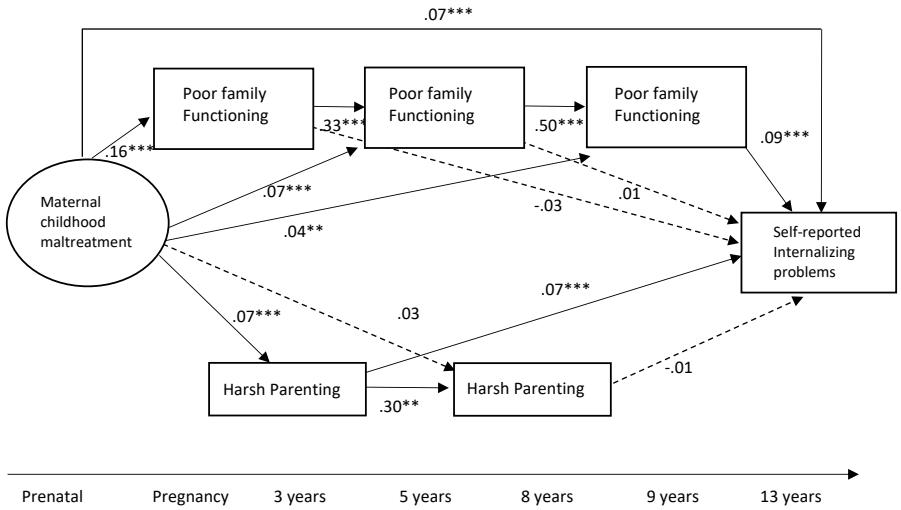


Figure 3: Structural equation model of maternal childhood maltreatment with parenting variables and internalizing problems. Numeric values are standardized path regression coefficients. Covariates (sex, income, age, mother's psychopathology and ethnicity) are included, but to improve readability, paths for the covariates among the variables are not shown in the figure. The bold lines denote significant associations. The dotted lines denote non-significant associations. Model fit was acceptable (CFI=.96; TLI=.83; RMSEA=.06)

Figure 4. Maternal childhood maltreatment, poor family functioning, harsh parenting and YSR externalizing problems at 13 years (child self-report)

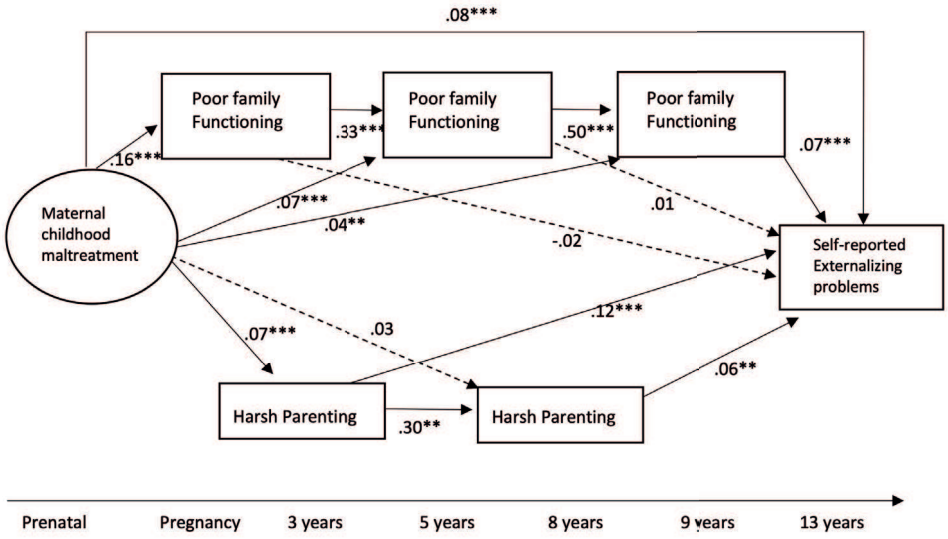


Figure 4: Structural equation model of maternal childhood maltreatment with parenting variables and externalizing problems. Numeric values are standardized path regression coefficients. Covariates (sex, income, age, mother's psychopathology and ethnicity) are included, but to improve readability, paths for the covariates among the variables are not shown in the figure. The bold lines denote significant associations. The dotted lines denote non-significant associations. Model fit was acceptable (CFI=.91; TLI=.82; RMSEA=.06)

Sensitivity analyses

In a sensitivity analysis, the models included mother reports (instead of youth self-reports) of offspring internalizing and externalizing problems. There was a significant positive association of maternal childhood maltreatment with internalizing (β =.11 SE=.02; p < .01) and externalizing problems (β =.10 SE=.02; p <.01) at age 13 years. Results were similar as the main analyses, for both direct and indirect effects, although associations were stronger with the mother reports as compared to the adolescent self-reports (see supplementary figures S2 and S3).

In the second sensitivity analysis, the models of youth self-reports of internalizing and externalizing problems were performed in the non-imputed data (n=3,422). Results were similar as for the imputed data, with similar effect sizes and significance levels for both direct and indirect effects (see supplementary figures S4 and S5).

Discussion

This population-based study contributes to a better understanding of the intergenerational transmission of maternal childhood maltreatment on adolescents' internalizing and externalizing problems. We found that the association was partly explained by an enduring negative family context, involving harsh parenting and poor family functioning. Consistent with the ecological framework theory, maternal childhood maltreatment was associated with the family context and the harsh parenting practices that mothers used with their children, which in turn were associated with internalizing and externalizing problems in adolescence. Importantly, the findings were not attributable to sociodemographic characteristics or maternal psychopathology, as these variables were controlled for in the analyses.

Maternal childhood maltreatment and offspring internalizing and externalizing problems

Related to the first aim of this study and in line with our hypotheses, the results indicated that maternal history of maltreatment was directly associated with more internalizing and externalizing problems among offspring at age 13 years. This result confirmed a meta-analytic review of 12 studies that showed a small but significant ($r = .14$, $p < .05$) increased risk of psychopathology among offspring (prior to the age of 18) from mothers who experienced childhood maltreatment (Su et al., 2022). Furthermore, a recent study supports the existence of intergenerational influences of parental exposure to childhood trauma on childhood risk for psychopathology in offspring at 8 years (Uy et al., 2022). Similarly, previous work in our cohort showed that maternal childhood maltreatment was associated with emotional and behavioral problems in children up to 6 years (Rijlaarsdam et al., 2014). Our current results expand these findings by showing that this association extends into later stages of child development, suggesting that a maternal history of child maltreatment may have long-lasting consequences not only in the individual who experienced the maltreatment but also in the next generation, at least up to adolescence. Additionally, while previous studies have often relied on maternal reports of offspring problems only (Pasalich et al., 2016; Plant et al., 2018), we had information of different reporters, and the results based on the mother report of adolescents' psychopathology reflected larger effect sizes than the results for the youth self-report. This suggests that other studies using mother-reported psychopathology potentially reported inflated estimates.

The role of family and parenting mechanisms and developmental cascade

Our second aim involved obtaining insight into the indirect effects, hence the mechanisms connecting maternal childhood maltreatment and child outcomes. Results regarding harsh parenting suggest that the link between a mother's history of childhood maltreatment and parent-child interaction was already visible in early childhood, by showing that the mothers used more harsh strategies for discipline with their children as early as the age of 3. This is worrisome, as there is a thin line between harsh discipline strategies and physical and emotional abuse (Gershoff & Grogan-Kaylor, 2016), and there is a danger that the history of maltreatment will repeat itself (Simons et al., 1991), since parental experience of maltreatment creates a risk factor for maltreatment in the current family context (Van IJzendoorn et al., 2020). This result corroborated existing literature that identified harsh parenting as one of the transmission mechanisms from maternal childhood maltreatment to child outcomes (Rijlaarsdam et al., 2014; Scaramella et al., 2008). However, we expected to find an association between harsh parenting at age 8 and internalizing problems. The absence of such an association could be explained by the fact that the assessment of harsh parenting at 8 years reflected corporal punishment. Previous studies have indicated that this type of punishment is more related to externalizing problems (Gromoske & Maguire-Jack, 2012; Ma et al., 2012; Mendez et al., 2016; Xing et al., 2018), which is consistent with our results. In fact, evidence suggests that the externalizing behaviors that most prominently emerge as a consequence of corporal punishment are aggression and antisocial behaviors (Straus et al., 1997). Based on the social learning theory, an explanation of the manifestation of these behaviors is that corporal punishment may provide the message to children that violence is an acceptable form of behavior (Graziano, 1994; Ma et al., 2012; Weiss et al., 1992).

Additionally, an alternative explanation of the absence of this association is that in the Netherlands, corporal punishment of children has been illegal since 2007. Thus, the low rates of corporal punishment might in part be due to socially desirable answering trends, which makes other constructs (e.g., poor family functioning) more relevant to assess instead of corporal punishment in the context of the Netherlands. Finally, the non-significant results regarding harsh parenting at 8 years and later internalizing symptoms might also be due to a limited operationalization of the concept. The 8 years measure of harsh parenting was based on only two items - reflecting physical punishment rather than the broader concept of harsh parenting - which might have reduced the variance.

Findings related to family functioning showed an indirect effect of maternal childhood maltreatment on offspring outcomes via family functioning. The associations with family functioning were visible from pregnancy until the child reached the age of 9 years. This suggests that, at least in some women, maternal childhood maltreatment may have an enduring, negative effect on a mother's family environment starting even before the next generation is born. Poor family functioning is characterized by the incapacity of family members to support each other, less communication with each other, difficulties in expressing emotions to each other, and the presence of unpleasant feelings related to the social relations within a family. These patters tended to be stable over time, as shown in our models. Possibly, the increasing stability of poor family functioning patterns described above could amplify the negative relationship between the family members making the cycle of negative interactions more persistent (Paschall et al., 2017). Likewise, it is possible that exposure to childhood maltreatment in mothers could, in the long term, affect the relational outcomes with their partners, which in turn may also affect the family context for their children (Adams et al., 2019; Nguyen et al., 2017). However, our results showed effect sizes small in magnitude, suggesting this mechanism only plays a little role for women in general, or plays a larger role for some women only. Apparently, the family patterns of mothers' own childhood do not necessarily repeat themselves in the current family, meaning that through the family environment, there is also substantial disruption of the intergenerational cycle of violence at play.

Given that our results demonstrated that poor family functioning and harsh parenting were related with maternal childhood maltreatment and offspring outcomes, it is important to consider that multiple pathways within the family context could explain future consequences on child development, as they separately but also collectively determined later functioning. This finding is consistent with a study reporting that a co-occurrence of harsh parenting with a context of disregard, inconsistency and uninvolvement might be a better predictor of the risk for childhood psychopathology rather than the consideration of isolated experiences (Simons et al., 1994). This is in line with the evidence that individual behavior and development are impacted by the entire history of cumulative experiences (Sroufe et al., 2009).

Moreover, our findings might best be explained by a developmental cascade perspective, with past experiences shaping future experiences and behavior and eventually spilling over to the next generation. Thus, from this perspective,

the consequences of a history of childhood maltreatment can progressively accumulate over time via multiple pathways (Masten & Cicchetti, 2010). In this way, our findings support the notion that cumulative risk begets subsequent maladaptation, in which childhood maltreatment generates maladaptive pathways which limit the capacity to follow typical developmental trajectories (Cicchetti, 1993; Russotti et al., 2021; Sroufe, 2013).

Strengths and limitations

There are several strengths of this study, including the multi-informant and prospective design that allowed the identification of contextual family risk factors at different time points. However, some limitations are important to note as well. First, the history of maternal childhood maltreatment was measured retrospectively via adult self-reporting of childhood abuse and neglect, which is prone to recall and measurement error, particularly given the long recall period from mid-adulthood back to childhood. Second, according to our non-response analyses, the included participants show selection towards a relatively high socioeconomic status. Thus, the generalizability and the interpretation of the results must be done with caution. Third, the lack of information on fathers' own childhood maltreatment experiences makes it challenging to identify the role of fathers in the family context and the child's emotional development. Likewise, we do not have information about exposure to maltreatment in offspring, which may impact the results of this study and would also provide a more comprehensive picture of the intergenerational transmission of adversity. Fourth, due to the small effect sizes of the associations found in this study, the practical significance is perhaps limited and needs to be cautiously considered. Finally, other variables than the ones included in this study are likely also involved in the intergenerational transmission of adversity. For instance, besides environmental processes, the association of maternal childhood maltreatment with offspring internalizing and externalizing problems may be partly due to shared genes.

Implications

Our findings suggest that mothers who experienced childhood maltreatment may face small, yet long-term risks that could affect their and their offspring's wellbeing. The results of the current study may inform interventions and social policies to mitigate the effects of maternal childhood maltreatment on child psychopathology and positively influence household dynamics. Particularly,

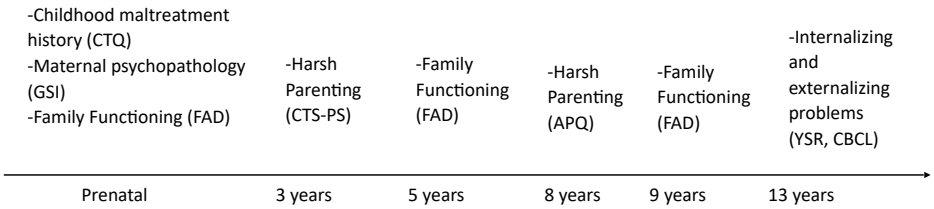
the association of maternal childhood maltreatment with family functioning during pregnancy shows the importance of identification of mothers-to-be with a history of child maltreatment. The perinatal period provides opportunities for interventions targeting the consequences of maternal history of maltreatment and providing families with tools to implement positive parenting in their future families (Russotti, et al., 2021). Indeed, previous studies showed that interventions in mothers who experienced child maltreatment helped to mitigate the risk for maltreatment through the reduction of harsh parenting (Julian et al., 2021). In this way, a promising mechanism to interrupt the intergenerational cycle of adversities is to simultaneously bolster a mother's positive parenting style as well, as to strengthen family interactions towards a healthy and supportive family environment for both the mother and her child (Van IJzendoorn et al., 2020).

Conclusion

The present study revealed a comprehensive overview of family context mechanisms involved in the intergenerational transmission of maternal childhood maltreatment on child outcomes. Thus, the findings demonstrate the potential long lasting consequences of child maltreatment not only in the person itself but rather, increasing the risk of maladaptive patters on the family environment of the children and their families. However, we did not explain the full path from maternal childhood maltreatment on child outcomes, and therefore encourage scholars to investigate other potential risk pathways as well as protective factors that may buffer against the negative consequences of childhood maltreatment across generations.

Supplementary tables and figures

Figure S1. Timeline study variables



Note: CTQ: CTQ: Childhood Trauma Questionnaire; GSI: Global Severity Index; FAD: Family Assessment Device; CTS: Conflict Tactics; Scales; APQ: Alabama Parenting Questionnaire; YSR: Youth Self Report (adolescent's self report); CBCL: Child Behavior Checklist (mothers report)

Table S1. Descriptive characteristics of the imputed study sample (N = 4,912)

Sample characteristics	Mean (SD)
Maternal childhood maltreatment	
Emotional abuse score	7.02 (3.46)
Physical abuse score	6.10 (2.49)
Sexual abuse score	6.69 (2.30)
Emotional neglect score	20.71 (8.70)
Physical neglect score	9.01 (2.20)
Total maltreatment score	49.52 (14.75)
Child age (in years)	
Child age at harsh parenting assessment (CTS-PS)	3.05 (1.30)
Child age at harsh parenting assessment (APQ)	8.16 (.24)
Weeks' of gestation FAD pregnancy assessment	13.64 (3.63)
Child age at FAD 5 years assessment	6.03 (5.27)
Child age at FAD 9 years assessment	9.71 (.31)
Child age at YSR assessment	13.60 (.41)
Child age at CBCL assessment	13.55 (.40)
Mediators	
Harsh parenting score at 3 years	2.10 (1.84)
Harsh parenting score at 8 years	2.55 (.96)
FAD score prenatal	1.54 (.47)
FAD score at 5 years	1.51 (.42)
FAD score at 9 years	1.53 (.45)
Outcome	
YSR total score	31.41 (19.01)
YSR externalizing problems	7.04 (5.35)

YSR internalizing problems	8.87 (7.27)
CBCL total score	18.33 (16.31)
CBCL externalizing problems	4.20 (5.14)
CBCL internalizing problems	5.60 (5.78)
Covariates	
GSI maternal psychopathology score	.27 (.36)
Mother's age at intake	30.68 (4.85)
Child gender, % boys	49.30
Marital status, % married & cohabiting	50.70
Ethnicity, % Dutch	62.6
Maternal education	
% high	51.80
% middle	29.10
% low	19.10
Family income	
< € 1200, %	5.9
€1200-€2000, %	14.0
> €2000, %	80.2

Note: FAD: Family Assessment Device; YSR: Youth Self Report; CBCL: Child Behavior Checklist; GSI: Global Severity Index; CTS: Conflict Tactics Scales

Figure S2. Maternal childhood maltreatment, poor family functioning, harsh parenting and CBCL internalizing problems at 13 years (maternal report)

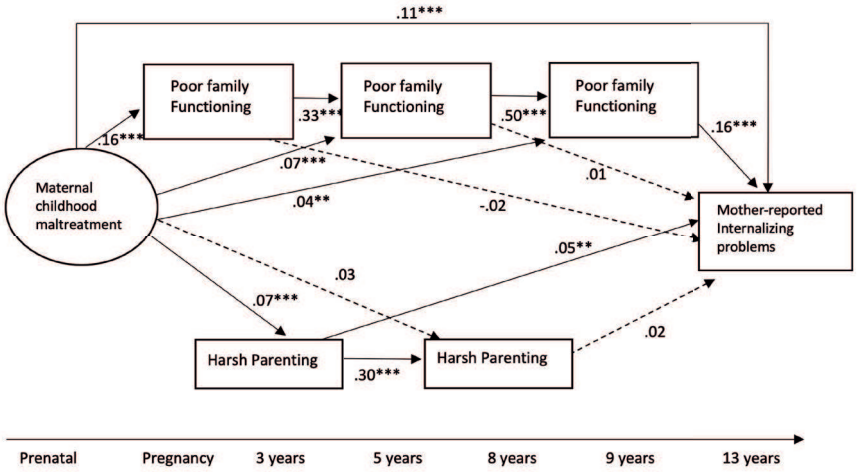


Figure S2: Structural equation model of maternal childhood maltreatment with parenting variables and internalizing problems. Numeric values are standardized path regression coefficients. Covariates (sex, income, age, mother's psychopathology and ethnicity) are included, but to improve readability, paths for the covariates among the variables are not shown in the figure. The bold lines denote significant associations. The dotted lines denote non-significant associations. Model fit was acceptable (CFI=.92; TLI=.83; RMSEA=.06).

Figure S3. Maternal childhood maltreatment, poor family functioning, harsh parenting and CBCL externalizing problems at 13 years (maternal report)

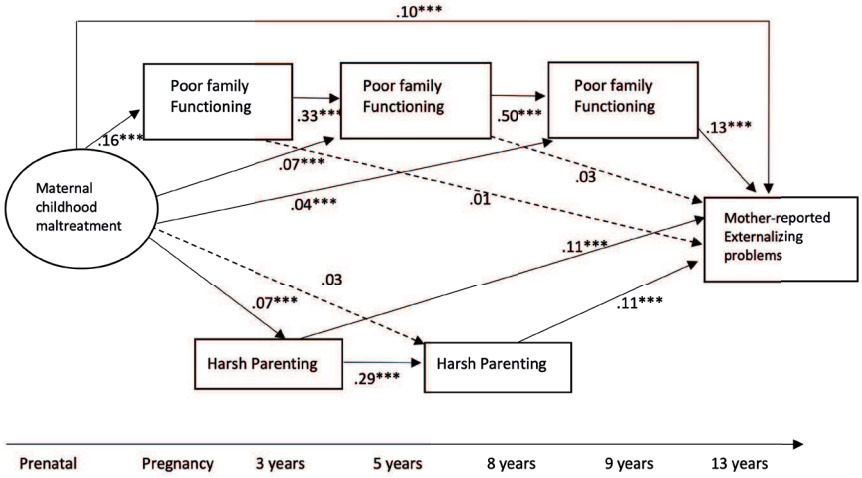


Figure S3: Structural equation model of maternal childhood maltreatment with parenting variables and externalizing problems. Numeric values are standardized path regression coefficients. Covariates (sex, income, age, mother's psychopathology and ethnicity) are included, but to improve readability, paths for the covariates among the variables are not shown in the figure. The bold lines denote significant associations. The dotted lines denote non-significant associations. Model fit was acceptable (CFI=.91; TLI=.83; RMSEA=.06)

Figure S4. Maternal childhood maltreatment, poor family functioning, harsh parenting and YSR internalizing problems at 13 years (child self-report) in the non-imputed data.

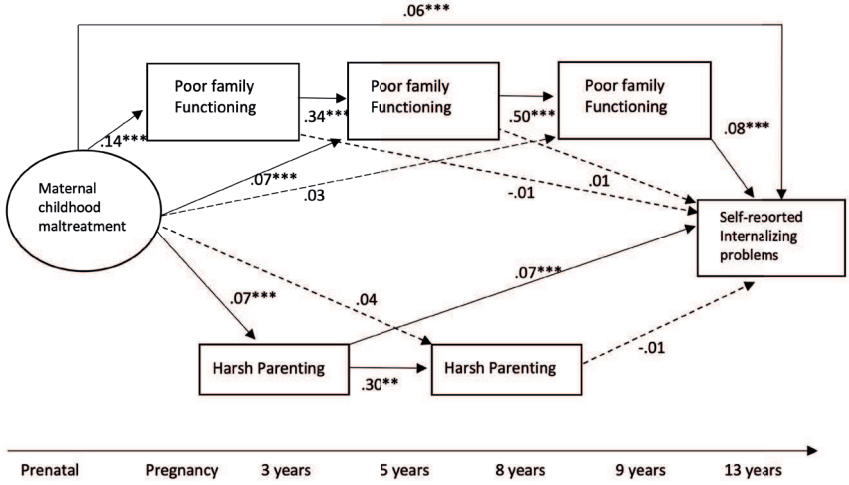


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Figure S5. Maternal childhood maltreatment, poor family functioning, harsh parenting and YSR externalizing problems at 13 years (child self-report) in the non-imputed data.

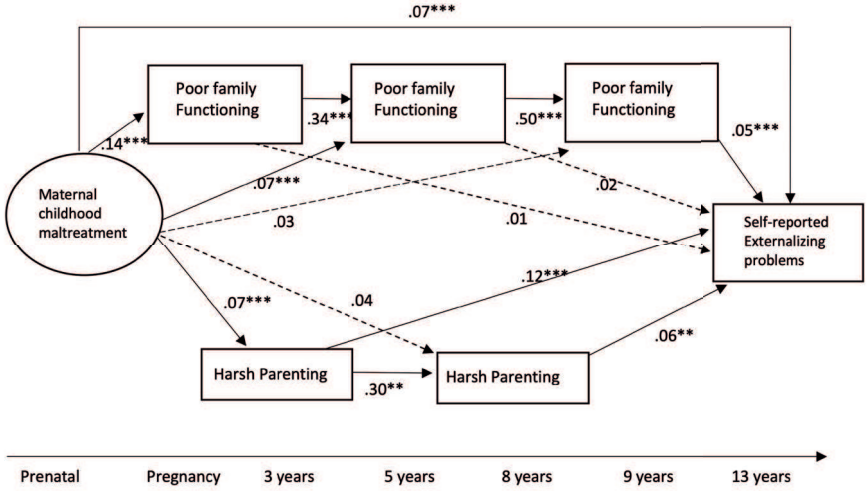


Figure S5: Structural equation model of maternal childhood maltreatment with parenting variables and externalizing problems. Numeric values are standardized path regression coefficients. Covariates (sex, income, age, mother's psychopathology and ethnicity) are included, but to improve readability, paths for the covariates among the variables are not shown in the figure. The bold lines denote significant associations. The dotted lines denote non-significant associations. Model fit was acceptable (CFI=.91; TLI=.83; RMSEA=.06)

References

Achenback, T. M., & Rescorla, L. A. (2001). Manual for the ASEBA school-age forms & profiles. *Burling: University of Vermont (Research center for children, youth and families)*.

Adams, T. R., Handley, E. D., Manly, J. T., Cicchetti, D., & Toth, S. L. (2019). Intimate partner violence as a mechanism underlying the intergenerational transmission of maltreatment among economically disadvantaged mothers and their adolescent daughters. *Development and Psychopathology, 31*(1), 83-93. doi:10.1017/S0954579418001505

Alderfer, M. A., Fiese, B. H., Gold, J. I., Cutuli, J. J., Holmbeck, G. N., Goldbeck, L., . . . Patterson, J. (2007). Evidence-based Assessment in Pediatric Psychology: Family Measures. *Journal of Pediatric Psychology, 33*(9), 1046-1061. doi:10.1093/jpepsy/jsm083

Alink, L. R. A., Cyr, C., & Madigan, S. (2019). The effect of maltreatment experiences on maltreating and dysfunctional parenting: A search for mechanisms INTRODUCTION TO THE SPECIAL SECTION. *Development and Psychopathology, 31*(1), 1-7. doi:10.1017/S0954579418001517

Ammerman, R. T., Shenk, C. E., Teeters, A. R., Noll, J. G., Putnam, F. W., & Van Ginkel, J. B. (2013). Multiple Mediation of Trauma and Parenting Stress in Mothers in Home Visiting. *Infant Mental Health Journal, 34*(3), 234-241. doi:10.1002/imhj.21383

Asparouhov, T., & Muthén, B. (2010). Multiple imputation with Mplus. *MPlus Web Notes, 29*, 238-246.

Bailey, H. N., DeOliveira, C. A., Wolfe, V. V., Evans, E. M., & Hartwick, C. (2012). The impact of childhood maltreatment history on parenting: a comparison of maltreatment types and assessment methods. *Child Abuse Negl, 36*(3), 236-246. doi:10.1016/j.chiabu.2011.11.005

Banyard, V. L., Williams, L. M., & Siegel, J. A. (2003). The impact of complex trauma and depression on parenting: an exploration of mediating risk and protective factors. *Child Maltreat, 8*(4), 334-349. doi:10.1177/1077559503257106

Belsky, J. (1980). Child Maltreatment - an Ecological Integration. *American Psychologist, 35*(4), 320-335. doi:10.1037/0003-066x.35.4.320

Belsky, J. (1984). The determinants of parenting: A process model. *Child Development, 55*, 83-96. doi:10.2307/1129836

Belsky, J. (1993). Etiology of child maltreatment: a developmental-ecological analysis. *Psychological Bulletin, 114*(3), 413-434. doi:10.1037/0033-2909.114.3.413

Bernstein, D. P., Ahluvalia, T., Pogge, D., & Handelsman, L. (1997). Validity of the Childhood Trauma Questionnaire in an adolescent psychiatric population. *J Am Acad Child Adolesc Psychiatry, 36*(3), 340-348. doi:10.1097/00004583-199703000-00012

Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., . . . Zule, W. (2003). Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child Abuse Negl, 27*(2), 169-190. doi:10.1016/s0145-2134(02)00541-0

Blok, E., de Mol, C. L., van der Ende, J., Hillegers, M. H. J., Althoff, R. R., Shaw, P., & White, T. (2021). Stability and Change of Psychopathology Symptoms Throughout Childhood and Adolescence. *Child Psychiatry Hum Dev, 53*(6), 1330-1339. doi:10.1007/s10578-021-01212-8.

Bodeker, K., Fuchs, A., Fuhrer, D., Kluczniok, D., Dittrich, K., Reichl, C., . . . Resch, F. (2019). Impact of Maternal Early Life Maltreatment and Maternal History of Depression on

Child Psychopathology: Mediating Role of Maternal Sensitivity? *Child Psychiatry Hum Dev, 50*(2), 278-290. doi:10.1007/s10578-018-0839-z

Bollen, K. A., & Stine, R. A. (1992). Bootstrapping Goodness-of-Fit Measures in Structural Equation Models. *Sociological Methods & Research, 21*(2), 205-229. doi:10.1177/0049124192021002004

Bosquet Enlow, M., Englund, M. M., & Egeland, B. (2018). Maternal Childhood Maltreatment History and Child Mental Health: Mechanisms in Intergenerational Effects. *J Clin Child Adolesc Psychol, 47*(sup1), S47-S62. doi:10.1080/15374416.2016.1144189

Buss, C., Entringer, S., Moog, N. K., Toepfer, P., Fair, D. A., Simhan, H. N., . . . Wadhwa, P. D. (2017). Intergenerational Transmission of Maternal Childhood Maltreatment Exposure: Implications for Fetal Brain Development. *J Am Acad Child Adolesc Psychiatry, 56*(5), 373-382. doi:10.1016/j.jaac.2017.03.001

Byles, J., Byrne, C., Boyle, M. H., & Offord, D. R. (1988). Ontario Child Health Study: reliability and validity of the general functioning subscale of the McMaster Family Assessment Device. *Fam Process, 27*(1), 97-104. doi:10.1111/j.1545-5300.1988.00097.x

Caldwell, J. G., Shaver, P. R., Li, C.-S., & Minzenberg, M. J. (2011). Childhood Maltreatment, Adult Attachment, and Depression as Predictors of Parental Self-Efficacy in At-Risk Mothers. *Journal of Aggression, Maltreatment & Trauma, 20*(6), 595-616. doi:10.1080/10926771.2011.595763

Chang, L., Schwartz, D., Dodge, K. A., & McBride-Chang, C. (2003). Harsh parenting in relation to child emotion regulation and aggression. *Journal of Family Psychology, 17*(4), 598-606. doi:10.1037/0893-3200.17.4.598

Choi, K. W., Houts, R., Arseneault, L., Pariante, C., Sikkema, K. J., & Moffitt, T. E. (2019). Maternal depression in the intergenerational transmission of childhood maltreatment and its sequelae: Testing postpartum effects in a longitudinal birth cohort. *Development and Psychopathology, 31*(1), 143-156. doi:10.1017/S0954579418000032

Cicchetti, D. (1993). Developmental Psychopathology - Reactions, Reflections, Projections. *Developmental Review, 13*(4), 471-502. doi:DOI 10.1006/drev.1993.1021

Cicchetti, D., & Toth, S. (2005). Child maltreatment. *Annual Review of Clinical Psychology., 1*(1), 409-438. doi:10.1146/annurev.clinpsy.1.102803.144029

Cicchetti, D., & Toth, S. (2016). Child Maltreatment and Developmental Psychopathology: A Multilevel Perspective. In D. Cicchetti (Ed.), *Developmental Psychopathology:Maladaptation and psychopathology* (pp. 457–512): John Wiley & Sons, Inc.

Cicchetti, D., & Valentino, K. (2015). An Ecological-Transactional Perspective on Child Maltreatment: Failure of the Average Expectable Environment and Its Influence on Child Development. In *Developmental Psychopathology* (pp. 129-201).

Corp, I. B. M. (2013). IBM SPSS statistics for windows, version 22.0. In. Armonk, NY: IBM corp.

DiLillo, D. (2001). Interpersonal functioning among women reporting a history of childhood sexual abuse: Empirical findings and methodological issues. *Clinical Psychology Review, 21*(4), 553-576. doi:10.1016/S0272-7358(99)00072-0

Dixon, L., Hamilton-Giachritsis, C., & Browne, K. (2005). Attributions and behaviours of parents abused as children: a mediational analysis of the intergenerational continuity of child maltreatment (Part II). *Journal of Child Psychology and Psychiatry, 46*(1), 58-68. doi:10.1111/j.1469-7610.2004.00340.x

Enders, C. K., & Bandalos, D. L. (2001). The Relative Performance of Full Information

Maximum Likelihood Estimation for Missing Data in Structural Equation Models. *Structural Equation Modeling-a Multidisciplinary Journal, 8*(3), 430-457. doi:10.1207/S15328007sem0803_5

Epstein, N. B., Baldwin, L. M., & Bishop, D. S. (1983). The Mcmaster Family Assessment Device. *Journal of Marital and Family Therapy, 9*(2), 171-180. doi:10.1111/j.1752-0606.1983.tb01497.x

Gershoff, E. T., & Grogan-Kaylor, A. (2016). Spanking and Child Outcomes: Old Controversies and New Meta-Analyses. *Journal of Family Psychology, 30*(4), 453-469. doi:10.1037/fam0000191

Graziano, A. M. (1994). Why We Should Study Subabusive Violence against Children. *Journal of Interpersonal Violence, 9*(3), 412-419. doi:Doi 10.1177/088626094009003009

Greene, C. A., Haisley, L., Wallace, C., & Ford, J. D. (2020). Intergenerational effects of childhood maltreatment: A systematic review of the parenting practices of adult survivors of childhood abuse, neglect, and violence. *Clinical Psychology Review, 80*, 101891. doi:10.1016/j.cpr.2020.101891

Gromoske, A. N., & Maguire-Jack, K. (2012). Transactional and Cascading Relations Between Early Spanking and Children's Social-Emotional Development. *Journal of Marriage and Family, 74*(5), 1054-1068. doi:10.1111/j.1741-3737.2012.01013.x

Hu, L. T., & Bentler, P. M. (1999). Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives. *Structural Equation Modeling-a Multidisciplinary Journal, 6*(1), 1-55. doi:10.1080/10705519909540118

Jansen, P. W., Raat, H., Mackenbach, J. P., Hofman, A., Jaddoe, V. W. V., Bakermans-Kranenburg, M. J., . . . Tiemeier, H. (2012). Early Determinants of Maternal and Paternal Harsh Discipline: The Generation R Study. *Family Relations, 61*(2), 253-270. doi:10.1111/j.1741-3729.2011.00691.x

Julian, M. M., Muzik, M., Jester, J. M., Handelzalts, J., Erickson, N., Stringer, M., . . . Ment, M. C. I. (2021). Relationships heal: Reducing harsh parenting and child abuse potential with relationship-based parent-infant home visiting. *Children and Youth Services Review, 128*. doi:10.1016/j.childyouth.2021.106135

Kluczniok, D., Boedeker, K., Fuchs, A., Attar, C. H., Fydrich, T., Fuehrer, D., . . . Bermpohl, F. (2016). Emotional Availability in Mother-Child Interaction: The Effects of Maternal Depression in Remission and Additional History of Childhood Abuse. *Depression and Anxiety, 33*(7), 648-657. doi:10.1002/da.22462

Kooijman, M. N., Kruithof, C. J., van Duijn, C. M., Duijts, L., Franco, O. H., Van IJzendoorn, M. H., . . . Jaddoe, V. W. V. (2016). The Generation R Study: design and cohort update 2017. *European Journal of Epidemiology, 31*(12), 1243-1264. doi:10.1007/s10654-016-0224-9

Krain, A. L., & Kendall, P. C. (2000). The role of parental emotional distress in parent report of child anxiety. *Journal of Clinical Child Psychology, 29*(3), 328-335. doi:10.1207/S15374424jccp2903_4

Letourneau, N., Dewey, D., Kaplan, B. J., Ntanda, H., Novick, J., Thomas, J. C., . . . Team, A. S. (2019). Intergenerational transmission of adverse childhood experiences via maternal depression and anxiety and moderation by child sex. *Journal of Developmental Origins of Health and Disease, 10*(1), 88-99. doi:10.1017/S2040174418000648

Ma, J., Han, Y., Grogan-Kaylor, A., Delva, J., & Castillo, M. (2012). Corporal punishment and youth externalizing behavior in Santiago, Chile. *Child Abuse Negl, 36*(6), 481-490.

doi:10.1016/j.chiabu.2012.03.006
Madigan, S., Cyr, C., Eirich, R., Fearon, R. M. P., Ly, A., Rash, C., . . . Alink, L. R. A. (2019). Testing the cycle of maltreatment hypothesis: Meta-analytic evidence of the intergenerational transmission of child maltreatment. *Development and Psychopathology, 31*(1), 23-51. doi:10.1017/S0954579418001700
Madigan, S., Wade, M., Plamondon, A., & Jenkins, J. (2015). Maternal Abuse History, Postpartum Depression, and Parenting: Links with Preschoolers' Internalizing Problems. *Infant Mental Health Journal, 36*(2), 146-155. doi:10.1002/imhj.21496
Marsh, H. W., Wen, Z. L., & Hau, K. T. (2004). Structural equation models of latent interactions: Evaluation of alternative estimation strategies and indicator construction. *Psychological Methods, 9*(3), 275-300. doi:10.1037/1082-989x.9.3.275
Martinez-Torteya, C., Dayton, C. J., Beeghly, M., Seng, J. S., McGinnis, E., Broderick, A., . . . Muzik, M. (2014). Maternal parenting predicts infant biobehavioral regulation among women with a history of childhood maltreatment. *Development and Psychopathology, 26*(2), 379-392. doi:10.1017/S0954579414000017
Masten, A. S., & Cicchetti, D. (2010). Developmental cascades. *Development and Psychopathology, 22*(3), 491-495. doi:10.1017/s0954579410000222
Meller, S., Kuperman, K. L., McCullough, C., & Shaffer, A. (2016). Adverse Effects of Childhood Emotional Maltreatment on Child Behavioral Outcomes. *Journal of Aggression Maltreatment & Trauma, 25*(2), 127-144. doi:10.1080/10926771.2016.1101034
Mendez, M., Durtschi, J., Neppl, T. K., & Stith, S. M. (2016). Corporal punishment and externalizing behaviors in toddlers: The moderating role of positive and harsh parenting. *Journal of Family Psychology, 30*(8), 887-895. doi:10.1037/fam0000187
Moehler, E., Biringen, Z., & Poustka, L. (2007). Emotional availability in a sample of mothers with a history of abuse. *American Journal of Orthopsychiatry, 77*(4), 624-628. doi:10.1037/0002-9432.77.4.624
Muthén, L., & Muthén, B. (1998). *Mplus: The comprehensive modeling program for applied researchers: User's guide*: Muthén & Muthén.
Nguyen, T. P., Karney, B. R., & Bradbury, T. N. (2017). Childhood abuse and later marital outcomes: Do partner characteristics moderate the association? *Journal of Family Psychology, 31*, 82-92. doi:10.1037/fam0000208
Norman, R. E., Byambaa, M., De, R., Butchart, A., Scott, J., & Vos, T. (2012). The Long-Term Health Consequences of Child Physical Abuse, Emotional Abuse, and Neglect: A Systematic Review and Meta-Analysis. *Plos Medicine, 9*(11). doi:10.1371/journal.pmed.1001349
Ozcan, N. K., Boyacioglu, N. E., Enginkaya, S., Bilgin, H., & Tomruk, N. B. (2016). The relationship between attachment styles and childhood trauma: a transgenerational perspective - a controlled study of patients with psychiatric disorders. *Journal of Clinical Nursing, 25*(15-16), 2357-2366. doi:10.1111/jocn.13274
Pasalich, D. S., Cyr, M., Zheng, Y., McMahon, R. J., & Spieker, S. J. (2016). Child abuse history in teen mothers and parent-child risk processes for offspring externalizing problems. *Child Abuse & Neglect, 56*, 89-98. doi:10.1016/j.chiabu.2016.04.011
Paschall, K. W., Barnett, M. A., Mastergeorge, A. M., & Mortensen, J. A. (2017). Family Conflict Moderates Early Parent-Child Behavioral Transactions. *Infant Mental Health Journal, 38*(5), 588-601. doi:10.1002/imhj.21660
Pedersen, A. B., Mikkelsen, E. M., Cronin-Fenton, D., Kristensen, N. R., Pham, T. M., Pedersen, L., & Petersen, I. (2017). Missing data and multiple imputation in clinical

epidemiological research. *Clinical Epidemiology, 9*, 157-165. doi:10.2147/Clep.S129785

Pereira, J., Ludmer, J. A., Gonzalez, A., & Atkinson, L. (2018). Mothers' Personal and Interpersonal Function as Potential Mediators Between Maternal Maltreatment History and Child Behavior Problems. *Child Maltreatment, 23*(2), 147-156. doi:10.1177/1077559517734937

Plant, D. T., Jones, F. W., Pariante, C. M., & Pawlby, S. (2017). Association between maternal childhood trauma and offspring childhood psychopathology: mediation analysis from the ALSPAC cohort. *British Journal of Psychiatry, 211*(3), 144-150. doi:10.1192/bjp.bp.117.198721

Plant, D. T., Pawlby, S., Pariante, C. M., & Jones, F. W. (2018). When one childhood meets another - maternal childhood trauma and offspring child psychopathology: A systematic review. *Clinical Child Psychology and Psychiatry, 23*(3), 483-500. doi:10.1177/1359104517742186

Reijman, S., Alink, L. R. A., Compier-de Block, L. H. C. G., Werner, C. D., Maras, A., Rijnberk, C., . . . Bakermans-Kranenburg, M. J. (2014). Autonomic Reactivity to Infant Crying in Maltreating Mothers. *Child Maltreatment, 19*(2), 101-112. doi:10.1177/1077559514538115

Richters, J. E. (1992). Depressed Mothers as Informants About Their Children - a Critical-Review of the Evidence for Distortion. *Psychological Bulletin, 112*(3), 485-499. doi:10.1037/0033-2909.112.3.485

Rijlaarsdam, J., Stevens, G. W. J. M., Jansen, P. W., Ringoot, A. P., Jaddoe, V. W. V., Hofman, A., . . . Tiemeier, H. (2014). Maternal Childhood Maltreatment and Offspring Emotional and Behavioral Problems: Maternal and Paternal Mechanisms of Risk Transmission. *Child Maltreatment, 19*(2), 67-78. doi:10.1177/1077559514527639

Ringoot, A. P., Tiemeier, H., Jaddoe, V. W. V., So, P., Hofman, A., Verhulst, F. C., & Jansen, P. W. (2015). Parental depression and child well-being: young children's self-reports helped addressing biases in parent reports. *Journal of Clinical Epidemiology, 68*(8), 928-938. doi:10.1016/j.jclinepi.2015.03.009

Roberts, A. L., Galea, S., Austin, S. B., Corliss, H. L., Williams, M. A., & Koenen, K. C. (2014). Women's Experience of Abuse in Childhood and Their Children's Smoking and Overweight. *American Journal of Preventive Medicine, 46*(3), 249-258. doi:10.1016/j.amepre.2013.11.012

Russotti, J., Warmingham, J. M., Handley, E. D., Rogosch, F. A., & Cicchetti, D. (2021). Child maltreatment: An intergenerational cascades model of risk processes potentiating child psychopathology. *Child Abuse & Neglect, 112*. doi:10.1016/j.chiabu.2020.104829

Savage, L. E., Tarabulsy, G. M., Pearson, J., Collin-Vezina, D., & Gagne, L. M. (2019). Maternal history of childhood maltreatment and later parenting behavior: A meta-analysis. *Development and Psychopathology, 31*(1), 9-21. doi:10.1017/S0954579418001542

Scaramella, L. V., Neppl, T. K., Ontai, L. L., & Conger, R. D. (2008). Consequences of Socioeconomic Disadvantage Across Three Generations: Parenting Behavior and Child Externalizing Problems. *Journal of Family Psychology, 22*(5), 725-733. doi:10.1037/a0013190

Shelton, K. K., Frick, P. J., & Wootton, J. (1996). Assessment of parenting practices in families of elementary school-age children. *Journal of Clinical Child Psychology, 25*(3), 317-329. doi:10.1207/s15374424jccp2503_8

Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods, 7*(4), 422-445. doi:10.1037//1082-989x.7.4.422

Simons, R. L., Johnson, C., & Conger, R. D. (1994). Harsh Corporal Punishment Versus Quality of Parental Involvement as an Explanation of Adolescent Maladjustment. *Journal of Marriage and the Family, 56*(3), 591-607. doi:10.2307/352870

Simons, R. L., Whitbeck, L. B., Conger, R. D., & Wu, C. I. (1991). Intergenerational Transmission of Harsh Parenting. *Developmental Psychology, 27*(1), 159-171. doi:10.1037/0012-1649.27.1.159

Sroufe, L. A. (2013). The promise of developmental psychopathology: Past and present. *Development and Psychopathology, 25*(4), 1215-1224. doi:10.1017/S0954579413000576

Sroufe, L. A., Egeland, B., Carlson, E. A., & Collins, W. A. (2009). *The development of the person: The Minnesota study of risk and adaptation from birth to adulthood*: Guilford Press.

St-Laurent, D., Dubois-Comtois, K., Milot, T., & Cantinotti, M. (2019). Intergenerational continuity/discontinuity of child maltreatment among low-income mother-child dyads: The roles of childhood maltreatment characteristics, maternal psychological functioning, and family ecology. *Development and Psychopathology, 31*(1), 189-202. doi:10.1017/S095457941800161x

Straus, M. A., Hamby, S., Finkelhor, D., Moore, D., & Runyan, D. (1998). Identification of child maltreatment with the parent-child conflict tactics scales: Development and psychometric data for a national sample of American parents. *Child Abuse & Neglect, 22*(4), 249-270. doi:10.1016/s0145-2134(97)00174-9.

Straus, M. A., Sugarman, D. B., & GilesSims, J. (1997). Spanking by parents and subsequent antisocial behavior of children. *Archives of Pediatrics & Adolescent Medicine, 151*(8), 761-767. doi:DOI 10.1001/archpedi.1997.02170450011002

Su, Y., D'Arcy, C., & Meng, X. (2022). Intergenerational Effect of Maternal Childhood Maltreatment on Next Generation's Vulnerability to Psychopathology: A Systematic Review With Meta-Analysis. *Trauma Violence Abuse, 23*(1), 152-162. doi:10.1177/1524838020933870

Uy, J. P., Tan, A. P., Broeckman, B., Gluckman, P. D., Chong, Y. S., Chen, H., . . . Callaghan, B. L. (2022). Effects of maternal childhood trauma on child emotional health: maternal mental health and frontoamygdala pathways. *J Child Psychol Psychiatry*. doi:10.1111/jcpp.13721

Van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., Coughlan, B., & Reijman, S. (2020). Annual Research Review: Umbrella synthesis of meta-analyses on child maltreatment antecedents and interventions: differential susceptibility perspective on risk and resilience. *J Child Psychol Psychiatry, 61*(3), 272-290. doi:10.1111/jcpp.13147

Weiss, B., Dodge, K. A., Bates, J. E., & Pettit, G. S. (1992). Some Consequences of Early Harsh Discipline - Child Aggression and a Maladaptive Social Information-Processing Style. *Child Development, 63*(6), 1321-1335. doi:Doi 10.2307/1131558

Woods, A. D., Davis-Kean, P., Halvorson, M. A., King, K., Logan, J., Xu, M., . . . Cruz, R. A. (2021). Missing data and multiple imputation decision tree.

Wright, D. B., Laurent, H. K., & Ablow, J. C. (2017). Mothers Who Were Neglected in Childhood Show Differences in Neural Response to Their Infant's Cry. *Child Maltreatment, 22*(2), 158-166. doi:10.1177/1077559516683503

Xerxa, Y., Rescorla, L. A., Serdarevic, F., Van IJzendorn, M. H., Jaddoe, V. W., Verhulst, F. C., . . . Tiemeier, H. (2020). The Complex Role of Parental Separation in the Association between Family Conflict and Child Problem Behavior. *Journal of Clinical Child and Adolescent Psychology, 49*(1), 79-93. doi:10.1080/15374416.2018.1520118

Xerxa, Y., Rescorla, L. A., van der Ende, J., Hillegers, M. H. J., Verhulst, F. C., & Tiemeier, H. (2021). From Parent to Child to Parent: Associations Between Parent and Offspring Psychopathology. *Child Development, 92*(1), 291-307. doi:10.1111/cdev.13402

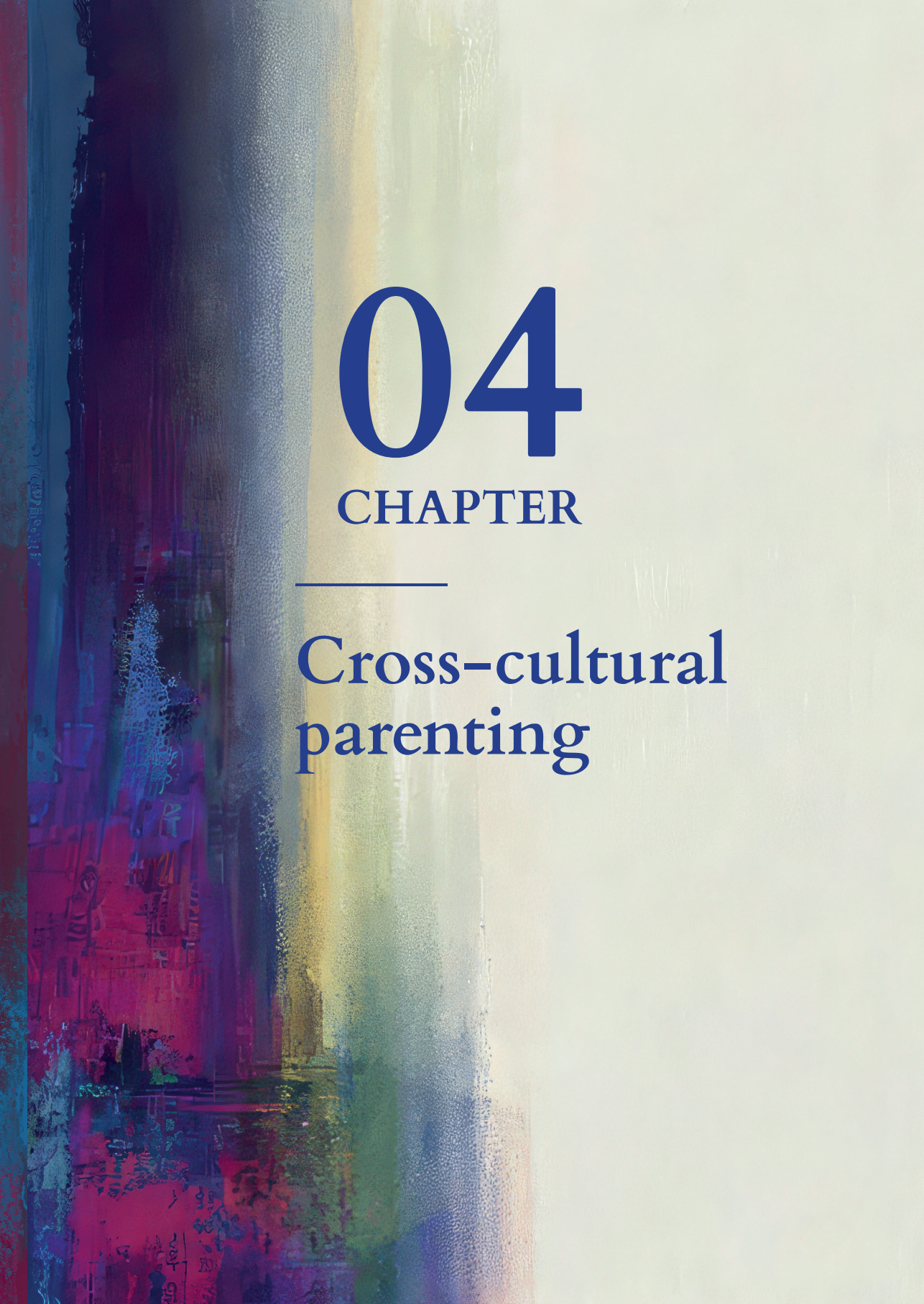
Xing, X., Wang, M., & Wang, Z. (2018). Parental corporal punishment in relation to children's executive function and externalizing behavior problems in China. *Soc Neurosci, 13*(2), 184-189. doi:10.1080/17470919.2016.1258009

Yoon, Y., Cederbaum, J. A., Mennen, F. E., Traube, D. E., Chou, C. P., & Lee, J. O. (2019). Linkage between teen mother's childhood adversity and externalizing behaviors in their children at age 11: Three aspects of parenting. *Child Abuse & Neglect, 88*, 326-336. doi:10.1016/j.chiabu.2018.12.005

Zalewski, M., Cyranowski, J. M., Cheng, Y., & Swartz, H. A. (2013). Role of Maternal Childhood Trauma on Parenting among Depressed Mothers of Psychiatrically Ill Children. *Depression and Anxiety, 30*(9), 792-799. doi:10.1002/da.22116




04
CHAPTER



04
CHAPTER

Cross-cultural parenting



4.1
CHAPTER

Children's mental health trajectories across cultures and the buffering effect of the early family environment: Evidence from two longitudinal studies in early childhood

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Abstract

Background: Developmental trajectories of child mental health problems have often been studied in Western European and North American countries, leaving the Latin American context less explored. **Methods:** Using a growth mixture model (GMM), we aim to explore the variety of emotional and behavioural problems and investigate early home environment factors explaining differentiated developmental patterns in Latin American and European contexts. Two samples were selected: 5,292 children from the Chilean Longitudinal Survey of Early Childhood (ELPI) and 6,523 children from the Generation R Study in the Netherlands. The Home Observation for the Measurement of the Environment (HOME) was used to measure emotional support and early stimulation at home. The Child Behavior Checklist (CBCL) was used to measure emotional and behavioural problems in children at three-time points until the age of 10 years. **Results:** In ELPI, we identified four trajectories: low stable (20.0%), moderate decreasing (58.6%), high stable (18.2%) and high decreasing (2.8%). In Generation R, we found three trajectories: low (50.3%), moderate (25.5%), and high stable (8.7%). In ELPI, the findings indicate that mothers of children in the most problematic categories display markedly lower emotional responses when compared to their counterparts in the low-risk group. Furthermore, these mothers provide fewer learning materials, have a lower educational level, and display higher depressive symptoms. In the Generation R Study, the high stable group was associated with more maternal depressive symptoms and fewer emotional responses. **Conclusion:** This study underscores the protective factor of family environment across cultures in promoting positive emotional child development over time.

Keywords: Trajectories, Child emotional development, Home environment, Latin American context, European context.

Introduction

Children's mental health outcomes are affected by different factors. Based on a developmental ecological perspective, child development can be influenced by the interaction of diverse systems (Bronfenbrenner, 1979; Cicchetti & Lynch, 1993). One of the most proximal factors playing an important role in child development is the family system, which is essential in promoting positive outcomes and buffering against poor outcomes (Cicchetti & Valentino, 2015; Pluess, 2024). Several distal risk factors for mental health problems in children have been widely studied, including ethnic minorities (Gieling et al., 2010; Kouider et al., 2014) and socioeconomic status (Taraban & Shaw, 2018; Ulloa Vidal et al., 2017). However, the interaction between potential positive factors related to the home environment and child mental health trajectories across different cultures has been less explored, especially in non-Western regions such as Latin American countries.

Research consistently highlights the significant impact of the home environment on children's overall well-being, emphasising its role as a critical factor in laying the foundation for healthy psychological and emotional development (Domitrovich et al., 2017; Fanti & Henrich, 2023; Lehrl et al., 2020). This home environment encompasses two primary dimensions: the emotional atmosphere, based on how caregivers respond sensitively to their children, and the physical setting, which refers to structural materials and the safety provided at home (Jones et al., 2017). A stimulating home environment, comprising emotional and physical elements, is linked to better emotional and behavioural outcomes in children (Britto et al., 2017) and facilitates children's adaptation and socioemotional development (Bradley & Corwyn, 2005). Additionally, evidence suggests that positive interactions and a nurturing atmosphere at home significantly foster a child's socioemotional development (Li et al., 2023). Particularly, the warmth and responsiveness exhibited by parents during infancy emerge as critical predictors of successful child development within the first five years (Knauer et al., 2019). Conversely, an adverse home environment, marked by stress, conflict (Ackerman et al., 1999; Kelley et al., 2011) and lack of stimulating play materials (Bradley et al., 1989), can negatively affect a child's mental health, potentially leading to behavioural and emotional problems.

Although studies have found a relationship between positive home environments and fewer children's mental health problems, there is still mixed evidence regarding the role of distal factors, such as the macrosystem (i.e., cultural beliefs

and economic context). Literature has shown that cultural beliefs about child-rearing might shape parenting (Ardelt & Eccles, 2001; Bornstein & Cheah, 2013; DePasquale & Gunnar, 2020) as well as cultural variance in cross-cultural studies of parenting and children's emotional problems (Lansford et al., 2018; Putnick et al., 2018). Accordingly, normative parental behaviours have a different value in one culture than another; in other words, they may differ in what is most relevant for parenting.

Taking as an example the case of Chile in a Latin American context and the Netherlands in Europe, both countries have in common a high-income classification, similar fertility rates, and a population rate of 17 to 19 million inhabitants, with a similar number of people living in urban areas (World Bank, 2022). However, wealth inequality is experienced differently, with a higher index in Chile than in the Netherlands (World Bank, 2023). Chile is classified as a country with a highly unequal economic distribution despite its classification as an upper-middle-income country (World Bank, 2023). In this way, the gap between poor and wealthy families is significant, and poverty has been linked to difficulties for parents in meeting financial needs that impact domestic domains such as education, health, and housing (Duncan, 2021). Therefore, these disadvantages might contribute negatively to children's socioemotional development. Indeed, based on an international comparison study among 24 countries, Chile was positioned in the poorest mental health range in children. In contrast, the Netherlands was positioned in the top 10 countries with good mental health (Rescorla et al., 2011).

Although socioeconomic factors are well documented as an important mechanism, research has disproportionately taken a deficit-oriented perspective to explain the effect of risk factors on a child's mental health (Cabrera et al., 2012; McLoyd, 1998). Even though culture tends to affect parenting beliefs, studies on parenting have emphasised that nurturing environments are universally beneficial for different child outcomes (Biglan et al., 2012; Evans, 2006; Farah et al., 2008; Foster et al., 2005). Research emphasises that despite the notable differences in cultural parenting models globally, certain consistent relationships emerge between the experience of a stimulating and responsive family environment and children's adaptive functioning (Bradley & Corwyn, 2005). Therefore, regardless of the cultural context, the family environment can buffer the negative impact on child development.

Evidence is less straightforward when considering the positive impact of children's home environment on mental health across cultures. Consequently, some questions remain unexplored; for example, does the home environment have the same protective effect in the presence of risk factors across cultures? Moreover, most prospective studies examining developmental trajectories of emotional and behavioural problems were conducted in European and North American populations (Fanti & Henrich, 2010; Shi et al., 2020). Therefore, the current study aims to provide an opportunity to advance our knowledge of children's behavioural problems over time and the role of family components across two cultures from Latin America and Europe. Specifically, the first aim was to identify patterns of emotional and behavioural problems during childhood across cultures. Second, we aimed to determine the buffering effect of the home environment on children's mental health patterns. Based on the presence of risk factors regarding economic inequalities, we expect higher levels of child emotional and behavioural problems over time in the Latin American context, but lower levels of child behavioural and emotional problems over time in the European context. Additionally, we expect that a more nurturing home environment (with more learning materials and emotional responsivity) is related to lower child behavioural and emotional problems over time in both contexts, regardless of cultural and economic inequalities.

Method

Design and study population

Data from the Chilean Longitudinal Study of Early Childhood (ELPI) and the Generation R Study in the Netherlands were used. The current study hypotheses, design, and analysis plan were preregistered; see (https://doi.org/10.17605/OSF.IO/GHUZB). Any deviations from the original methodology plan are indicated throughout the manuscript.

The ELPI Study recruited a Chilean nationally representative sample and collected data on sociodemographic, emotional, cognitive and anthropometric factors at 3 different time points in 2010, 2012 and 2017 (Bravo, 2013). The information on the birth records from the participants was extracted from the Chilean Civil Registry and Identification Service. The eligibility criterion for participants in the first wave was children aged below 5 years (born between January 1, 2006, and August 31, 2009). In total, 15,175 families were enrolled in 2010, and participated in cognitive,

socioemotional, and early childhood developmental measures. We included only one mother-child dyad to avoid the repetition of mothers (in case the mother has more children, we only selected the first one), children aged 18 – 48 months who completed the evaluation in 2010 (n = 9,831) and had at least one assessment of emotional and behavioural problems across the 3-time points, leaving 5,292 for the analysis. Additionally, one of the main criteria to complete the surveys was being the primary caregiver or the mother of the child. In our study 100% of them were biological mothers. The Ethical Committee of the Center of Survey and Longitudinal Studies from the Pontificia Universidad Católica of Chile approved the study. Written informed consent was obtained from all the participants in the study.

The Generation R Study is a population-based cohort from fetal life onwards (Kooijman et al., 2016). Pregnant women living in Rotterdam (study area) in the Netherlands were invited to participate in the study. The eligibility criterion for participation was the expected delivery date (between April 2002 and January 2006). Therefore, the dyads were all biological mothers and their offspring. In total 9,778 mothers were enrolled (response rate of 61%). Of these, 7,393 mothers and offspring gave consent for participation until age 10. The current study includes 6,523 families with data on emotional and behavioural problems available for at least one data point (i.e., ages 1.5, 6, or 10 years). Only one dyad, mother-child, was selected to avoid repeated data from the mother. The Medical Ethical Committee of the Erasmus University Medical Center, Rotterdam approved the study. All participants signed an informed consent form before participating.

Measures

Emotional and behavioural problems

In both ELPI and the Generation R Study, the Child Behaviour Checklist (CBCL; Achenbach & Rescorla , 2000) was used to assess parent-reported emotional and behavioural problems. The CBCL version 1.5–5 years contains 99 items rated on a 3-point scale: 0 (not true), 1 (somewhat or sometimes true) and 2 (very true or often true). The CBCL version 6–18 years consists of 112 items, rated on a similar scale. Raw scores were created for both versions by summing up all the items. In the Chilean population, the CBCL's bi-factor structure has been shown to have good internal reliability and good validity (East et al., 2018; Rodriguez et al., 2019; Rosales & Bedregal, 2019). In the Netherlands, the CBCL's psychometric properties are well established (Verhulst & van der Ende, 2013). In this sample, the reliability

of the scales in ELPI was good for the three time-points respectively (α = .92; α = .94; α = .95). In Generation R, the reliability was also good for the three time-points respectively (α = .93; α = .94; α = .94).

Home environment

The Infant-Toddler Home Observation for Measurement of the Environment (IT-HOME) Inventory (Bradley & Caldwell, 1984) was used to assess social interactions and conditions experienced by a child in the family context. (e.g., "The mother encourages the child to try new activities"). This scale was rated by psychologists (ELPI) or research assistants (Generation R) based on direct observation during a home visit. In ELPI, some questions were also obtained during the interview with the primary caregiver. The original scale contained 45 statements (0 = No, 1 = Yes) with a total score of 45, with lower scores representing potentially inadequate environments. In the first wave of the ELPI study, 20 out of the 45 original items were observed, and 14 items were obtained from an interview with the primary caregiver. In Generation R, 29 observational items were used (Rijlaarsdam et al., 2012).

For the purpose of the current study, two subscales using similar items across both cohorts were used, namely "learning materials" and "social and emotional responsivity" (see items in Supplementary Table 1). The reliability of the HOME scale in both cohorts was good, namely in ELPI (α = .78) (Soto-Ramírez et al., 2022) and in Generation R (α = .82) (Rijlaarsdam et al., 2012).

Covariates

Sociodemographic information was obtained via self-report questionnaires at the enrolment in ELPI and during pregnancy in Generation R. Maternal education was defined as the highest degree finished by the mother. The educational level was classified into low (primary or lower level), middle (secondary level finished) and high (university degree or higher). Birth records were used to determine the child's sex and date of birth. Symptoms of maternal depression were self-reported. In the ELPI study, maternal depression was self-reported in a questionnaire in the third wave, using the Center for Epidemiological Studies Depression (CESD-10; Lewinsohn et al., 1997). This is a 10-item questionnaire that rates the feelings of mothers in the past week. The rating scale was 0 (not at all) to 3 (extremely). The internal consistency was good (α =.73). In the Generation R Study, depression was measured by a questionnaire during pregnancy using the Dutch version of the Brief Symptom Inventory (BSI; De Beurs, 2009). This is a 53-item questionnaire

that rates the extent to which each item describes the mother's feelings in the past week. The rating scale was 0 (not at all) to 4 (extremely). In this study, we used the depression subscale which included 6 items. The internal consistency of the subscale was good (α = .84). To facilitate comparison, we harmonised both measures of maternal depression to ensure the equivalence between the measures (Orhan et al., 2022). The data harmonisation was calculated based on a negative reciprocal transformation of the scores (Verhage et al., 2022). The Generation R measure was used as a reference scale to recode the measure scores in ELPI, with a 24 total maximum score for both scales.

Data analysis

We used an unconditional growth mixture model (GMM) to examine the trajectories of children's behavioural and emotional problems in the first nine years. The models were specified up to 5 classes. To identify the optimal number of classes in both cohorts, the model fit criteria was based on different parameters, namely the Akaike Information Criteria (AIC), the Bayesian Information Criteria (BIC), the Sample-Size Adjusted BIC (SSABIC), the Bootstrap Likelihood Ratio Test (BLRT), and entropy (Chen et al., 2017). A more parsimonious model was chosen according to lower values of AIC, BIC, and SSABI and a nonsignificant BLRT, which suggests the model with one fewer class is superior and thus preferred (Nylund et al., 2007). In addition, entropy is a measure of classification accuracy (range: 0–1), with higher values indicating greater precision (Peugh & Fan, 2012) , with a threshold of >.80 indicating a good accuracy (Lubke & Muthén, 2007).

Once we identified the optimal number of classes in the unconditional model, we specified the predictive model, including the predictors of the trajectories, such as the family context (HOME subscales) and covariates. Using the auxiliary function in Mplus, all the predictors were entered in the model in a multinomial logistic regression. To handle missing data in the emotional and behavioural problems subscales or covariates, the model was estimated with full information maximum likelihood estimation (FIML). Analyses were conducted in Mplus version 8.1 (Muthén & Muthén, 1998). To test the robustness of our findings, we performed a sensitivity analysis using the subscales (internalizing and externalizing problems) from the CBCL separately as outcomes in both cohorts (not preregistered).

Results

Table 1. Descriptive of the samples (ELPI and Generation R)

	ELPI		Generation R	
	N	M (SD) or %	N	M (SD) or %
Child characteristics				
Child sex (%boy)	5292	49.8%	6523	50.1%
Age at assessment (months)				
T1	5292	32.81 (8.9)	4722	18.4 (1.1)
T2	5287	58.88 (9.1)	5834	72.5 (5.5)
T3	5287	127.25(9.2)	5223	116.6 (.3)
CBCL T scores				
T1	5292	60.45 (9.6)	4618	44.4 (8.9)
T2	4807	55.07(11.9)	5752	41.9 (9.6)
T3	5292	51.05(10.8)	4870	46.2 (10.0)
Family environment				
Home socio-emotional involvement (score)	5287	5.80 (1.5)	1827	7.8 (0.7)
Home learning materials (score)	5287	2.08 (1.7)	1823	4.2 (1.5)
Maternal depression*	5287	5.85 (4.3)	4850	1.2 (2.5)
Maternal age	5219	29.87 (7.2)	6521	31.00 (4.9)
Educational level	5292		6523	
Low		18.6%		6.6%
Middle		59.2%		10.9%
High		20.5%		75.5%

Note: CBCL= Child Behaviour Checklist. *The scales for maternal depression in ELPI and Generation R study were harmonized to clarify the interpretation and comparison.

Trajectories of behavioural and emotional problems

The model fit indices for the latent class growth curve analysis of the CBCL in both cohorts are reported in Table 2. The results indicated that the entropy for the four-class model is slightly higher than the five-class models, although both are below the threshold (.80). Therefore, other components of the model fit were considered, such as the Akaike Information Criteria (AIC), the Bayesian Information Criteria (BIC), the Sample-Size Adjusted BIC (SSABIC), the Bootstrap Likelihood Ratio Test (BLRT). Additionally, the four-class model selection was also based on prior knowledge about the data and the underlying phenomenon showing by past research identifying around 4-5 profiles (Shi et al., 2020; Fanti & Henrich, 2023; Morales et al., 2023). Besides, adding more classes does not provide substantial information compared to the model with four classes, given that the model with five classes has two classes with less than 5% of the sample (3% and 5% each). In Generation R, a three-class solution fitted the data best. In the ELPI study, the four trajectories of child emotional and behavioural problems reflect low stable (n =

1083, 20.0%), moderate decreasing (n = 3101, 58.6%), high stable (n = 961, 18.2%) and high decreasing (n = 145, 2.8%) trajectories. In Generation R, the identified trajectories of child emotional and behavioural problems were low (n = 3272, 50.3%), moderate (n = 1846, 25.5%), and high stable (n = 564, 8.7%) (Figures 1 and 2, respectively).

Table 2. Model fit indices of the latent class growth curve analysis with 1-5 classes with CBCL data.

Cohort		AIC	BIC	Sample-size adjusted BIC	BLRT		N smallest class	Entropy
					Value	p		
ELPI	1 class	116566.40	116599.27	116583.38				
	2 classes	115383.77	115436.37	115410.94	-58278.20	<0.001	2073 (39.1%)	.51
	3 classes	115187.05	115259.36	115224.41	-57683.89	<0.001	965 (18.3%)	.54
	4 classes	115143.24	115235.28	115190.79	-57582.52	0.01	145 (2.8%)	.63
	5 classes	115096.53	115208.29	115154.27	-57557.62	0.01	157 (3.0%)	.62
GENR	1 group	112376.91	112410.82	112394.93				
	2 groups	110218.92	110273.17	110247.75	-56183.46	<0.001	1957(30.1%)	.65
	3 groups	109783.25	109857.84	109822.89	-55101.46	<0.001	564 (8.7%)	.61
	4 groups	109695.96	109790.90	109746.41	-54880.62	0.09	288 (4.4%)	.54
	5 groups	109607.22	109722.51	109668.48	-54833.98	0.03	276 (4.2%)	.55

Note: AIC = Akaike information criterion, BIC = Bayesian information criteria, BLRT = Bootstrap likelihood ratio test

Figure 1. Four behavioural and emotional problems trajectories (CBCL) after adding the covariates and predictors in ELPI study.

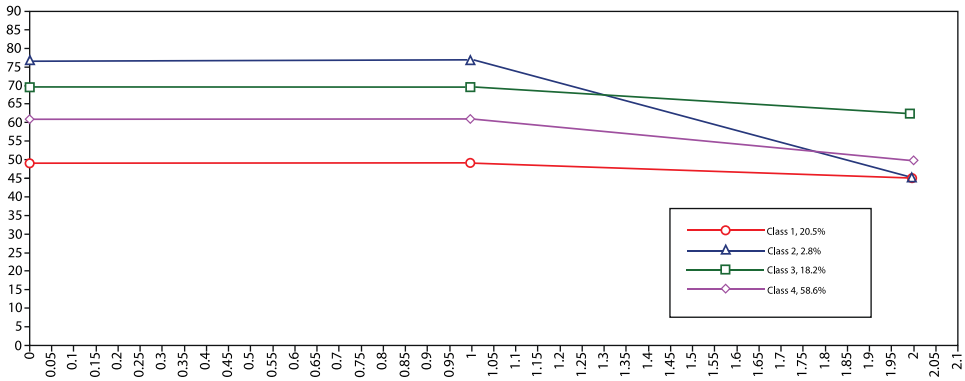
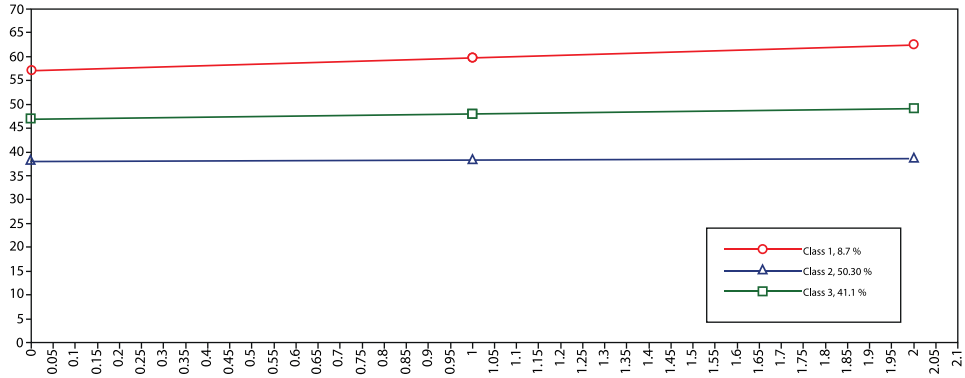


Figure 2. Three behavioural and emotional problems trajectories (CBCL) after adding the covariates and predictors in Generation R study.



Predictors of the trajectory classes

Tables 3 and 4 present the results of the multinomial logistic regression analyses with family environment as a predictor of the CBCL trajectories for ELPI and Generation R, respectively. In both cohort studies, the trajectories differ significantly according to their intercept and slope (See supplementary tables 2 & 3).

The reference group for both cohorts was the low-stable class. In the ELPI study, it was found that, in comparison to the low-stable group, children who received emotional support, more learning materials, their mothers exhibited fewer maternal depressive symptoms, and possessed a higher level of maternal education, were less likely to belong to the high-decreasing group and the moderate-decreasing group. Meanwhile, higher levels of emotional support and learning materials, less maternal depressive symptoms, higher maternal education and being a girl decreased the odds of belonging to the high stable group.

In the Generation R Study, receiving more emotional support, lower levels of maternal depression and being a girl decreased the odds of belonging to the high-stable group of child emotional and behavioural problems compared to the low-stable class. No other home environment dimensions significantly predicted trajectory membership. Regarding the covariates, it was found that being a girl and having mothers with fewer depression symptoms decreased the odds of belonging to the moderate group.

Table 3. Multinomial logistic regression analyses comparing the four trajectories according to the early family environment characteristics in the ELPI study

	CBCL trajectory (reference is stable low class)		
Environmental factors	High decreasing	High stable	Moderate decreasing
	OR [95% C.I.]	OR [95% C.I.]	OR [95% C.I.]
Emotional response and verbalization	**.68 [.56, .83]**	**.84 [.75, .93]**	**.90 [.82, .99]**
Learning materials	**.70 [.55, .90]**	**.65 [.56, .76]**	**.77 [.67, .89]**
Maternal depression	**1.12 [1.05, 1.20]**	**1.26 [1.22, 1.30]**	**1.10 [1.06, 1.14]**
Maternal education	**.26 [.15, .45]**	**.39 [.30, .50]**	**.66 [.53, .82]**
Sex (1=boys, 2= girls)	.72[.36, 1.244]	**.60 [.45, .80]**	.79 [.62, 1.00]

Note: In bold significant results at the .05 level. CBCL=Child Behaviour Checklist.

Table 4. Multinomial logistic regression analyses comparing the three trajectories according to the early family environment characteristics in Gen R study

	CBCL trajectory (reference is stable low class)	
Environmental factors	High-increasing	Moderate stable
	OR [95% C.I.]	OR [95% C.I.]
Emotional response and verbalization	**.71 [.51, .99]**	.98 [.71, 1.38]
Learning materials	.98 [.78, 1.24]	.98 [.84, 1.41]
Maternal depression	**2.05 [1.46, 2.89]**	**1.93 [1.37, 2.73]**
Maternal education	.86 [.52, 1.45]	.85 [.64, 1.14]
Sex (1=boys, 2= girls)	**.40 [.21, .76]**	**.62 [.42, .91]**

Note: In bold significant results at the .05 level. CBCL=Child Behaviour Checklist.

In a sensitivity analysis in both cohorts, we looked at internalizing and externalizing problems separately. The number of trajectories and their shape was similar. The only exception was related to the predictors. In the Generation R study, for internalizing problems, only maternal depression was a predictor (OR = 1.66; CI = 1.32, 2.08). While for externalizing problems, the predictors were maternal depression (OR = 3.77; CI = 1.44, 9.88) and child sex (OR = .52; CI = .32, .85) following the same pattern as in total problems. In the ELPI study, for internalizing problems had the same trend as in total problems, however child sex was no longer significant as a predictor of the high stable class. While externalizing problems followed the same trend as in total problems.

Discussion

This study examined trajectories of mother-reported emotional and behavioural problems during childhood across cultures. In the Chilean population, two stable (low and high) and two decreasing trajectories were found, in which a less supportive home environment, maternal depressive symptoms and lower maternal education were related to more problematic trajectories. In the Dutch population, three stable trajectories over time were found characterized by different levels of problems, in which only lower maternal emotional involvement and higher maternal depressive symptoms were predictors of more problematic trajectories.

Trajectories of emotional & behavioural problems

The findings for the CBCL trajectories are consistent with previous studies that also identified between 3 to 5 different trajectories of child emotional and behavioural problems (Fanti & Henrich, 2010; Fanti & Henrich, 2023; Shi et al., 2020). Regarding the shape of the trajectories, in Western countries, studies have found mostly low stable or linear increases over time, just as in our study (Chen, 2022; Duinhof et al., 2015; Robbers et al., 2011). However, in the Chilean sample, we identified two decreasing trajectories over time. This aligns with another Chilean study that found stable and decreasing patterns over time (Morales et al., 2023). A possible explanation for this decreasing pattern up to age 10 years is related to the support of the program "Chile Grows with you" (ChCC), which started in 2007 and ensures access to a set of universal services for all children in Chile, specifically focused on promoting child development (Torres et al., 2018). Additionally, almost 9 years after the initiation of ChCC, a new bioecological perspective emphasising nurturing and sensitive care for children was promoted and added to the program (World Bank, 2018). Therefore, the program might start showing its impact years later, reflected in the decreasing pattern found in this study.

Interestingly, in the Chilean population, only 20% of the sample belongs to the low stable group. This finding is comparable to evidence suggesting the high levels of emotional and behavioural problems in the Chilean population (Rescorla et al., 2011). Conversely to the results with the Chilean population, half of the Dutch sample belongs to the low-stable class and tends to be stable over time. This low percentage of emotional and behavioural problems identified in the Dutch sample may be explained by the socioeconomic status, represented by

the high maternal education of this sample (75%). Accordingly, a Dutch study has found that economic inequalities in socioemotional development decreased over time, and for externalising problems even disappeared in later childhood (Houweling et al., 2022). Besides economic disparities, another explanation may be due to cultural values, considering that societal factors impacting child development may vary according to specific contexts. In this line, in cultures that emphasise collectivism, e.g., Latin America, child rearing is often perceived as a shared behaviour characterised by supporting each other in the family system and sharing the burden of care with the group as a whole, leading to more family support, and has indeed been reported to be associated with fewer levels of child problems (Fuller & Coll, 2010). Conversely, in cultures stressing independence, e.g., North America and Western Europe, individualism is considered a positive aspect that can protect the family system by emphasising the importance of taking care of themselves as a substantial value beneficial for children's socio-emotional development (Bornstein & Cheah, 2013; Oyserman et al., 2002; Tamis-LeMonda et al., 2008). Along the same line, other unmeasured variables such as societal norms and child support benefits (e.g., monthly child support, parental help programs, and childcare benefits) might already explain the favourable low rates of emotional and behavioural problems. Thus, more distal factors related to the broader environment in which families live might contribute more significantly to that relationship.

Predictors of trajectories of emotional & behavioural problems

Regarding the home environment, our results in the Chilean and Dutch populations showed that receiving less maternal emotional involvement was linked with more child problems, as indicated by moderate and high emotional and behavioural problems trajectories. Similar results were identified in other studies, in which a positive home environment might help to reduce emotional and behavioural problems over time (Fanti & Henrich, 2010; Shaw et al., 2003). Our result confirms the importance of the home environment in the life of a child and how the lack of early maternal support may impair children's emotional development over time (Fanti & Henrich, 2023; Soto-Ramírez et al., 2022). Notably, mothers in the Chilean sample present a highly prevalent postpartum depression (24,8%) and parental stress (18,1%) (Bravo, 2013). These results highlight that even though being part of a context with risk factors, such as poor maternal mental health, maternal involvement plays an important role in mitigating emotional and behavioural problems of children. Accordingly, it seems necessary to emphasise the relevance

of the home environment regardless of the presence of contextual risk factors.

The exposure to learning materials was significantly associated with class membership, but only in the Chilean population. This result is in line with another study in China that found significant associations of learning environment and mental health problems (Lee & Xie, 2018). On the other hand, the lack of a significant link in the Dutch population might be explained by the fact that the acquisition of learning materials also relied on socioeconomic factors, which might be easier to obtain in a high-income context. Additionally, Chile has 454 public libraries that provide access to different learning materials (SERPAT, 2024). While in the Netherlands, 1270 libraries are available for parents and children, with a high level of participation (CBS, 2023). Therefore, whether children receive less or more learning materials at home might not necessarily have an impact on the Dutch population, considering that perhaps it is no longer an unmet need that has to be solved at home, with learning materials likely being more related to academic and educational development than emotional problems (Lehrl et al., 2020; Tamis-LeMonda et al., 2019).

Notably, in both cohorts, child sex seemed to have an important contribution to class membership. Our findings showed that being a male increased the odds of belonging to a high-decreasing and highly stable group. This is in line with past literature showing child sex differences in the trajectories of externalizing and internalizing problems in children (Gong et al., 2023). Specifically, boys present higher levels of emotional and behavioural problems than girls (La Maison et al., 2020; van den Oord et al., 1995) and are more likely to have persistent higher levels of externalising behaviours over time (Fanti & Henrich, 2023; Sentse et al., 2017). Additionally, maternal depression was significantly associated with moderate and high-class membership in both cohorts. This result is in line with other studies that stressed the role of maternal depression as a risk factor for subsequent emotional and behavioural problems throughout childhood (Ashman et al., 2008; Guyon-Harris et al., 2016; Matijasevich et al., 2015). Finally, low maternal education was identified as a predictor only in the Chilean context. This finding is comparable to other Chilean studies using the same cohort, in which they found an important socioeconomic gap that persists in socio-emotional problems among children over time (Abufhele et al., 2022). Literature has been consistent in showing that children and adolescents with low socioeconomic status are at higher risk of mental health problems (Peverill et al., 2021; Reiss, 2013). This finding suggests the important role of socioeconomic factors in maintaining emotional and

behavioural problems.

Regarding the implications, the individual differences found in this study highlight the diverse trajectories of child behavioural and emotional problems. Thus, identifying the individual characteristics associated with the onset and maintenance of emotional and behavioural problems brings important information to be used clinically, specifically for those belonging to the most problematic trajectory. Based on the findings, we identify high levels of emotional and behavioural problems in early childhood, which tend to decrease at the age of 10 years, especially in the Chilean population. Therefore, strategies for the implementation, guidance, and support of caregivers must start early. A cross-cultural examination of child development provides valuable insights into how children's emotional and behavioural problems differ across various cultures. It also reveals how parenting practices serve as a support system for children's socioemotional growth in these diverse contexts. Furthermore, the results highlight the need for early identification of childhood socioemotional problems and hint at how the reduction of socioeconomic inequalities in society might improve mental health in childhood (Reiss, 2013).

Limitations

The findings of the current study contribute to our knowledge of changes and predictors of behavioural and emotional problems over time in a prospective study design in two different cultures. Nevertheless, the findings must be considered in the light of some limitations. First, the study relied on mothers' reports of children's behavioural and emotional problems and only maternal information (depression, educational level and home environment). This might reflect a notable limitation in our study, which reveals a broader issue within the field of early predictors of child development, regarding the insufficient information about fathers or partners. This gap remains significant, and evidence pertaining to the role of fathers continues to emerge, requiring further exploration and acknowledgement in future research. Second, for this study, only available predictors in both cohorts were considered, limiting its conclusions. Other predictors regarding parenting and family atmosphere are needed to provide a more comprehensive picture of the family context. Additionally, given the differences in items and scoring systems between the dimensions of the home environment subscales, we did not test whether learning materials and social and emotional responsivity were invariant across the two groups, which may limit the interpretations of our results.

Third, although this study examined the culture-specific effect by comparing the trajectories of emotional and behavioural problems in two countries, measures assessing cultural values such as individualism and collectivism were not included. Therefore, we cannot guarantee that the variability between the trajectories found accounts for cultural differences across the countries. Moreover, the lack of more time points, especially across adolescence, prevents us from identifying a more extensive overview of the changes over time, since mental health problems may change according to different stages of child development. Finally, given the nature of longitudinal designs, dropouts through the study are expected; thus, selection bias might be particularly a concern since the more vulnerable groups may be more prone to drop. However, the use of additional strategies to reduce selection bias might be important to consider, such as complete case analysis, inverse probability weighting, and multiple imputation (Little et al., 2024). In this way, future research can mitigate the impact of systematic attrition with the use of more strategies to handle missing data.

Conclusion

Using growth mixture modelling in a prospective study of two different cultures, this study found changes in children emotional and behavioural problems over ten years of assessment at three different time points. The results showed heterogeneous trajectories over time, including stable and decreasing patterns. Children's sex, maternal education, emotional involvement and learning materials were associated to class membership in the Chilean population. In contrast, in the Dutch population, only child sex and maternal involvement were significant predictors. These findings suggest that slightly different aspects are relevant in the development and maintenance of children's socioemotional development across cultural contexts. Prevention strategies should focus on factors in the home environment that seem to predict high stable levels of child behavioral problems. Further research is needed in different cultures to understand the heterogeneous changes over time in diverse cultural contexts. The findings of this study underscore critical public health implications for global child development. By recognising the diverse factors that influence children's emotional and behavioural trajectories, this study encourages further research to explore multifaceted challenges faced by children across various cultural contexts. The implications extend beyond the immediate study population, offering insights that are relevant for policymakers and practitioners worldwide.

References

Abufhele, A., Contreras, D., Puentes, E., Telias, A., & Valdebenito, N. (2022). Socioeconomic gradients in child development: Evidence from a Chilean longitudinal study 2010-2017. *Advances in Life Course Research*, *52*. https://doi.org/10.1016/j.alcr.2021.100451

Achenbach, T., & Rescorla, L. (2000). *Manual for the ASEBA Preschool forms & profiles*. Burlington: University of Vermont, Research Center for Children, Youth & Families.

Ackerman, B. P., Kogos, J., Youngstrom, E., Schoff, K., & Izard, C. (1999). Family instability and the problem behaviors of children from economically disadvantaged families. *Developmental Psychology*, *35*(1), 258-268. https://doi.org/10.1037/0012-1649.35.1.258

Ardelt, M., & Eccles, J. S. (2001). Effects of mothers' parental efficacy beliefs and promotive parenting strategies on inner-city youth. *Journal of Family Issues*, *22*(8), 944-972. https://doi.org/10.1177/019251301022008001

Ashman, S. B., Dawson, G., & Panagiotides, H. (2008). Trajectories of maternal depression over 7 years: relations with child psychophysiology and behavior and role of contextual risks. *Development and Psychopathology*, *20*(1), 55-77. https://doi.org/10.1017/S0954579408000035

Biglan, A., Flay, B. R., Embry, D. D., & Sandler, I. N. (2012). The critical role of nurturing environments for promoting human well-being. *Am Psychol*, *67*(4), 257-271. https://doi.org/10.1037/a0026796

Bornstein, M. H., & Cheah, C. S. L. (2013). The place of "culture and parenting" in the ecological contextual perspective on developmental science. In *Parenting beliefs, behaviors, and parent-child relations* (pp. 3-34). Psychology Press.

Bradley, R. H., & Caldwell, B. M. (1984). The HOME Inventory and family demographics. *Developmental Psychology*, *20*(2), 315. https://doi.org/10.1037/0012-1649.20.2.315

Bradley, R. H., Caldwell, B. M., Rock, S. L., Ramey, C. T., Barnard, K. E., Gray, C., Hammond, M. A., Mitchell, S., Gottfried, A. W., Siegel, L., & Johnson, D. L. (1989). Home environment and cognitive development in the first 3 years of life: A collaborative study involving six sites and three ethnic groups in North America. *Developmental Psychology*, *25*(2), 217-235. https://doi.org/10.1037/0012-1649.25.2.217

Bradley, R. H., & Corwyn, R. F. (2005). Caring for children around the world: A view from HOME. *International Journal of Behavioral Development*, *29*(6), 468-478. https://doi.org/10.1080/01650250500146925

Bravo, D. (2013). *Encuesta longitudinal de la primera infancia: primeros resultados 2012*. Santiago, Chile: Universidad de Chile, Centro de Microdatos. https://observatorio.ministeriodesarrollosocial.gob.cl/storage/docs/elpi/2012/Informe_Resultados_Encuesta_Hogares_2012.pdf

Britto, P. R., Lye, S. J., Proulx, K., Yousafzai, A. K., Matthews, S. G., Vaivada, T., Perez-Escamilla, R., Rao, N., Ip, P., Fernald, L. C. H., MacMillan, H., Hanson, M., Wachs, T. D., Yao, H., Yoshikawa, H., Cerezo, A., Leckman, J. F., Bhutta, Z. A., & Early Childhood Development Interventions Review Group, f. t. L. E. C. D. S. S. C. (2017). Nurturing care: promoting early childhood development. *Lancet*, *389*(10064), 91-102. https://doi.org/10.1016/S0140-6736(16)31390-3

Bronfenbrenner, U. (1979). *The ecology of human development experiments by nature and*

design. Harvard University Press. https://doi.org/10.2307/j.ctv26071r6

Cabrera, N. J., Beeghly, M., & Eisenberg, N. (2012). Positive Development of Minority Children: Introduction to the Special Issue. *Child Development Perspectives*, *6*(3), 207-209. https://doi.org/10.1111/j.1750-8606.2012.00253.x

CBS. (2023). *Open data: Public libraries*. https://opendata.cbs.nl/statline/#/CBS/en/dataset/70763ENG/table

Chen, C. (2022). Trajectories of behavioral problems and predictors in children aged 4 to 7 years: A growth mixture model analysis. *Journal of Psychopathology and Behavioral Assessment*, *44*(3), 636-648. https://doi.org/10.1007/s10862-022-09953-z

Chen, Q., Luo, W., Palardy, G. J., Glaman, R., & McEnturff, A. (2017). The efficacy of common fit Indices for enumerating classes in growth mixture models when nested data structure is ignored: A monte carlo study. *Sage Open*, *7*(1). https://doi.org/10.1177/2158244017700459

Cicchetti, D., & Lynch, M. (1993). Toward an ecological/transactional model of community violence and child maltreatment: consequences for children's development. *Psychiatry*, *56*(1), 96-118. https://doi.org/10.1080/00332747.1993.11024624

Cicchetti, D., & Valentino, K. (2015). An ecological-transactional perspective on child maltreatment: Failure of the average expectable environment and iIts influence on child development. In *Developmental Psychopathology* (pp. 129-201). https://doi.org/10.1002/9780470939406.ch4

De Beurs, E. (2009). *BSI: brief symptom inventory handleiding* PITS B.V.

DePasquale, C. E., & Gunnar, M. R. (2020). Parental sensitivity and nurturance *Future of Children*, *30*(2), 53-70. https://doi.org/10.1353/foc.2020.a807761

Domitrovich, C. E., Durlak, J. A., Staley, K. C., & Weissberg, R. P. (2017). Social-emotional competence: An essential factor for promoting positive adjustment and reducing risk in school children. *Child Development*, *88*(2), 408-416. https://doi.org/10.1111/cdev.12739

Duinhof, E. L., Stevens, G. W., van Dorsselaer, S., Monshouwer, K., & Vollebergh, W. A. (2015). Ten-year trends in adolescents' self-reported emotional and behavioral problems in the Netherlands. *Eur Child Adolesc Psychiatry*, *24*(9), 1119-1128. https://doi.org/10.1007/s00787-014-0664-2

Duncan, G. J. (2021). A Roadmap to Reducing Child Poverty. *Acad Pediatr*, *21*(8S), S97-S101. https://doi.org/10.1016/j.acap.2021.04.028

East, P., Delker, E., Lozoff, B., Delva, J., Castillo, M., & Gahagan, S. (2018). Associations among infant iron deficiency, childhood emotion and attention regulation, and adolescent problem behaviors. *Child Development*, *89*(2), 593-608. https://doi.org/10.1111/cdev.12765

Evans, G. W. (2006). Child development and the physical environment. *Annual Review of Psychology*, *57*, 423-451. https://doi.org/10.1146/annurev.psych.57.102904.190057

Fanti, K. A., & Henrich, C. C. (2010). Trajectories of pure and co-occurring internalizing and externalizing problems from age 2 to age 12: findings from the National Institute of Child Health and Human Development Study of Early Child Care. *Developmental Psychology*, *46*(5), 1159-1175. https://doi.org/10.1037/a0020659

Fanti, K. A., & Henrich, C. C. (2023). The relation of home and childcare/school environment to differential trajectories of externalizing problems. *International Journal about Parents in Education*, *1*(1). https://doi.org/10.54195/ijpe.18257

Farah, M. J., Betancourt, L., Shera, D. M., Savage, J. H., Giannetta, J. M., Brodsky, N. L., Malmud, E. K., & Hurt, H. (2008). Environmental stimulation, parental nurturance and cognitive development in humans. *Developmental Science*, *11*(5), 793-801. https://doi.org/10.1111/j.1467-7687.2008.00688.x

Foster, M. A., Lambert, R., Abbott-Shim, M., McCarty, F., & Franze, S. (2005). A model of home learning environment and social risk factors in relation to children's emergent literacy and social outcomes. *Early Childhood Research Quarterly*, *20*(1), 13-36. https://doi.org/10.1016/j.ecresq.2005.01.006

Fuller, B., & Coll, C. G. (2010). Learning from latinos: Contexts, families, and child development in motion. *Developmental Psychology*, *46*(3), 559-565. https://doi.org/10.1037/a0019412

Gieling, M., Vollebergh, W., & van Dorsselaer, S. (2010). Ethnic density in school classes and adolescent mental health. *Social Psychiatry and Psychiatric Epidemiology*, *45*(6), 639-646. https://doi.org/10.1007/s00127-009-0105-6

Gong, X., Guo, N., Huebner, E. S., & Tian, L. (2023). Gender-specific co-developmental trajectories of internalizing and externalizing problems from middle childhood to early adolescence: Environmental and individual predictors. *Development and Psychopathology*, *35*(3), 1468-1483. https://doi.org/10.1017/S0954579422000207

Guyon-Harris, K., Huth-Bocks, A., Lauterbach, D., & Janisse, H. (2016). Trajectories of maternal depressive symptoms across the birth of a child: associations with toddler emotional development. *Arch Womens Ment Health*, *19*(1), 153-165. https://doi.org/10.1007/s00737-015-0546-8

Houweling, T. A. J., Oude Groeniger, J., Jansen, P. W., van Lier, P., Horoz, N., Buil, M., & van Lenthe, F. J. (2022). Trajectories of socioeconomic inequality in early child development: a cohort analysis. *International journal for equity in health*, *21*(1), 79. https://doi.org/10.1186/s12939-022-01675-8

Jones, P. C., Pendergast, L. L., Schaefer, B. A., Rasheed, M., Svensen, E., Scharf, R., Shrestha, R., Maphula, A., Roshan, R., Rasmussen, Z., Seidman, J. C., Murray-Kolb, L. E., & Investigators, M.-E. N. (2017). Measuring home environments across cultures: Invariance of the HOME scale across eight international sites from the MAL-ED study. *J Sch Psychol*, *64*, 109-127. https://doi.org/10.1016/j.jsp.2017.06.001

Kelley, S. J., Whitley, D. M., & Campos, P. E. (2011). Behavior problems in children raised by grandmothers: The role of caregiver distress, family resources, and the home environment. *Children and Youth Services Review*, *33*(11), 2138-2145. https://doi.org/10.1016/j.childyouth.2011.06.021

Knauer, H. A., Ozer, E. J., Dow, W. H., & Fernald, L. C. H. (2019). Parenting quality at two developmental periods in early childhood and their association with child development. *Early Childhood Research Quarterly*, *47*, 396-404. https://doi.org/10.1016/j.ecresq.2018.08.009

Kooijman, M. N., Kruithof, C. J., van Duijn, C. M., Duijts, L., Franco, O. H., Van IJzendoorn, M. H., de Jongste, J. C., Klaver, C. C. W., van der Lugt, A., Mackenbach, J. P., Moll, H. A., Peeters, R. P., Raat, H., Rings, E. H. H. M., Rivadeneira, F., van der Schroeff, M. P., Steegers, E. A. P., Tiemeier, H., Uitterlinden, A. G., . . . Jaddoe, V. W. V. (2016). The Generation R Study: design and cohort update 2017. *European Journal of Epidemiology*, *31*(12), 1243-1264. https://doi.org/10.1007/s10654-016-0224-9

Kouider, E. B., Koglin, U., & Petermann, F. (2014). Emotional and behavioral problems in migrant children and adolescents in Europe: a systematic review. *European Child &*

Adolescent Psychiatry, *23*(6), 373-391. https://doi.org/10.1007/s00787-013-0485-8

La Maison, C., Maruyama, J. M., Munhoz, T. N., Santos, I. S., do Amaral, M. R., Anselmi, L., Barros, F. C., Pastor-Valero, M., & Matijasevich, A. (2020). Continuity of psychiatric disorders between 6 and 11 years of age in the 2004 Pelotas Birth Cohort. *Brazilian Journal of Psychiatry*, *42*(5), 496-502. https://doi.org/10.1590/1516-4446-2019-0723

Lansford, J. E., Godwin, J., Al-Hassan, S. M., Bacchini, D., Bornstein, M. H., Chang, L., Chen, B. B., Deater-Deckard, K., Di Giunta, L., Dodge, K. A., Malone, P. S., Oburu, P., Pastorelli, C., Skinner, A. T., Sorbring, E., Steinberg, L., Tapanya, S., Alampay, L. P., Tirado, L. M. U., & Zelli, A. (2018). Longitudinal associations between parenting and youth adjustment in twelve cultural groups: Cultural normativeness of parenting as a moderator. *Developmental Psychology*, *54*(2), 362-377. https://doi.org/10.1037/dev0000416

Lee, K., & Xie, X. Q. (2018). Associations between home learning environment and mental health for young children living in China. *Social Work in Mental Health*, *16*(3), 284-302. https://doi.org/10.1080/15332985.2017.1385566

Lehrl, S., Evangelou, M., & Sammons, P. (2020). The home learning environment and its role in shaping children's educational development. *School Effectiveness and School Improvement*, *31*(1), 1-6. https://doi.org/10.1080/09243453.2020.1693487

Lewinsohn, P. M., Seeley, J. R., Roberts, R. E., & Allen, N. B. (1997). Center for Epidemiologic Studies Depression Scale (CES-D) as a screening instrument for depression among community-residing older adults. *Psychology and Aging*, *12*(2), 277-287. https://doi.org/10.1037/0882-7974.12.2.277

Li, S., Tang, Y., & Zheng, Y. (2023). How the home learning environment contributes to children's social–emotional competence: A moderated mediation model. *Frontiers in Psychology*, *14*. https://doi.org/10.3389/fpsyg.2023.1065978

Little, R. J., Carpenter, J. R., Lee, K. J., & Initiative, S. (2024). A comparison of three popular methods for handling missing data: Complete-case analysis, inverse probability weighting, and multiple imputation. *Sociological Methods & Research*, *53*(3), 1105-1135. https://doi.org/10.1177/00491241221113873

Lubke, G., & Muthén, B. O. (2007). Performance of factor mixture models as a function of model size, covariate effects, and class-specific parameters. *Structural Equation Modeling-a Multidisciplinary Journal*, *14*(1), 26-47. https://doi.org/10.1207/s15328007sem1401_2

Matijasevich, A., Murray, J., Cooper, P. J., Anselmi, L., Barros, A. J., Barros, F. C., & Santos, I. S. (2015). Trajectories of maternal depression and offspring psychopathology at 6 years: 2004 Pelotas cohort study. *J Affect Disord*, *174*, 424-431. https://doi.org/10.1016/j.jad.2014.12.012

McLoyd, V. C. (1998). Socioeconomic disadvantage and child development. *American Psychologist*, *53*(2), 185-204. https://doi.org/10.1037/0003-066x.53.2.185

Morales, M. F., MacBeth, A., Nagin, D., & Girard, L. C. (2023). Developmental trajectories of aggression, hyperactivity/inattention, and anxious depressed mood: co-occurring problems within a chilean context. *Current Psychology*. https://doi.org/10.1007/s12144-023-04530-3

Muthén, L., & Muthén, B. (1998). *Mplus: The comprehensive modeling program for applied researchers: User's guide*. Muthén & Muthén.

Nylund, K. L., Asparoutiov, T., & Muthén, B. O. (2007). Deciding on the number of classes

in latent class analysis and growth mixture modeling:: A Monte Carlo simulation study. *Structural Equation Modeling-a Multidisciplinary Journal*, *14*(4), 535-569. https://doi.org/10.1080/10705510701575396

Orhan, M., Millett, C., Klaus, F., Blumberg, H. P., Briggs, F., Chung, K. H., Korten, N., McManus, K., van Oppen, P., Patrick, R. E., Sarna, K., Sutherland, A., Tsai, S. Y., Villa, L. M., Yala, J., Sajatovic, M., Burdick, K. E., Eyler, L., Dols, A., & consortium, G.-B. (2022). Comparing continuous and harmonized measures of depression severity in older adults with bipolar disorder: Relationship to functioning. *Journal of Affective Disorders*, *314*, 44-49. https://doi.org/10.1016/j.jad.2022.06.074

Oyserman, D., Coon, H. M., & Kemmelmeier, M. (2002). Rethinking individualism and collectivism: Evaluation of theoretical assumptions and meta-analyses. *Psychological Bulletin*, *128*(1), 3-72. https://doi.org/10.1037/0033-2909.128.1.3

Peugh, J., & Fan, X. (2012). How well does growth mixture modeling identify heterogeneous growth trajectories? A simulation study examining GMM's performance characteristics. *Structural Equation Modeling: A Multidisciplinary Journal*, *19*(2), 204-226. https://doi.org/10.1080/10705511.2012.659618

Peverill, M., Dirks, M. A., Narvaja, T., Herts, K. L., Comer, J. S., & McLaughlin, K. A. (2021). Socioeconomic status and child psychopathology in the United States: A meta-analysis of population-based studies. *Clin Psychol Rev*, *83*, 101933. https://doi.org/10.1016/j.cpr.2020.101933

Pluess, M. (2024). Beyond developmental psychopathology: Positive child development. *Development and Psychopathology*. https://doi.org/10.1017/S0954579424000294

Putnick, D. L., Bornstein, M. H., Lansford, J. E., Chang, L., Deater-Deckard, K., Di Giunta, L., Dodge, K. A., Malone, P. S., Oburu, P., Pastorelli, C., Skinner, A. T., Sorbring, E., Tapanya, S., Tirado, L. M. U., Zelli, A., Alampay, L. P., Al-Hassan, S. M., Bacchini, D., & Bombi, A. S. (2018). Parental acceptance-rejection and child prosocial behavior: Developmental transactions across the transition to adolescence in nine countries, mothers and fathers, and girls and boys. *Developmental Psychology*, *54*(10), 1881-1890. https://doi.org/10.1037/dev0000565

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

Rescorla, L. A., Achenbach, T. M., Ivanova, M. Y., Harder, V. S., Otten, L., Bilenberg, N., Bjarnadottir, G., Capron, C., De Pauw, S. S., Dias, P., Dobrean, A., Döpfner, M., Duyme, M., Eapen, V., Erol, N., Esmaeili, E. M., Ezpeleta, L., Frigerio, A., Fung, D. S., . . . Verhulst, F. C. (2011). International comparisons of behavioral and emotional problems in preschool children: parents' reports from 24 societies. *J Clin Child Adolesc Psychol*, *40*(3), 456-467. https://doi.org/10.1080/15374416.2011.563472

Rijlaarsdam, J., Stevens, G. W. J. M., Van der Ende, J., Arends, L. R., Hofman, A., Jaddoe, V. W. V., Mackenbach, J. P., Verhulst, F. C., & Tiemeier, H. (2012). A brief observational instrument for the assessment of infant home environment: development and psychometric testing. *International Journal of Methods in Psychiatric Research*, *21*(3), 195-204. https://doi.org/10.1002/mpr.1361

Robbers, S. C., van Oort, F. V., Polderman, T. J., Bartels, M., Boomsma, D. I., Verhulst, F. C., Lubke, G. H., & Huizink, A. C. (2011). Trajectories of CBCL attention problems in childhood. *European Child & Adolescent Psychiatry*, *20*(8), 419-427. https://doi.org/10.1007/s00787-011-0194-0

Rodriguez, P. R., Solar, F. C., & Navarrete, C. B. (2019). Cross-cultural adaptation of the children's emotion regulation processes survey (CERP) in Chilean preschoolers. *Trends in Psychology*, *27*(1), 85-97. https://doi.org/10.9788/TP2019.1-07

Rosales, R. S., & Bedregal, P. (2019). Dysregulation profile defined by Child Behavior Checklist in a sample of preschool children. *Revista Chilena De Pediatria-Chile*, *90*(2), 157-165. https://doi.org/10.32641/rchped.v90i2.657

Sentse, M., Prinzie, P., & Salmivalli, C. (2017). Testing the direction of longitudinal paths between victimization, peer rejection, and different types of internalizing problems in adolescence. *Journal of abnormal child psychology*, *45*, 1013-1023. https://doi.org/10.1007/s10802-016-0216-y

SERPAT. (2024). *Informe de Gestión 2023 Sistema Nacional de Bibliotecas Públicas* https://www.bibliotecaspublicas.gob.cl/sites/www.bibliotecaspublicas.gob.cl/files/2024-04/SNBP_informe2023_final.pdf

Shaw, D. S., Gilliom, M., Ingoldsby, E. M., & Nagin, D. S. (2003). Trajectories leading to school-age conduct problems. *Developmental Psychology*, *39*(2), 189-200. https://doi.org/10.1037//0012-1649.39.2.189

Shi, Q. X., Ettekal, I., Deutz, M. H. F., & Woltering, S. (2020). Trajectories of Pure and Co-Occurring Internalizing and Externalizing Problems From Early Childhood to Adolescence: Associations With Early Childhood Individual and Contextual Antecedents. *Developmental Psychology*, *56*(10), 1906-1918. https://doi.org/10.1037/dev0001095

Soto-Ramírez, P., Jiang, H., Strasser, K., Chaparro-Moreno, L. J., & Justice, L. M. (2022). Early home learning environment profiles and their contribution to child development in Chile. *Journal of Applied Developmental Psychology*, *82*. https://doi.org/10.1016/j.appdev.2022.101452

Tamis-LeMonda, C. S., Luo, R., McFadden, K. E., Bandel, E. T., & Vallotton, C. (2019). Early home learning environment predicts children's 5th grade academic skills. *Applied Developmental Science*, *23*(2), 153-169. https://doi.org/10.1080/10888691.2017.1345634

Tamis-LeMonda, C. S., Way, N., Hughes, D., Yoshikawa, H., Kalman, R. K., & Niwa, E. Y. (2008). Parents' goals for children: The dynamic coexistence of individualism and collectivism in cultures and individuals. *Social Development*, *17*(1), 183-209. https://doi.org/10.1111/j.1467-9507.2007.00419.x

Taraban, L., & Shaw, D. S. (2018). Parenting in context: Revisiting Belsky's classic process of parenting model in early childhood. *Developmental Review*, *48*, 55-81. https://doi.org/10.1016/j.dr.2018.03.006

Torres, A., Boo, F. L., Parra, V., Vazquez, C., Segura-Pérez, S., Cetin, Z., & Pérez-Escamilla, R. (2018). Chile Crece Contigo: Implementation, results, and scaling-up lessons. *Child Care Health and Development*, *44*(1), 4-11. https://doi.org/10.1111/cch.12519

Ulloa Vidal, N., Cova Solar, F., & Bustos, N. C. (2017). Nivel Socioeconomico y conductas externalizadas en preescolares: el rol del mediador parental. *Rev Chil Pediatr*, *88*(3), 340-347. https://doi.org/10.4067/S0370-41062017000300005

van den Oord, E. J. C. G., Koot, H. M., Boomsma, D. I., Verhulst, F. C., & Orlebeke, J. F. (1995). A twin-singleton comparison of problem behavior in 2-3-year-olds. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *36*(3), 449-458. https://doi.org/10.1111/j.1469-7610.1995.tb01302.x

Verhage, M. L., Schuengel, C., Holopainen, A., Bakermans-Kranenburg, M. J., Bernier, A.,

Brown, G. L., Madigan, S., Roisman, G. I., Vaever, M. S., Wong, M. S., & Collaboration on Attachment Transmission, S. (2022). Conceptual comparison of constructs as first step in data harmonization: Parental sensitivity, child temperament, and social support as illustrations. *MethodsX*, *9*, 101889. https://doi.org/10.1016/j.mex.2022.101889

Verhulst, F. C., & van der Ende, J. (2013). *Handleiding ASEBA: vragenlijsten voor leeftijden 6 t/m 18 jaar: CBCL/6-18, YSR, TRF*. ASEBA Nederland.

World Bank. (2018). *10 Years of Chile grows with you (Chile crece contigo) : Key components and lessons learned for the setting up of comprehensive child development support systems (English)*. http://documents.worldbank.org/curated/en/992351537159031673/10-Years-of-Chile-Grows-With-You-Chile-Crece-Contigo-Key-Components-and-Lessons-Learned-for-the-Setting-Up-of-Comprehensive-Child-Development-Support-Systems

World Bank. (2022). *World social indicators: population total*. https://data.worldbank.org/indicator/SP.POP.TOTL

World Bank. (2023). *The world bank annual report 2023: A new era in development (English).* . http://documents.worldbank.org/curated/en/099092823161580577

Supplementary tables

Table S1. List of items available in both cohorts (ELPI and Generation R Study)

	ELPI	Generation R
Play and learning environment subscale	The mother provides the child toys that develop skills	Various toys are available for the infant during home visit
	There are learning materials suitable for the child's age such as cuddly soft toys or costumes.	Cuddly toys are available for the infant
	There are literary and musical materials	Musical toys are available for the infant
	The child has one or more toys that require muscular activity	Muscle activity toys or equipment are available for the infant
	The child has a special place to keep his/her toys and belongings.	Infant has a special place to lay down and play
Social-emotional environment subscale	The mother talks to the child while answering survey	Parent responds verbally to infant's vocalizations or verbalizations
	The mother does not show any negative discipline during the visit	Parent expresses positive feelings toward infant
	The mother talks to the child at least twice	Parent spontaneously vocalizes to infant at least once
	The mother kisses/caresses the child at least once	Parent caresses or kisses infant at least once
	-	Parent makes eye contact with infant
	The mother praises the child at least twice	Parent spontaneously praises infant at least twice
	The mother shows positive emotions when child is praised	Parent responds positively to praise of infant offered by Visitor
	The mother tends to keep the child in visual range	Parent keeps infant in visual range, looks at often

Table S2. Class Parameters for the ELPI Study

	CBCL trajectory			
	Low stable	Moderate decreasing	High stable	High decreasing
Mean intercept	49.15 (.65)***	60.65(.43)***	69.50 (.62)***	76.46 (2.05)***
Mean Slope	-2-15 (.43)***	-5.50 (.22)***	-3.65 (.34)***	-15.37 (.73)***

Note:*p<.05. **p <.01. ***p<001, indicating significant differences from each trajectory

Table S3. Class Parameters for the Generation R Study

	Low stable	Moderate stable	High stable
Mean intercept	38.00 (.24)***	46.68 (.61)***	56.91 (0.83)***
Mean Slope	.27 (.13)*	1.19 (.18)***	2.6 (0.51)***

Note: *p<.05. **p <.01. ***p<001, indicating significant differences from each trajectory





4.2
CHAPTER

Father's parenting and child self-control: a comparison between the Netherlands and South Korea

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Abstract

Background: Parents from different cultures may employ different parenting behaviors to support children's development. It remains unclear whether the associations of parental warmth and control with self-control abilities vary across cultures. Moreover, little is known about how these associations may differ for father' parenting behaviors. We investigated the associations of paternal warmth and control with children's self-control problems using data from the Netherlands and South Korea. **Methods:** Data came from two prospective studies: the Dutch Generation R Study (n = 2,136) and the Panel Study on Korean Children (n = 1,468). **Results:** The results showed paternal warmth was protective against child self-control problems in both countries. Paternal control was associated with more self-control problems in Dutch but not in Korean children, though this association in Dutch children was not significant after including all covariates. **Conclusion:** The findings emphasize the universal significance of paternal parenting in fostering children's self-control and stress to support fathers' involvement in child development.

Keywords: fathers' parenting; parental warmth; parental control; self-regulation; cross-cultural

Introduction

Self-control is the ability that allows individuals to regulate their emotions, impulses, and thoughts (de Ridder et al., 2012). It enables individuals to pursue valued distal goals for long-term adaptation over less important proximal motives. Self-control in young children is crucial for socializing in early life stages; children with good self-control skills are more likely to have good peer relations and academic performances (Eisenberg et al., 2010) than those with poor control. Furthermore, self-control is associated with favorable long-term outcomes such as well-being, healthy behaviors, and good physical and mental health (Moffitt et al., 2013). Self-control is shaped from infancy to young adulthood and develops most strongly during toddlerhood and childhood (LeCuyer & Zhang, 2015), hence under parental nurturing (Jaramillo et al., 2017). Like other child development research, research on associations between parenting and child self-control suffers from a systematic bias due to an excessive focus on WEIRD (Western, Educated, Industrialized, Rich, and Democratic) populations (Henrich et al., 2010). The current study uses a cross-cultural approach to understand the link between parenting and self-control (problems) across individuals holding different cultural values, using longitudinal data from the Netherlands and South Korea.

Parenting, Children's Self-control Development and Cultural Contexts

Multiple aspects of parenting can affect children's self-control development, among which parental warmth and control play important roles. Parental warmth indicates whether parents support, praise, and display affection to children (Deater-Deckard et al., 2011). It facilitates the formation of secure attachment between children and parents, which provides a safe environment for children to learn and practice self-control. In addition, securely attached children are less likely to consume cognitive resources to worry about the availability of parents, so they can allocate more resources to obtain self-control skills (Bernier et al., 2012). Parental control encompasses discipline practices, including setting rules and limits. A moderate level of parental control can facilitate self-control development by setting guidelines for children. However, high levels of parental control may hinder self-control development and lead to more self-control problems as it can disturb the sense of autonomy in children (Grolnick & Pomerantz, 2009). Children who perceive high parental control may regulate their behaviors, emotions, and cognitions less actively (Sokol et al., 2013).

These parenting dimensions do not operate in a vacuum. Parenting behaviors are shaped by cultural values and social norms, which influence how parents raise their children (Bernier et al., 2010; Keller et al., 2004; Trommsdorff, 2009). According to cultural normativeness theory, parenting behaviors in line with normative behavior within the cultural context are expected to be linked with better child developmental outcomes (Deater-Deckard & Dodge, 1997, Lansford, Godwin, et al., 2018). In other words, parental behavior considered normative in a given culture may be more beneficial (or less detrimental) to child development (Deater-Deckard & Dodge, 1997) than parenting behavior considered deviant. Recognizing the importance of cultural normativeness, previous research has examined whether the association between parenting behaviors and children's self-control differs by cultural context. While some studies suggest the culture-specific parenting effects aligning with cultural normativeness theory (Rothenberg, Lansford, Alampay, et al., 2020; Rothenberg, Lansford, Bacchini, et al., 2020), the evidence is mixed. For example, a meta-analysis of 191 studies on parenting and self-control abilities in adolescents showed that the relation between the two did not vary significantly across independent and interdependent cultures (Li et al., 2019). Another meta-analysis showed that authoritative parenting had protective effects on externalizing behaviors in children and adolescents (mean age 13) in eight out of ten regions (Pinquart & Kauser, 2018). However, these findings are mostly based on school-aged children and adolescents, hence an age group for whom teachers and peers become salient factors in child development, and the influence of parenting may decrease. Examining younger children may better capture the culturally moderated effects of parenting on self-control. Nonetheless, direct empirical evidence on the cross-cultural effect of parental warmth and control on self-control in young children is limited.

Comparison of two cultures: Netherlands and South Korea

The Netherlands and South Korea have different cultural values based on the Hofstede cultural dimensions model. The Netherlands has an independent culture with high indulgence (scored 80 on individualism and 68 on indulgence). In contrast, South Korea has an interdependent culture and is a restraint society (scored 18 on individualism and 29 on indulgence) (Hofstede Insights, 2022). These cultural differences may shape how parents raise their children in accordance with culturally endorsed expectations.

In cultures that emphasize independence, including the Netherlands, parental

control behaviors are often perceived as interfering with the development of children's autonomy, leading to self-control problems, and have indeed been reported to be associated with self-control problems in these cultures (Ruiz-Hernández et al., 2019). In contrast, in interdependent cultures, including South Korea, parental control is often considered beneficial for the development of self-control in social settings (Lee, Baker, & Whitebread, 2018; Vinden, 2001). Parents in these cultures focus on aiding their children to develop self-control skills to harmonize with other people, which is often achieved via parental control behaviors such as setting rules and limits (Rudy & Grusec, 2006). Similarly, children may interpret their parents' parenting behaviors in the context of a given culture and in comparison with other parents and caretakers. Therefore, the same parenting behavior may have different effects on children's development depending on whether it is perceived as normative within a given culture (Ho et al., 2008).

Based on this framework, we expect the negative association between parental control and self-control problems will be stronger in the Dutch group, where parental control is less normative, and weaker (or even positive) in the Korean group, where parental control is more culturally accepted. Similarly, while parental warmth is generally beneficial, its interpretation may also vary across cultures. In cultures emphasizing autonomy, such as the Netherlands, warmth may be more overtly expressed and strongly associated with positive developmental outcomes. In contrast, in South Korea, where emotional expression tends to be restrained due to cultural values emphasizing self-discipline (Park et al., 2012), warmth may be expressed more indirectly and its association with self-control outcomes may be less pronounced.

Fathers' parenting and children's self-control

A limitation of previous studies on parenting and child self-control is that they focused on the effects of mothers' parenting. The importance of fatherhood has been addressed over the decades, and fathers are now expected to contribute equally to parenting as mothers do. The direction of change in fatherhood seems universal, but the pace varies from culture to culture (Afrooz et al., 2022). Especially in East Asian countries, including South Korea, the importance of studying fathers' involvement and parenting has only recently been acknowledged (Ko et al., 2022; Lee et al., 2018; Park & Dotterer, 2018). Empirical evidence on the culture-specific effects of fathers' parenting on children's self-control development is also minimal.

Therefore, it is not well known whether paternal parenting in interdependent East Asian culture influences child outcomes as it does in independent European culture.

The Present Study

This study aims to investigate whether culture-specific effects of paternal warmth and control on child self-control problems exist, by comparing the Dutch and South Korean samples. The Netherlands has a culture that values independence and indulgence, while South Korea has an interdependence-based restraint culture. Therefore, we hypothesized that:

1) Korean fathers exert more parental control and less parental warmth than Dutch fathers;
2) Paternal warmth reduces self-control problems more in Dutch children than in Korean children; and
3) Paternal control increases self-control problems less in Korean children than in Dutch children.

We tested the hypotheses in young children since self-control rapidly develops in early life, and parenting is highly salient in this period (McCabe et al., 2004). Paternal warmth and control at age three were used, and self-control problems were assessed at age six in children growing up in the Netherlands and South Korea.

If any culture-specific effects of parenting on self-control (problems) exist, a further question might be whether these effects are similar for boys and girls. Fathers may exert different parenting styles for boys and girls in line with cultural expectations (Dwairy & Achoui, 2010). Although a meta-analysis on parenting and self-regulation in children showed no evidence that children's sex moderated the association between parenting and self-regulation (Karreman et al., 2006), this analysis was based primarily on studies from North American or West European countries, which share similar cultural values. Given that cultural norms around gender roles may differ more substantially between the Netherlands and South Korea—with South Korea categorized by more traditional gender roles and a more masculine culture orientation compared to the Netherlands (Hofstede Insights, 2022)—it is plausible that fathers in these countries may engage differently with sons and daughters. Therefore, we additionally explored possible sex differences in the effect of paternal parenting on self-control problems by comparing the

effects across boys and girls from the Netherlands and South Korea.

Methods

Data and Sample

Data came from the Generation R Study, a population-based prospective cohort from fetal life until young adulthood (Jaddoe et al., 2008; Kooijman et al., 2016), and the Panel Study on Korean Children (PSKC), a prospective cohort on Korean children's development (https://kicce.re.kr/engpskc/index.do). The Generation R Study is approved by the Medical Ethical Committee of the Erasmus Medical Center, Rotterdam (217.595/2002/202). In the PSKC, written informed consent was obtained from all participants at the time of recruitment. The PSKC was approved by the Institutional Review Board of the Korea Institute of Child Care and Education from the eighth wave onward. In Generation R, pregnant women who were expected to give birth between April 2002 and January 2006 in Rotterdam were invited to the study. In total, 9,778 mothers were enrolled in the study, and full consent for the postnatal phase of the study was obtained from 7,295 women. The PSKC has followed 2,150 infants born in medical institutes nationwide from April to July 2008. The current study used data collected at ages three and six years from both cohort studies (measurement waves 4 and 7 of the PSKC). Among the initial population, we excluded children whose parents did not report on both parenting and self-control (n = 1,632 in Generation R; n = 430 in PSKC) and who had a non-Dutch or non-Korean parent (n = 2,859 in Generation R; n = 252 in PSKC) to ease interpretation of the results. In addition, Dutch children whose paternal parenting behaviors were not reported by their biological father (n = 639) were excluded. This includes cases where the information on the reporter was missing, as well as the cases where the reporter was someone other than the biological father. Among the excluded cases with known reporter information, approximately 80% were filled out by mothers. Furthermore, Dutch children whose ages were not comparable to those of the Korean children (n = 29) were also excluded. Thus, the analyses were conducted on 2,136 Dutch children (1,082 girls) and 1,468 Korean children (702 girls) (Figure 1).

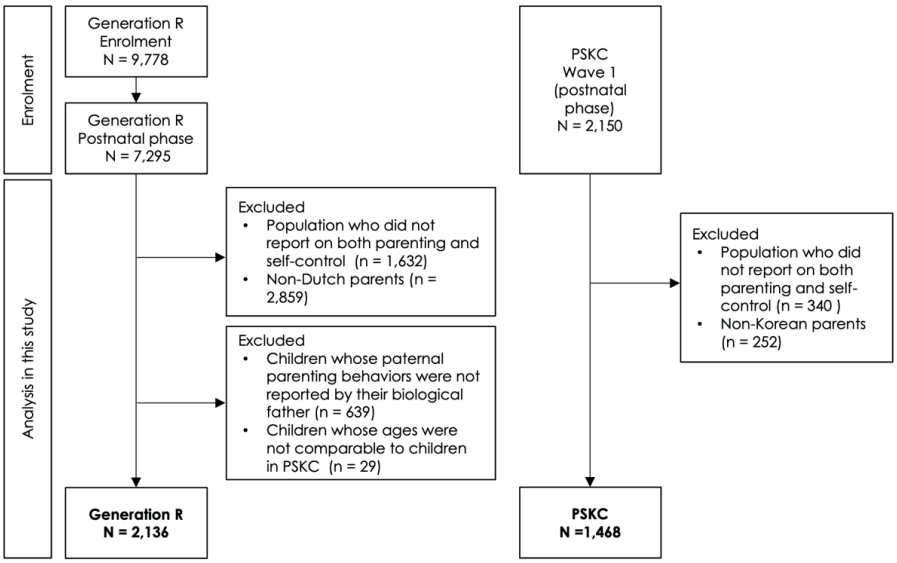


Fig 1. Flowchart of the study population selection for the Generation R and Panel Study of Korean Children (PSKC)

Measures

Parental warmth and control

In Generation R, a questionnaire based on the Dutch version of the Block Child Rearing Practices Report (CRPR) (Block, 1965) was used to assess paternal parenting behaviors at the child age of three. The CRPR includes items measuring parental warmth and control (Deković et al., 1991; Lindhout, Markus, Hoogendijk, & Boer, 2009). In PSKC, parental warmth and control were measured using items developed based on a parenting style scale reflecting the Korean cultural context of parenting behaviors (Cho et al., 1999). Fathers rated the items from 1 (completely disagree) to 6 (completely agree) in Generation R and from 1 (strongly disagree) to 5 (strongly agree) in the PSKC. In Generation R, nine items were used to measure paternal warmth (α = .731), and seven items were used to measure paternal control (α = .646), while in the PSKC, paternal warmth (α = .881) and control (α = .807) were measured by eight items each. Among the items, four paternal warmth items (i.e., respecting the child's opinion, treating the child in a relaxed way, playing with the child, and showing interest in the child's achievements) and two paternal control items (i.e., punishment and rules) overlapped across the two studies. Cronbach's alphas for the overlapping items of paternal warmth were .50 and .81 in Generation R and PSKC, respectively, and .30

and .62 for paternal control. Since the two studies used different Likert scales, we transformed the scores into a scale ranging from 0 (completely/strongly disagree) to 1 (completely/strongly disagree).

Child self-control

The parent-reported Achenbach System of Empirically Based Assessment (ASEBA) Self-Control Scale (ASCS), which is part of the Child Behavior Checklist (CBCL) version 1.5-5, was used as a measure of children's self-control in both samples (Willems et al., 2018). The ASCS consists of eight items, measuring attention problems (four items), aggressive behaviors (three items), and rule-breaking behaviors (one item). Mothers rated the items from 0 (not true) to 2 (very or often true) at child age six. The ASCS was originally developed for children and adolescents aged 6 to 18, based on the ASEBA questionnaires developed for this age group (i.e., CBCL/6-18, Youth Self-Report, Teacher Report Form). Similar items were assessed in the CBCL/1.5-5, with slight deviations to make the assessment more age appropriate. The CBCL/6-18 item 'inattentive or easily distracted' was not included in the CBCL/1.5-5, leaving a self-control scale containing seven items. Table S1 compares the original ASCS items and those based on CBCL/1.5-5. Cronbach's alphas for self-control items were .73 and .72 in Generation R and PSKC, respectively.

Covariates

Child demographics

Children's sex (0= boy, 1= girl) was coded based on records from the hospitals and midwifery practices for children in Generation R and based on parents' reports in PSKC. In addition, children's age at self-control measurement was calculated based on birth date.

Paternal demographics and familial socioeconomic status

Paternal age refers to the age at childbirth in Generation R. In PSKC, paternal age was calculated using birth year and date of the first measurement wave when children were four to eight months old. Father's residence, i.e., whether the father lived together with a child, was reported by the mother at child age three and categorized into yes and no. Paternal highest level of education was assessed at child age three and categorized into three levels: low (no education, primary school, lower vocational school, or intermediate general school in Generation R; no education, primary school, middle school, or high school in PSKC), middle

(higher vocational school or more than three years of general secondary school in Generation R; vocational college in PSKC), and high (university or higher). Net household income was assessed at child age three in PSKC and at child age six in Generation R and categorized into low (<1,600 euro in Generation R; < 2,000,000 Korean won in PSKC), middle (€ 1,600 – 3,200 in Generation R; ₩ 2,000,000 – 4,000,000 in PSKC), and high (> € 3,200 in Generation R; > ₩ 4,000,000 in PSKC).

Analysis Plan

Before testing the hypotheses, we checked whether the self-control scale reflected the same construct across the two groups by performing a multi-group confirmatory factor analysis (MG-CFA). In the MG-CFA, we correlated the residual variances of the items belonging to the subscales of ASCS (attention problems and aggressive behaviors) and tested measurement across the two countries. For each measurement invariance model (i.e., configural, metric, and scalar invariance), we checked how well the model fitted the data by using a chi-square ($\chi 2$) statistic and goodness-of-fit indices: the comparative fit index (CFI; > .90), Tucker-Lewis index (TLI; > .90), root mean square errors of approximation (RMSEA; ≤ .080), and standardized root mean square residual (SRMR; ≤ .080). Together with Satorra-Bentler scaled chi-square difference test, we used the following criteria to test measurement (non)invariance: ΔCFI ≤ −.010, supplemented by ΔRMSEA ≥ .015 or ΔSRMR ≥ .030 in SRMR, indicated metric non-invariance; ΔCFI ≤ −.010, supplemented by ΔRMSEA ≥ .015 or ΔSRMR ≥ .010, indicated scalar non-invariance (Chen, 2007).

Multi-group structural equation model (MG-SEM) with paths from paternal warmth and control to child self-control problems was used to test the hypotheses. The self-control problems latent variable was defined as depicted in Figure S1. The parental warmth and control latent variables were created using mean scores from the transformed parenting scale. To test whether the paths differed across the countries, we compared the model fit of four MG-SEMs: 1) an unconstrained model, 2) a model constraining the path from paternal control to self-control problems, 3) a model constraining the path from paternal warmth to self-control problems, and 4) a model constraining both paths. We used Satorra-Bentler scaled chi-square test and the same fit indices as in the measurement invariance test. After that, three unconstrained MG-SEMs were tested: the base model without covariates (model 1), a model with child sex and child age added as covariates (model 2), and a model with father residence, paternal age, paternal education

level, and household income additionally included as covariates (model 3).

To explore possible sex differences in the effects of parenting on self-control, we fitted MG-SEMs for four groups: Dutch boys, Dutch girls, Korean boys, and Korean girls. In addition, we examined mean differences in paternal warmth, paternal control, and self-control scores between boys and girls to provide descriptive context. Furthermore, as a sensitivity analysis, we re-ran the MG-SEMs using the complete scales of paternal warmth and paternal control, which had higher reliabilities than the scales containing only the overlapping items (see Table S2 for the list of parenting items).

Missing data in parenting, self-control, and covariates were dealt with using maximum likelihood estimations with robust standard errors. All analyses were two-sided with a significance level of 0.05. To interpret the results from the MG-SEMs, we set the smallest effect size of interest to $\beta = .10$.

The analytic plan for this study has been preregistered on the Open Science Framework (https://osf.io/3v8yd). All parameters were estimated using the lavaan package (version 0.6-10) in R version 4.1.2. The R syntax used for the data analysis and the results are available at https://osf.io/c6k8t/.

Results

Descriptive statistics

Dutch parents reported more self-control problems in their children than Korean parents (mean difference = .05; se = .010). Compared to Korean fathers, Dutch fathers reported more parental warmth (mean difference = .11; se = .006) and control (mean difference = .23; se = .004). The majority (> 96%) of children in both groups lived with their fathers. More Dutch fathers belonged to a high education (70.7% vs. 53.6%) and household income (72.2% vs. 33.8%) group compared to the Korean fathers (Table 1).

Table 1

Descriptive statistics

	Generation R (Dutch children)					Panel Study of Korean Children				
Variable	Missing (%)	*n*	*M/ or %*	*SD*	Range	Missing (%)	*n*	*M or/%*	*SD*	Range
Paternal warmth score at age 3	0.2	2132	0.90	0.10	0-1	8.2	1347	0.67	0.15	0-1
Paternal control score at age 3	0.3	2129	0.72	0.18	0-1	8.2	1347	0.61	0.18	0-1
Self-control problems score at age 6	5.5	2018	0.31	0.29	0-2	9.7	1326	0.27	0.26	0-2
Sex (girls)	0	2136	50.7%			0	1468	47.8%		
Age at 3	0	2136	3.0	0.1	2.9-3.9	2.9	1426	3.2	0.1	2.9-3.6
Age at 6	5.5	2018	5.9	0.2	5.1-7.0	9.3	1332	6.3	0.1	6.0-6.6
Father residence (yes)	2.9	2075	98.3%			3.5	1416	96.8%		
Paternal age	5.2	2025	34.2	4.8	19-57	1.2	1452	33.7	4.0	19-51
Paternal education - low	5.6	2016	8.5%			3.5	1416	26.6%		
Paternal education - middle			20.8%					19.8%		
Paternal education - high			70.7%					53.6%		
Household income - low	10.6	1909	3.2%			2.9	1425	11.3%		
Household income - middle			24.5%					54.9%		
Household income - high			72.2%					33.8%		

Bivariate Correlations

Pearson correlations (see Table 2) showed that paternal warmth and control were positively and significantly correlated in Dutch fathers but not in Korean fathers. Child self-control problems were negatively correlated with paternal warmth in the Korean group. Of the covariates, being a girl, having a high paternal education, and having a high household income were negatively correlated with self-control problems in both countries. The correlations between parenting behaviors and family socioeconomic variables (paternal education and household income) were different: paternal control was negatively correlated with family socioeconomic variables in Dutch but not in Korean sample. In contrast, paternal warmth was positively correlated with family socioeconomic variables only in Korean sample.

Table 2

Correlations of study variables in the Dutch and Korean population

	1	2	3	4	5	6	7	8	9
1. Self-control problems	1	-.102**	.002	.002	-.095**	-.046	-.045	-.088**	-.125**
2. Paternal warmth	-.040	1	.045	.011	.006	.044	.061*	.105**	.078**
3. Paternal control	.043	.167**	1	.037	-.036	.001	-.030	.030	-.002
4. Child age	.030	.013	.027	1	.032	-.005	.021	.048	.080**
5. Child sex (0=boy,1=girl)	-.122**	.022	.000	.011	1	.000	.009	-.022	.025
6. Paternal age	-.030	-.008	-.097**	-.029	.006	1	.082**	.087**	.166**
7. Father residence (0=no, 1=yes)	.019	-.008	.006	.043	.016	.011	1	.063*	.042
8. Paternal education (0=low, 1=middle, 2=high)	-.095**	-.051*	-.095**	-.034	.025	.051*	-.028	1	.284**
9. Household income (0=low, 1=middle, 2=high)	-.119**	-.005	-.066**	-.024	.003	.106**	-.190**	.378**	1

Note. Bottom left part of the table (with no background) shows the correlation coefficients in the Dutch population; top right of the table (with a gray background) shows the correlation coefficients in the Korean population; *p<.05. **p<0.01.

Multi-group Structural Equation Models

Configural invariance of self-control problems was supported by a good overall model fit, indicating that self-control problems had the same meaning across the two countries (factor structures are shown in Figure S1). The Satorra-Bentler scaled chi-square difference test showed that the metric invariance model was significantly worse than the configural invariance model. Partial metric invariance was achieved by the release of the equality constraint of a factor loading for the item of "temper tantrums or hot temper". Scalar invariance was not supported: both the Satorra-Bentler test and the other fit indices indicated a significantly worse fit of the scalar invariance model compared to the metric invariance model (Table S3). Therefore, in the MG-SEMs, factor loadings for self-control problems were constrained to be equal across groups except for one item.

Table 3

Model fit results for the multi-group structural equation modeling with and without constraining the paths between the two countries

Model	χ^2 (*df*)	RMSEA	90% CI	TLI	CFI	SRMR	Δ χ^2	ΔRMSEA	ΔTLI	ΔCFI	ΔSRMR
1. Unconstrained model	101.647 (46)	.026	[.019 .032]	.986	.978	.021					
2. Constraining the path PC → SC	102.808 (47)	.027	[.020 .034]	.986	.978	.021					
Model 1 vs. 2							1.014	.001	.	.	.
3.Constraining the path PW → SC	101.887 (47)	.025	[.019 .032]	.986	.978	.021					
Model 1 vs. 3							0.064	-.001	.	.	.
4. Constraining both paths	103.127 (48)	.025	[.019 .032]	.986	.979	.022					
Model 1 vs. 4							1.144	-.001	.	.001	.001

Note. PC = parental control; PW = parental warmth; SC = self-control (problems); RMSEA = root mean square error of approximation; TLI = Tucker-Lewis Index; CFI = comparative fit index; SRMR= standardized root mean square residual; Δ χ 2 = Satorra-Bentler scaled chi-square difference test of the null hypothesis of identical fit of the two nested models; the model fit of base models were compared (covariates were not included).

Table 3 shows the model fit of unconstrained and constrained MG-SEMs, without covariates. Both unconstrained and fully constrained MG-SEMs showed an almost equally good fit to the data, although the constrained MG-SEM was not significantly better than the unconstrained MG-SEM ($\Delta\chi2 = 1.151, \Delta df = 2, p = .563$). Figure 2 shows the path coefficients of the fully adjusted unconstrained MG-SEM (all covariates included in the model), and all model parameters of the unadjusted and adjusted unconstrained MG-SEMs are shown in Table 4. The results from the constrained MG-SEMs hint at a weak culture-specific effect of paternal parenting on children's self-control problems. Unadjusted and adjusted models showed that paternal warmth was negatively associated with child self-control problems in both groups. The 95% confidence intervals for the effects overlapped between the two groups, and the less conservative 85% confidence intervals for group comparisons overlapped as well (85% CI for NL = -.111, -.028 and for KOR = -.163, -.059), suggesting no significant differences (Knol et al., 2011). Paternal control was associated with more self-control problems only in Dutch children (Models 1 and 2), although the association was smaller than .10 and not significant anymore when we adjusted for all covariates. Similar results were shown for the path from paternal warmth to self-control problems in the constrained models (Table S4).

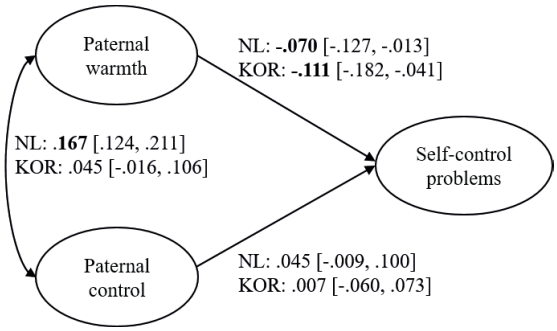


Fig. 2 Standardized coefficients are depicted with 95% confidence intervals in the brackets. Child sex, child age, paternal age, paternal presence, paternal education, and household income were included as covariates but are not depicted. Both paths are allowed to freely vary between the groups. Figures in bold indicate two-sided significance at p < .05. Model Fit: χ2 (142, NNetherlands=2136, NKorea= 1468) = 355.833 (p < .001), comparative fit index (CFI) = .951, Tucker-Lewis Index (TLI) = .938, Standardized Root Mean Square Residual (SRMR) = .028, root mean square error of approximation (RMSEA) = .030 [CI = .026, .033].

Table 4

Standardized estimates from multi-group structural equation modeling (MG-SEM) comparing Dutch and Korean children

	Self-control problems					
	Model 1		Model 2		Model 3	
	β	95% CI	β	95% CI	β	95% CI
Dutch children						
Paternal warmth	**-.071**	-.128, -.015	**-.069**	-.125, -.013	**-.070**	-.127, -.013
Paternal control	**.058**	.002, 113	**.057**	.002, .111	.045	-.009, 100
Child sex[a]			**-.153**	-.209, -.098	**-.152**	-.207, -.097
Child age			.030	-.032, 093	.026	-.036, 089
Paternal age					-.005	-.068, 059
Father residence[b]					-.007	-.072, 058
Paternal education[c]					-.057	-.118, .003
Household income[c]					**-.187**	-.175, -.040
Korean children						
Paternal warmth	**-.129**	-.199, -.059	**-.128**	-.198, -.059	**-.111**	-.182, -.041
Paternal control	.010	-.058, 078	.006	-.062, 073	.007	-.060, 073
Child sex[a]			**-.123**	-.187, -.058	**-.123**	-.186, -.059
Child age			.013	-.054, 080	.025	-.042, 092
Paternal age					-.036	-.101, 028
Father residence[b]					-.037	-.091, 017
Paternal education[c]					-.062	-.132, 008
Household income[c]					**-.114**	-.182, -.045

Note. β = standardized estimate; 95% CI = 95% confidence interval for the standardized estimate; a Categorized into 0 = boy and 1 = girl; b Categorized into 0 = no, 1 = yes; c Categorized into 0 = low, 1 = middle, and 2 = high; figures in bold indicate two-sided significance at p < .05.

Boys versus Girls

Partial metric invariance was obtained after releasing the equality constraint of factor loadings for item 36 and 85 (gets into everything; temper tantrums or hot temper), but scalar invariance was not supported (Table S5). Both Dutch and Korean parents reported more self-control problems in boys (MNL = .35, SDNL = .30; MKOR = .29, SDKOR = .27) than in girls (MNL = .28, SDNL = .26; MKOR = .24, SDKOR = .24), tNL(2016) = 5.52, pNL <.001, tKOR(1324) = 3.49, pKOR =.001.

The unconstrained MG-SEMs with four groups (Dutch boys, Dutch girls, Korean boys, and Korean girls) showed a good fit, but it was not significantly better than the fit of constrained four-group MG-SEM ($\Delta\chi 2 = 3.492$; $\Delta df = 6$; $p = .745$, see Table S6 for other fit indices), suggesting weak evidence of group differences. The unconstrained SEM showed that the effect of paternal warmth was strongest on Korean boys' self-control problems, whereas paternal warmth was not significantly associated with self-control problems of Dutch boys (Figure 3). However, the differences between boys and girls across two countries were not significant as the confidence intervals overlapped between boys and girls. In addition, paternal control was not associated with self-control problems in all four groups. For more details, please see Table S7.

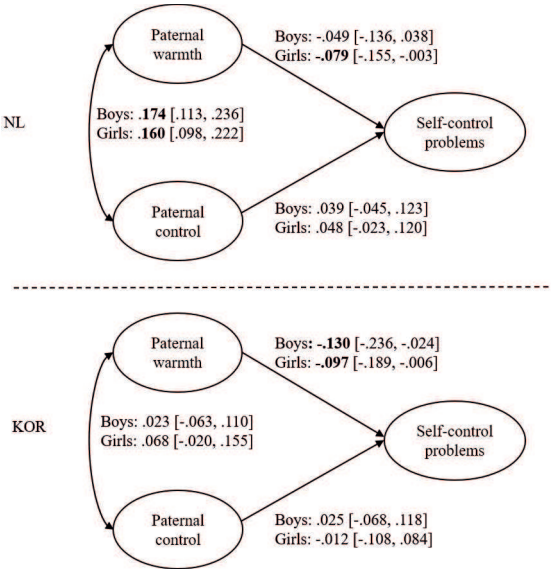


Fig. 3 Standardized coefficients are depicted with 95% confidence intervals in the brackets. Child sex, child age, paternal age, paternal presence, paternal education, and household income were included as covariates but are not depicted. Both paths are allowed to freely vary between the groups. Figures in bold indicate two-sided significance at $p < .05$. Model Fit: $\chi 2$ (255, NNetherlands-boys = 1054, NNetherlands-girls = 1082, NKorea-boys = 702, NKorea-boys = 766) = 431.281 ($p < .001$), comparative fit index (CFI) = .958, Tucker-Lewis Index (TLI) = .947, Standardized Root Mean Square Residual (SRMR) = .034, root mean square error of approximation (RMSEA) = .028 [CI = .024, .033].

Sensitivity Analysis Using Complete Parenting Scales

In a sensitivity analysis, we used paternal warmth and control scores based on the original scales (hence, including non-overlapping items), which had higher reliability than the scales containing only the overlapping items. The sensitivity analysis also suggested the lack of culture-specific effect of paternal parenting on child self-control problems. Paternal warmth was associated with fewer self-control problems in both countries. The association between paternal control and child self-control problems remained nonsignificant in both samples. However, in the Korean sample, the direction of the association shifted to negative (β = -.013; 95% CI= -.081, .055), indicating that higher paternal control was—although not statistically significant—associated with fewer self-control problems. Both constrained and unconstrained sensitivity MG-SEMs showed good fits ($\Delta\chi 2$ = 1.967; $\Delta df = 2$; $p = .374$, see Table S8 for other fit indices). Path coefficients of the unconstrained sensitivity MG-SEMs are shown in Table S9.

Fathers' scores on the parenting items were not based on absolute levels, but on their perceived parenting behaviors compared to their reference group. The reference groups of the two samples were culturally different in a number of ways, which may have limited the comparability of the paternal warmth and control effects on self-control between the two countries (Heine et al., 2002). To aid the interpretation of the results, we checked the distribution, skewness, and kurtosis of the reported parenting scores and compared the means of each parental item score across the two groups using independent sample t-tests. Mean, standardized deviation, skewness, kurtosis, and the t-test result of each parenting item are reported in Table S10. Briefly, Dutch fathers scored higher on all parental warmth and control items than Korean fathers, with larger gaps between the groups in parental warmth items than parental control items. Further, the parental warmth items in Dutch fathers were highly skewed to the left, suggesting possible ceiling effects in this sample. Figure S2 shows the distribution of parenting items by country. Three-quarters of the Dutch fathers reported the highest score of three parental warmth items (i.e., treating a child in a relaxed way, playing with a child, and showing interest in the child's achievements). Around 30% of Dutch fathers reported the highest score for the other parental warmth item (respecting the child's opinion).

Discussion

The current study aimed to investigate the influence of paternal warmth and control at age three on self-control problems at age six in Dutch and South Korean children, with a focus on understanding the role of fathers' parenting in the interplay between culture and self-control development. Firstly, an overall test of the difference between the two countries did not reach statistical significance when comparing the fit of structural equation models with unconstrained paths and models with constrained paths across the two countries. This suggests limited variations in the impact of paternal parenting on self-control problems between the Netherlands and Korea. Additionally, the results indicate minimal cultural differences when examining individual paths from parenting behaviors to self-control problems. The findings regarding the association between paternal warmth and child self-control problems did not align with our hypothesis: paternal warmth was not more strongly associated with fewer self-control problems for Dutch children than for Korean children. As hypothesized, paternal

control was associated with self-control problems in Dutch children but not in Korean children. Nevertheless, the association in the Dutch group was weak (β <.10) and became non-significant after adjusting for covariates, including family socioeconomic status. Lastly, there was limited evidence of sex differences in the impact of paternal parenting on self-control.

Paternal Warmth and Control in the Netherlands and South Korea

We found that Korean fathers reported lower parental warmth and control than Dutch fathers, with the largest gap observed in parental warmth. Previous literature has reported low levels of parental warmth among Korean and East-Asian parents (Deater-Deckard et al., 2011; Yun & Cui, 2020). These lower scores in Korean fathers might partly reflect low paternal involvement, which could be shaped by broader societal factors. For example, South Korea's relatively low female labor force participation rate (66.6% in Korea and 83.7% in the Netherlands among the age group from 25 to 54 years in 2020;OECD, 2022b) and longer average working hours (1908 hours per year in Korea and 1399 hours per year in the Netherlands in 2020;OECD, 2022a) may limit opportunities for father-child interactions. A recent study on paternal involvement in South Korea empirically demonstrated that work demands are a key barrier to paternal involvement (Ko et al., 2021). Yet, it remains unclear to what extent the lower scores of paternal warmth and control among Korean fathers reflect true cultural differences versus measurement-related issues. The findings should be interpreted with caution, as paternal warmth and control were measured differently in each country, which may have influenced how fathers reported their behaviors.

An unexpected finding was the lower level of paternal control in Korean fathers compared to Dutch fathers. In addition to the aforementioned role of father involvement, this finding could be partly explained by the fact that the two parental control items used were not fully identical across the two studies. The Korean questionnaire assessed stricter parental control. For example, the Dutch questionnaires focused on whether fathers teach their children that certain actions are not allowed and may lead to punishment. In contrast, the Korean questionnaire asked if fathers always punish their children for doing something bad (see Table S2). This higher threshold in the Korean questionnaire might have partly resulted in lower scores of paternal control in Korean fathers. Although minor differences like this in the measures limit the direct comparison of the amount of parental warmth and control in the two countries, both were designed

to capture relevant expressions of paternal control in each cultural context and might in fact be more valid than exactly similarly formulated items. At any case, we believe these measures offer insights into how culturally grounded expressions of paternal control relate to child self-control within each context.

An interesting finding was that paternal warmth and control were positively correlated among Dutch fathers but not among Korean fathers. This may reflect cultural differences in how parenting behaviors are expressed and perceived. In the Dutch context, paternal control may reflect guidance rather than strictness, and thus co-occur with paternal warmth as part of an authoritative parenting style. In contrast, in the Korean context, where parental control is more closely tied to hierarchy and obedience, paternal warmth and control may be more distinct and less likely to co-occur. We also observed variations in the correlations between paternal parenting behaviors and socioeconomic status (measured by paternal education and household income) across the two countries. In the Dutch sample, socioeconomic status showed a negative correlation with both paternal warmth and control. This finding was unexpected and may reflect the relatively high and homogeneous socioeconomic status composition of the Dutch sample, which consisted largely of highly educated and higher income fathers. Among such families, higher socioeconomic status may be associated with more parenting behaviors that emphasize autonomy and independence, even in early childhood, involving fewer overt expressions of warmth and control. However, in the Korean sample, socioeconomic status was positively correlated with parental warmth but not with paternal control, consistent with previous research showing that higher socioeconomic status in East Asian families is linked to more emotionally supportive parenting (Liu et al., 2023). These findings support the need for further investigation to disentangle the effects of culture, socioeconomic status, and parenting on child self-control development.

Are Paternal Warmth and Control Differently Linked to Self-control in Dutch and South Korean Children?

Although the unconstrained model was not better in explaining the data than the constrained model, we examined the differences in estimates by freeing the paths from paternal parenting behaviors to child self-control problems between the two groups. Our findings did not support the hypotheses and revealed some points to be considered in future research. We found that paternal warmth was linked to fewer self-control problems in children from both countries. Additionally,

the link between paternal warmth and self-control problems was slightly stronger in Korean children than in Dutch children although the difference was not statistically significant. In summary, paternal warmth was linked to fewer self-control problems in both groups, but the direction of associations across the two countries contradicted our hypothesis. The stronger link between paternal warmth and child self-control in Korean children compared to Dutch children may be related to the low father involvement discussed earlier. Children who lack paternal affection and warmth may benefit more from it when provided, especially in comparison to children who already receive sufficient paternal warmth. Further investigation is needed to confirm that the level of paternal involvement in a certain society might moderate the effect of paternal warmth on children's development.

Regarding paternal control, it did not have meaningful effects on self-control problems in both countries. Paternal control was not associated with Korean children's self-control problems. Higher paternal control was linked to more self-control problems for Dutch children, but the association was not statistically significant after adding all covariates. These findings align with a systematic review paper on parenting and self-control in adolescents, which showed that the association between parenting and adolescent self-control was largely equivalent across cultures when measured based on individualism (Li et al., 2019). The current study adds that parenting, especially parental warmth, might be equally important for self-control in younger children as well from independence and interdependence cultures.

Other explanations for weak culture-specific effects observed in our study can be attributed to certain features of our data. The limited range of parental control behaviors covered by the two items used, namely punishment and rule-setting, may partly explain the generally weak associations observed for paternal control in our study. Although a sensitivity check by including additional items did not yield statistically significant differences, it revealed a change in direction in the Korean sample—where paternal control was negatively associated with self-control problems. This shift may indicate that the broader item set better captures culturally relevant aspects of parental control. This finding supports our hypothesis and suggests that measurement scope and cultural context are important considerations when interpreting cross-cultural effects. Additionally, the smaller-than-expected association between paternal warmth on self-control problems in Dutch children may have been due to ceiling effects. A post hoc

check of the distribution of the parenting items showed that most Dutch fathers reported the highest score on parental warmth items. Hence, we did not capture sufficient variance in parental warmth among a large proportion of Dutch fathers, which reduced the likelihood of detecting strong associations with self-control problems. In addition, although parenting was measured before children started school, the Dutch children were attending primary school when self-control problems were measured. It is possible that the school environment contributed to the smaller than expected relationship between parenting and self-control. Therefore, further inquiries are necessary to investigate the culture-specific effect of parenting on self-control during the preschool period, which is when the effects of parenting are most prominent.

Paternal Parenting and Self-control in Boys and Girls across the Two Countries

No apparent sex differences were observed in the links between paternal parenting and child self-control in either the Dutch or Korean group. This finding aligns with a previous cross-cultural study on parenting (monitoring, disciplining, and attachment) and self-control in boys and girls in Anglo-Saxon, West-European, Northern European, South-European/Mediterranean, Post-Socialist, and Latin-American country clusters (Botchkovar et al., 2015). Across these countries, parenting played a minimal role in explaining the sex differences in self-control. The current study adds to the literature by examining paternal parenting and self-control in boys and girls from an East-Asian (South Korea) and a West-European (Netherlands) country. In our study, children's sex and household income consistently explained variation in self-control problems of both Dutch and Korean children: being a girl and having a high household income were associated with fewer self-control problems.

Limitations and Future Directions

The present study has some limitations. First, although the cross-cultural validity of the self-control problems scores was tested using measurement invariance tests, the validity of cross-cultural comparisons of parenting is not guaranteed. Due to the differences in items and scoring systems and the limited number of items used, we could not test whether parenting warmth and control scores were invariant across the two groups, which may limit the interpretations of our results. Although we conducted additional exploratory analysis to aid interpretation—examining the distribution, skewness, kurtosis, and mean differences of individual

parenting items across the two groups—this does not address the underlying differences in item response formats between the Dutch and Korean samples (6-point vs. 5-point Likert scales). Future research using standardized instruments that are validated for cross-cultural equivalence would be necessary to validate the findings.

Second, the current study examined the culture-specific effect of parenting on child self-control problems by comparing two countries emphasizing different cultural values. However, we did not include measures that assess the cultural values of individuals within a country. Therefore, we cannot guarantee that the between-group variability in cultural values was greater than the within-group variabilities, nor that differences in cultural values of the participants account for the differences in associations across the countries.

Another point of caution in interpreting the result is that our results may not be generalizable to all Dutch or Korean children. Specifically, the Dutch fathers in our sample were highly educated, had high incomes, and resided in urban areas. Fathers from families with higher socioeconomic status may put more effort into parenting and engage in more positive parenting compared to fathers from lower socioeconomic backgrounds (Bradley & Corwyn, 2002). Although we controlled for paternal education and household income, the differences observed in parenting effects on self-control may not be entirely explained by general cultural differences between the countries. Moreover, the findings may not generalize to other developmental stages, as the influence of paternal control on self-control development could vary with children's age.

Lastly, maternal parenting was not measured in Generation R, preventing us from examining differences between mothers' and fathers' parenting in relation to child self-control problems. Including parenting measures from both parents in future studies would allow for comparisons of the effects of mothers' and fathers' parenting in different cultural settings.

In summary, further research is needed to confirm the observed weak culture-specific effects and gain a deeper understanding of parenting dynamics across cultures. This can be achieved through longitudinal studies that incorporate measures of cultural values on interdependence/independence and compare the effects of parenting behaviors of both mothers and fathers on children's self-control development across cultures. Additionally, future studies should consider

using a combination of parental questionnaires and observational tasks to assess parenting behaviors such as warmth and control. Observational methods may enhance the methodological rigor by compensating for limitations related to variability and measurement equivalence across cultures, thereby providing a more comprehensive evaluation of parenting practices. Such studies are warranted to shed light on the complexities of parenting across different cultural contexts.

Conclusion

The current study did not find clear evidence of the culture-specific effects of paternal warmth and control on self-control problems in Korean and Dutch children. However, in line with our hypothesis, we found a pattern suggesting that paternal control may be more consistently associated with greater self-control problems in Dutch children than in Korean children. Furthermore, paternal warmth was consistently associated with fewer self-control problems in both countries, suggesting a potential universal role of paternal warmth in self-control development. Our findings also hint at the possible culture-specific interactions between parenting and family socioeconomic status. Lastly, consistent with prior research, we found no evidence of differences by child sex in how paternal parenting was related to child self-control in the two countries. These findings underscore the universal importance of father's warmth in promoting children's self-control abilities, irrespective of cultural background between the two countries and children's sex, and emphasize the need for increased recognition and support for father's involvement.

References

Afrooz, G. A., Asgharpour, H., & Kashani, F. L. (2022). The Father's Role in Parenting: a Comparison of Different Cultures and Psychological Perspectives. *Men's Health Journal, 6*(1), e1. https://doi.org/10.22037/mhj.v6i1.36795

Bernier, A., Carlson, S. M., Deschênes, M., & Matte-Gagné, C. (2012). Social factors in the development of early executive functioning: A closer look at the caregiving environment. *Developmental Science, 15*(1), 12-24.

Bernier, A., Carlson, S. M., & Whipple, N. (2010). From external regulation to self-regulation: early parenting precursors of young children's executive functioning. *Child Development, 81*(1), 326-339.

Block, J. H. (1965). The Child-Rearing Practices Report (CRPR): A set of Q items for the description of parental socialization attitudes and values.

Botchkovar, E., Marshall, I. H., Rocque, M., & Posick, C. (2015). The Importance of Parenting in the Development of Self-Control in Boys and Girls: Results from a Multinational Study of Youth. *Journal of Criminal Justice, 43*(2), 133-141.

Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology, 53*(1), 371-399.

Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal*, 14(3), 464-504.

Cho, B. H., Lee, J. S., Lee, H. S., Kwon, H. K. (1999). 한국 부모의 자녀 양육방식에서의 차원과 평가[Dimensions and Assessment of Korean Parenting Style]. *Journal of the Korean Home Economics Association, 37*(10), 123-133.

de Ridder, D. T. D., Lensvelt-Mulders, G., Finkenauer, C., Stok, F. M., & Baumeister, R. F. (2012). Taking Stock of Self-Control: A Meta-Analysis of How Trait Self-Control Relates to a Wide Range of Behaviors. *Personality and Social Psychology Review, 16*(1), 76-99.

Deater-Deckard, K., & Dodge, K. A. (1997). Externalizing behavior problems and discipline revisited: Nonlinear effects and variation by culture, context, and gender. *Psychological Inquiry, 8*(3), 161-175.

Deater-Deckard, K., Lansford, J. E., Malone, P. S., Alampay, L. P., Sorbring, E., Bacchini, D., . . . Al-Hassan, S. M. (2011). The association between parental warmth and control in thirteen cultural groups. *Journal of Family Psychology, 25*(5), 790-794.

Deković, M., Janssens, J. M., & Gerris, J. R. (1991). Factor structure and construct validity of the Block Child Rearing Practices Report (CRPR). *Psychological Assessment: A Journal of Consulting and Clinical Psychology, 3*(2), 182–187.

Dwairy, M., & Achoui, M. (2010). Parental Control: A Second Cross-Cultural Research on Parenting and Psychological Adjustment of Children. *Journal of Child & Family*

Studies, 19(1), 16-22.

Eisenberg, N., Valiente, C., & Eggum, N. D. (2010). Self-Regulation and School Readiness. *Early Education and Development, 21*(5), 681-698.

Grolnick, W. S., & Pomerantz, E. M. (2009). Issues and challenges in studying parental control: Toward a new conceptualization. *Child Development Perspectives, 3*(3), 165-170.

Heine, S. J., Lehman, D. R., Peng, K., & Greenholtz, J. (2002). What's wrong with cross-cultural comparisons of subjective Likert scales?: The reference-group effect. *Journal of Personality and Social Psychology, 82*(6), 903–918.

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). Most people are not WEIRD. *Nature, 466*(7302), 29-29.

Ho, C., Bluestein, D. N., & Jenkins, J. M. (2008). Cultural differences in the relationship between parenting and children's behavior. *Developmental Psychology, 44*(2), 507–522.

Jaddoe, V. W., Mackenbach, J. P., Moll, H. A., Steegers, E. A., Tiemeier, H., Verhulst, F. C., . . . Hofman, A. (2006). The Generation R Study: design and cohort profile. *European Journal of Epidemiology, 21*(6), 475-484.

Hofstede Insights (2022). *Compare countries.* https://www.hofstede-insights.com/product/compare-countries/. Last accessed 15 December 2022.

Jaramillo, J. M., Rendón, M. I., Muñoz, L., Weis, M., & Trommsdorff, G. (2017). Children's Self-Regulation in Cultural Contexts: The Role of Parental Socialization Theories, Goals, and Practices. *Frontiers in Psychology, 8*, 923.

Karreman, A., Van Tuijl, C., van Aken, M. A., & Deković, M. (2006). Parenting and self-regulation in preschoolers: A meta-analysis. *Infant and Child Development: An International Journal of Research and Practice, 15*(6), 561-579.

Keller, H., Yovsi, R., Borke, J., Kärtner, J., Jensen, H., & Papaligoura, Z. (2004). Developmental consequences of early parenting experiences: self-recognition and self-regulation in three cultural communities. *Child Development*, 75(6), 1745-1760.

Knol, M. J., Pestman, W. R., & Grobbee, D. E. (2011). The (mis) use of overlap of confidence intervals to assess effect modification. *European Journal of Epidemiology, 26*, 253-254.

Ko, K., Kang, Y., & Choi, J. (2022). Patterns of Paternal Involvement of Korean Fathers: A Person-Centered Approach. *Journal of Family Issues, 43*(9), 2505–2528.

Kooijman, M. N., Kruithof, C. J., van Duijn, C. M., Duijts, L., Franco, O. H., Van IJzendoorn, M. H., . . . Jaddoe, V. W. V. (2016). The Generation R Study: design and cohort update 2017. *European Journal of Epidemiology, 31*(12), 1243-1264.

Lansford, J. E., Godwin, J., Al-Hassan, S. M., Bacchini, D., Bornstein, M. H., Chang, L., ... & Zelli, A. (2018). Longitudinal associations between parenting and youth adjustment

in twelve cultural groups: Cultural normativeness of parenting as a moderator. *Developmental Psychology, 54*(2), 362.

LeCuyer, E. A., & Zhang, Y. (2015). An integrative review of ethnic and cultural variation in socialization and children's self-regulation. *Journal of Advanced Nursing, 71*(4), 735-750.

Lee, S. J., Pace, G. T., Lee, J. Y., & Knauer, H. (2018). The Association of Fathers' Parental Warmth and Parenting Stress to Child Behavior Problems. *Children and Youth Services Review, 91*, 1-10.

Li, J. B., Willems, Y. E., Stok, F. M., Deković, M., Bartels, M., & Finkenauer, C. (2019). Parenting and self-control across early to late adolescence: A three-level meta-analysis. *Perspectives on Psychological Science, 14*(6), 967-1005.

Lindhout, I. E., Markus, M. T., Hoogendijk, T. H., & Boer, F. (2009). Temperament and parental child-rearing style: unique contributions to clinical anxiety disorders in childhood. *European Child & Adolescent Psychiatry, 18*(7), 439-446.

Liu, G., Zhao, Z., Li, B., Pan, Y., & Cheng, G. (2023). Parental psychological well-being and parental emotional warmth as mediators of the relationship between family socioeconomic status and children's life satisfaction. *Current Psychology, 42*(27), 23958-23965.

McCabe, L. A., Cunnington, M., & Brooks-Gunn, J. (2004). The development of self-regulation in young children: Individual characteristics and environmental contexts. In R. F. Baumeister & K. D. Vohs (Eds.), Handbook of self-regulation: Research, theory, and applications (pp. 340–356). The Guilford Press.

Moffitt, T. E., Poulton, R., & Caspi, A. (2013). Lifelong Impact of Early Self-Control. *American Scientist, 101*(5), 352-359.

OECD. (2022a). Average annual hours actually worked (Publication no. doi:https://doi.org/10.1787/data-00303-en). OECD Employment and Labour Market Statistics. https://www.oecd-ilibrary.org/content/data/data-00303-en

OECD. (2022b). OECD Labour Force Statistics 2021. https://doi.org/10.1787/177e93b9-en

Park, S., & Dotterer, A. M. (2018). Longitudinal associations of family stressors, fathers' warmth, and Korean children's externalizing behaviors. *Journal of Family Psychology, 32*(8), 1036-1045.

Park, S. Y., Trommsdorff, G., & Lee, E. G. (2012). Korean mothers' intuitive theories regarding emotion socialization of their children. *International Journal of Human Ecology, 13*(1), 39-56.

Pinquart, M., & Kauser, R. (2018). Do the associations of parenting styles with behavior problems and academic achievement vary by culture? Results from a meta-analysis. *Cultural Diversity & Ethnic Minority Psychology, 24*(1), 75-100.

Rothenberg, W. A., Lansford, J. E., Alampay, L. P., Al-Hassan, S. M., Bacchini, D., Bornstein,

M. H., ... & Yotanyamaneewong, S. (2020). Examining effects of mother and father warmth and control on child externalizing and internalizing problems from age 8 to 13 in nine countries. *Development and Psychopathology, 32*(3), 1113-1137.

Rothenberg, W. A., Lansford, J. E., Bacchini, D., Bornstein, M. H., Chang, L., Deater-Deckard, K., ... & Al-Hassan, S. M. (2020). Cross-cultural effects of parent warmth and control on aggression and rule-breaking from ages 8 to 13. *Aggressive Behavior, 46*(4), 327-340.

Rudy, D., & Grusec, J. E. (2006). Authoritarian parenting in individualist and collectivist groups: Associations with maternal emotion and cognition and children's self-esteem. *Journal of Family Psychology, 20*(1), 68-78.

Ruiz-Hernández, J. A., Moral-Zafra, E., Llor-Esteban, B., & Jiménez-Barbero, J. A. (2019). Influence of Parental Styles and Other Psychosocial Variables on the Development of Externalizing Behaviors in Adolescents: A Sytematic Review. *The European Journal of Psychology Applied to Legal Context, 11*(1), 9-21.

Sokol, B. W., Grouzet, F. M., & Mueller, U. (2013). Self-Regulation and autonomy: Cambridge University Press.

Trommsdorff, G. (2009). Culture and development of self-regulation. *Social and Personality Psychology Compass, 3*(5), 687-701.

Vinden, P. G. (2001). Parenting attitudes and children's understanding of mind: A comparison of Korean American and Anglo-American families. *Cognitive Development, 16*(3), 793-809.

Willems, Y. E., Dolan, C. V., van Beijsterveldt, C. E., de Zeeuw, E. L., Boomsma, D. I., Bartels, M., & Finkenauer, C. (2018). Genetic and environmental influences on self-control: assessing self-control with the ASEBA self-control scale. *Behavior Genetics, 48*(2), 135-146.

Yun, H.-J., & Cui, M. (2020). The Effects of Parental Warmth on Adolescent Delinquency in the United States and South Korea: a Cross-Cultural Perspective. *Journal of Youth and Adolescence, 49*(1), 228-237.

Supplementary information

Supplementary tables and figures for Father's parenting and child self-control: a comparison between the Netherlands and South Korea

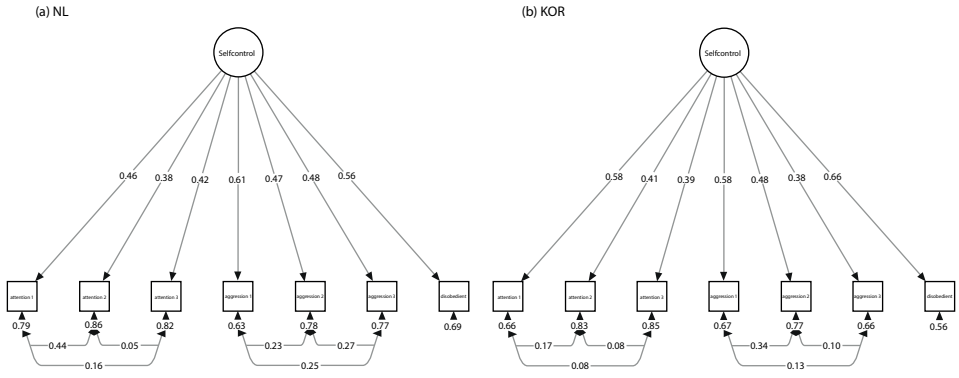


Figure S1. Confirmatory factor analysis results for self-control problems in Dutch (a) and Korean (b) children
Note. Three items belong to the attention problem scale, and their residual variances are correlated: fails to finish (attention1), can't concentrate (attention2), and impulsive (attention3). Three items belong to the aggressive behavior scale, and their residual variances are correlated: stubborn (aggression1), mood change (aggression2), and hot temper (aggression 3).

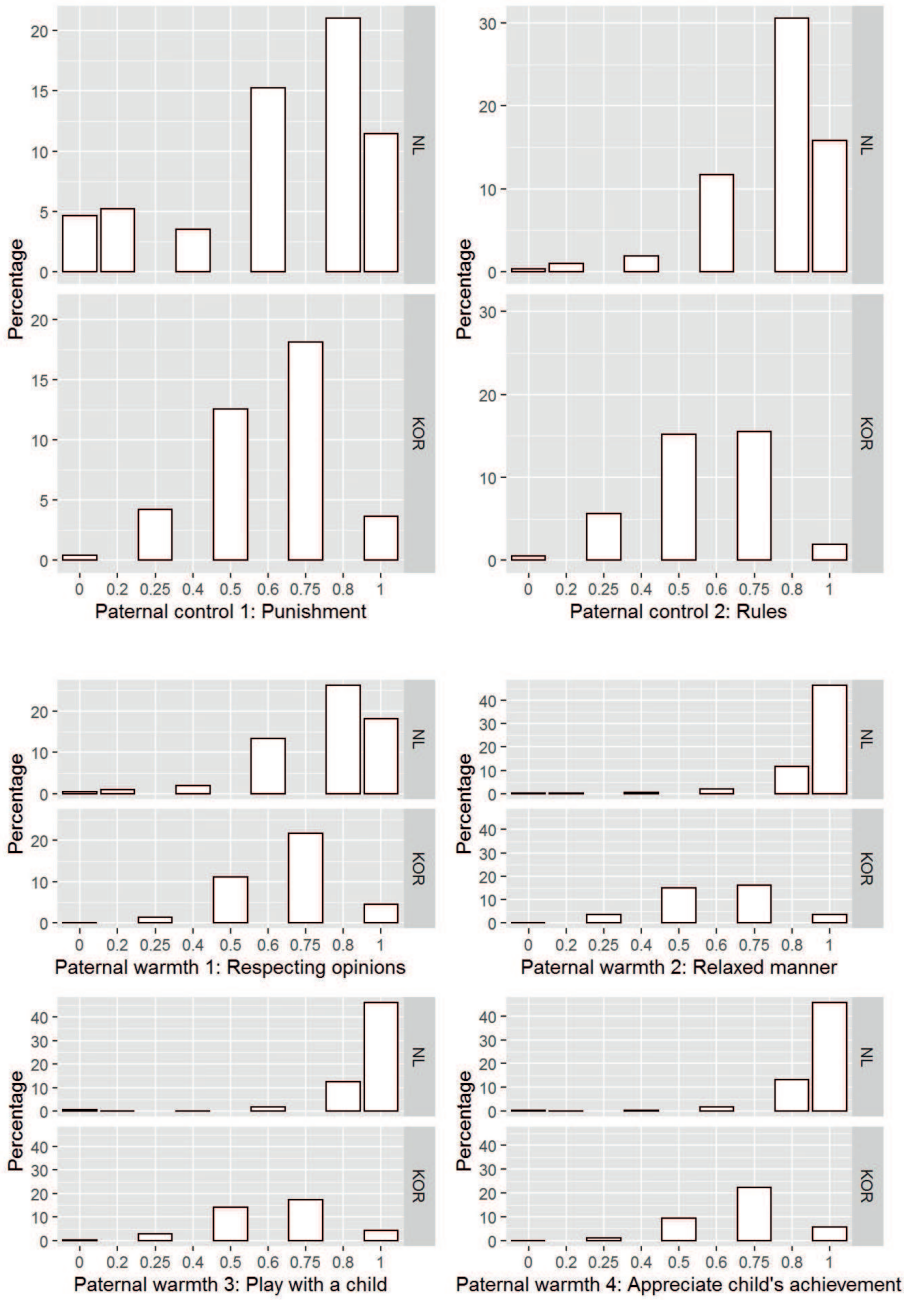


Figure S2. Distribution of responses for paternal control and paternal warmth items in the Dutch (NL) and Korean (KOR) population
Note. Paternal control and warmth items were rescaled with the miminum and maximum scores of 0 and 1.

Table S1. Comparison of ASCS items between CBCL 6-18 and CBCL 1.5-5

CBCL 6/18	Item	CBCL 1.5/5	Item
4	Fails to finish things he/she starts	59	Quickly shifts from one activity to another
8	Can't concentrate, can't pay attention for long	5	Can't concentrate, can't pay attention for long
28	Breaks rules at home, school, or elsewhere	20	Child is disobedient
41	Impulsive or acts without thinking	36	Gets into everything
78	Inattentive or easily distracted	N/A	
86	Stubborn, sullen, or irritable	81	Stubborn, sullen, or irritable
87	Sudden changes in mood or feelings	82	Sudden changes in mood or feelings
95	Temper tantrums or hot temper	85	Temper tantrums or hot temper

Table S2. Comparison of parental warmth and control items between Generation R and PSKC

Parental warmth		Parental control	
Generation R (9 items)	**PSKC (8 items)**	**Generation R (7 items)**	**PSKC (8 items)**
	Overlapping items		
Warmth 1. I respect my child's opinion.	Warmth 1. I respect my child's opinions and allow my child to express them.	Control 1. I teach my child that bad behaviour or doing something that isn't allowed will be punished in one way or	Control 1. When my child does something wrong, I always punish him or her and make him or her reflect on it.
Warmth 2. I have contact with my child in a relaxed way and I feel completely at ease with him/her.	Warmth 2. I treat my child in a relaxed and comfortable manner.	Control 2. I maintain strict rules that my child is aware of in relation to my child.	Control 2. I set rules and regulations and let my child obey (follow) them.
Warmth 3. I have fun and play with my child.	Warmth 3. I talk to and play with my child		
Warmth 4. I ensure that my child knows that I appreciate what he/she tries or achieves.	Warmth 4. I try to show that I am interested in the child's behavior or what the child has		
	Non-overlapping items		
I generally take into account my child's preferences if we do something as a family.	I spend intimate time with my child.	I ensure that I always know where my child is and what he/she is doing.	I teach manners strictly even when my child is young.
I encourage my child to be independent.	I set family rules with my child.	I prefer it if my child doesn't do things if there is a chance that he/she will fail in doing them.	I make my child obey my words.
If my child misbehaves I talk it through with him/her.	When the child asks a question, I try to explain well.	I feel that my child should be aware of how much I sacrifice for him/her.	I limit (restrict) my child's behavior for the sake of home education (domestic discipline).
I find it important and instructive to spend alot of time with my child.	I tell my child verbally (e.g. I love you) or physically (e.g. stroking, cuddling, etc.) express affection.	I make my child aware of how ashamed and disappointed I am if he/she misbehaves.	I make my child uphold public morals.
I allow my child to make a lot of decisions for him/herself.		I ensure that my child behaves well by warning him/her of the horrible things that can happen if	I restrain my child's aggressive behavior (e.g. throwing objects, hitting, etc).
I allow my child to make a lot of decisions for him/herself.			I do not accept (I ignore) my child's tantrum.

Table S3. Configural, metric, and scalar invariance models between the two study groups (NL vs. KOR)

Model for self-control	χ^2 (*df*)	RMSEA	90% CI	CFI	TIL	SRMR	$\Delta\chi^2$	ΔRMSEA	ΔCFI	ΔTLI	ΔSRMR
1. Configural	57.349 (16)	.044	[.031 .056]	.988	.969	.017					
2. Metric	95.186 (23)	.049	[.039 .060]	.979	.961	.034					
2-1. Partial metric 1	66.414 (22)	.039	[.028 .050]	.987	.975	.021					
Model 1 vs. 2-1							9.377	-.005	-.001	.006	.004
3. Scalar	90.754 (25)	.040	[.034 .054]	.981	.969	.024					
Model 2-1 vs. 3							27.614*	.001	-.006	-.006	.003

Note. RMSEA = root mean square error of approximation; TLI = Tucker-Lewis Index; CFI = comparative fit index; SRMR = standardized root mean square residual; Δ χ2 = Satorra-Bentler scaled chi-square difference test of the null hypothesis of identical fit of the two nested models. * p < .001.

Table S4. Standardized estimates from multi-group structural equation modeling with and without constraining paths between the two study groups (NL vs. KOR)

	Self-control problems					
	Model 1		Model 2		Model 3	
	β	95% CI	β	95% CI	β	95% CI
Unconstrained model						
Dutch children						
Paternal warmth	**-.071**	[-.128, -.015]	**-.069**	[-.125, -.013]	**-.070**	[-.127, -.013]
Paternal control	**.058**	[.002, 113]	**.057**	[.002, .111]	.045	[-.009, 100]
Korean children						
Paternal warmth	**-.129**	[-.199, -.059]	**-.128**	[-.198, -.059]	**-.111**	[-.182, -.041]
Paternal control	.010	[-.058, 078]	.006	[-.062, 073]	.007	[-.060, 073]
Constraining the path parental control -> self-control						
Dutch children						
Paternal warmth	**-.068**	[-.125, -.012]	**-.066**	[-.122, -.010]	-.067	[-.124, .011]
Paternal control	.040	[-.004, .083]	.037	[-.006, .080]	.030	[-.013, .073]
Korean children						
Paternal warmth	**-.130**	[-.199, -.061]	**-.129**	[-.199, -.060]	**-.112**	[-.182, -.042]
Paternal control	.038	[-.004, 080]	.036	[-.006, 077]	.029	[-.012, 070]

Constraining the path parental warmth -> self-control						
			Dutch children			
Paternal warmth	**-.078**	[-.113, -.043]	**-.077**	[-.112, -.042]	**-.070**	[-.106, -.035]
Paternal control	**.059**	[.004, 114]	**.058**	[.004, .112]	.045	[-.009, .099]
			Korean children			
Paternal warmth	**-.123**	[-.178, -.067]	**-.121**	[-.176, -.066]	**-.111**	[-.166, -.055]
Paternal control	.010	[-.058, 078]	.005	[-.062, 073]	.007	[-.060, 073]
Constraining both paths						
			Dutch children			
Paternal warmth	**-.077**	[-.113, -.042]	**-.076**	[-.111, -.041]	**-.070**	[-.105, -.034]
Paternal control	.040	[-.003, .084]	.038	[-.005, .081]	.030	[-.012, .073]
			Korean children			
Paternal warmth	**-.122**	[-.176, -.067]	**-.120**	[-.175, -.065]	**-.110**	[-.166, -.054]
Paternal control	.039	[-.003, 081]	.037	[-.005, 078]	.029	[-.012, 070]

Note. β = standardized estimate; 95% CI = 95% confidence interval for the standardized estimate; figures in bold indicate two-sided significance at p < .05.

Table S5. Configural, metric, and scalar invariance models between the four study groups: across boys and girls from the two countries

Model for self-control	χ^2 (*df*)	RMSEA	90% CI	CFI	TIL	SRMR	$\Delta\chi^2$	ΔRMSEA	ΔCFI	ΔTLI	ΔSRMR
1. Configural	65.842 (32)	.039	[.025 .052]	.990	.975	.018					
2. Metric	146.426 (53)	.052	[.043 .062]	.972	.956	.048					
2-1. Partial metric 1	98.981 (50)	.038	[.027 .049]	.986	.976	.034					
2-2. Partial metric 2	87.478 (47)	.036	[.024 .047]	.988	.979	.034					
Model 1 vs. 2-2							22.004	-.003	-.002	.004	.016
3. Scalar	176.367 (59)	.053	[.044 .062]	.967	.953	.043					
Model 2-1 vs. 3							100.494 *	-.021	-.026	-.006	.009

Note. RMSEA = root mean square error of approximation; TLI = Tucker-Lewis Index; CFI = comparative fit index; SRMR = standardized root mean square residual; Δ χ 2 = Satorra-Bentler scaled chi-square difference test of the null hypothesis of identical fit of the two nested models. * p < .001.

Table S6. Model fit results for the multi-group structural equation modeling with and without constraining the paths across boys and girls from the two countries.

Model	χ^2 (*df*)	RMSEA	90% CI	CFI	TIL	SRMR	$\Delta\chi^2$	ΔRMSEA	ΔCFI	ΔTLI	ΔSRMR
1. Unconstrained MG-SEM	143.961 (95)	.025	[.016. .033]	.987	.981	.031					
2. Constrained MG-SEM	146.975 (101)	.024	[.015. .032]	.988	.983	.031					
Model 1 vs. 2							3.492	-.001	.001	.002	.000

Note. Paths from parental warmth and control to self-control problems are constrained to be equal across groups in model 2.

Table S7. Standardized estimates from multi-group structural equation modeling (MG-SEM) comparing Dutch and Korean children: boys vs. girls

	Self-control problems in boys						Self-control problems in girls					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI
	Dutch children						*Dutch children*					
Paternal warmth	-.053	[-.139, .033]	-.053	[-.139, .033]	-.049	[-.136, .038]	**-.075**	[-.151, .000]	**-.074**	[-.149, .001]	**-.079**	[-.155, -.003]
Paternal control	.057	[-.027, .142]	.057	[-.027, .142]	.039	[-.045, .123]	.055	[-.016, .127]	.053	[-.018, .125]	.048	[-.023, .120]
Child age			.002	[-.092, .095]	-.005	[-.098, .089]			.057	[-.028, .142]	.054	[-.032, .140]
Paternal age					-.013	[-.103, .077]					.005	[-.087, .098]
Father residence [a]					-.023	[-.129, .083]					-.001	[-.084, .082]
Paternal education [b]					-.080	[-.171, .011]					-.034	[-.115, .048]
Household income [b]					**-.112**	[-.216, -.007]					**-.109**	[-.198, -.019]
	Korean children						*Korean children*					
Paternal warmth	**-.149**	[-.254, -.043]	**-.149**	[-.254, -.043]	**-.130**	[-.236, -.024]	**-.108**	[-.198, -.018]	**-.108**	[-.198, -.018]	**-.097**	[-.189, -.006]
Paternal control	.028	[-.070, .126]	.028	[-.070, .126]	.025	[-.068, .118]	-.016	[-.112, .080]	-.017	[-.113, .079]	-.012	[-.108, .084]
Child age			-.003	[-.099, .092]	.004	[-.089, .097]			.034	[-.064, .133]	.047	[-.053, .147]
Paternal age					-.075	[-.164, .013]					.007	[-.091, .105]
Father residence [a]					**-.067**	[-.131, -.002]					-.001	[-.091, .089]
Paternal education [b]					**-.118**	[-.216, -.021]					-.002	[-.105, .102]
Household income [b]					**-.105**	[-.205, -.005]					**-.122**	[-.217, -.026]

Note. β =standardized estimate; 95% CI = 95% confidence interval for the standardized estimate; a Categorized into 0=no, 1=yes; b Categorized into 0=low, 1=middle, and 2=high; figures in bold indicate two-sided significance at $p < .05$.

Table S8. Model fit results for the sensitivity multi-group structural equation modeling with and without constraining the paths between the two countries

Model	χ^2 (*df*)	RMSEA	90% CI	CFI	TIL	SRMR	$\Delta\chi^2$	ΔRMSEA	ΔCFI	ΔTLI	ΔSRMR
1. Unconstrained MG-SEM	148.068 (47)	.039	[.032 .046]	.973	.959	.032					
2. Constrained MG-SEM	150.534 (49)	.038	[.031 .045]	.973	.961	.032					
Model 1 vs. 2							2.190	-.001	.000	.002	.000

Note. Parenting mean scores were calculated based on all items (inclusive of non-overlapping items). PC = parental control; PW = parental warmth; SC = self-control (problems); RMSEA = root mean square error of approximation; TLI = Tucker-Lewis Index; CFI = comparative fit index; SRMR= standardized root mean square residual; Δ χ 2 = Satorra-Bentler scaled chi-square difference test of the null hypothesis of identical fit of the two nested models; the model fit of base models were compared (covariates were not included).

Table S9. Standardized estimates from multi-group structural equation modeling (MG-SEM) comparing Dutch and Korean children using complete scales for parenting behaviors

	Self-control problems					
	Model 1		Model 2		Model 3	
	β	95% CI	β	95% CI	β	95% CI
Dutch children						
Paternal warmth	**-.064**	[-.120, -.008]	**-.060**	[-.117, -.004]	-.055	[-.112, .001]
Paternal control	.049	[-.008, .106]	.047	[-.010, .104]	.026	[-.030, .083]
Child sex [a]			**-.151**	[-.204, -.090]	**-.145**	[-.203, -.088]
Child age			.025	[-.035, .092]	-.024	[-.040, .087]
Paternal age					-.010	[-.077, .056]
Father residence [b]					-.012	[-.077, .053]
Paternal education [c]					-.061	[-.123, .001]
Household income [c]					**-.114**	[-.184, -.045]
Korean children						
Paternal warmth	**-.121**	[-.191, -.052]	**-.118**	[-.118, -.049]	**-.103**	[-.173, -.033]
Paternal control	-.011	[-.080, .058]	-.016	[-.085, .052]	-.013	[-.081, .055]
Child sex [a]			**-.123**	[-.186, -.060]	**-.123**	[-.185, -.061]
Child age			.018	[-.048, .083]	.029	[-.037, .094]
Paternal age					-.036	[-.099, .026]
Father residence [b]					-.034	[-.087, .020]
Paternal education [c]					-.059	[-.128, .010]
Household income [c]					**-.112**	[-.179, -.045]

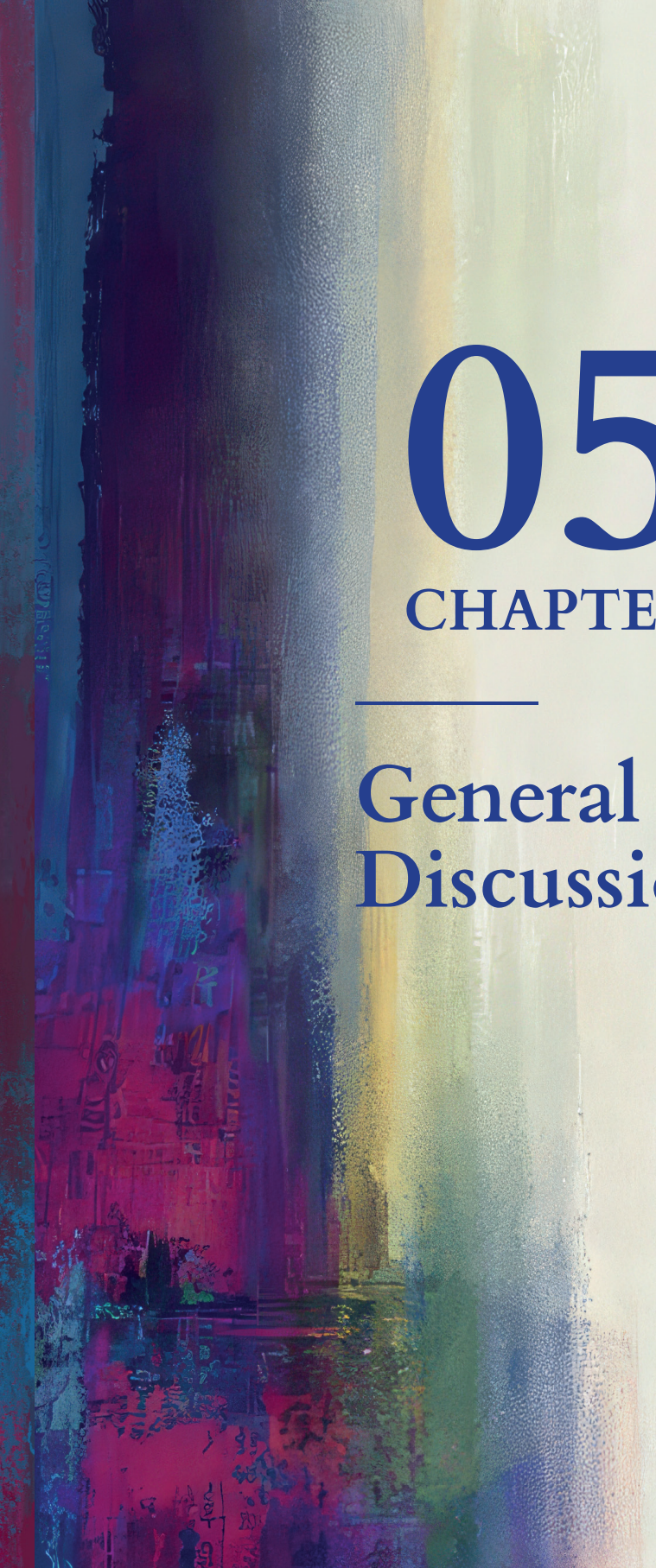
Note. β =standardized estimate; 95% CI = 95% confidence interval for the standardized estimate; a Categorized into 0 = boy and 1 = girl; b Categorized into 0 = no, 1 = yes; c Categorized into 0 = low, 1 = middle, and 2 = high; figures in bold indicate two-sided significance at $p < .05$.

Table S10. Mean, standardized deviation, skewness, kurtosis, and t-test results for parenting items

		N	*M*	*SD*	Skewness	Kurtosis	t^{a}	*p*-value
Dutch fathers	Control1	2116	.65	.29	-.86	-.11		
	Control2	2126	.79	.18	-1.11	2.30		
	Warmth1	2124	.79	.19	-1.05	1.81		
	Warmth2	2125	.93	.15	-3.18	13.16		
	Warmth3	2126	.94	.14	-3.49	17.21		
	Warmth4	2128	.94	.13	-3.03	14.04		
Korean fathers	Control1	1347	.63	.21	-.41	-.07	2.52	.012
	Control2	1347	.58	.21	-.29	-.23	30.04	<.001
	Warmth1	1346	.69	.18	-.40	.50	15.46	<.001
	Warmth2	1347	.63	.24	-.19	-.14	48.24	<.001
	Warmth3	1347	.64	.20	-.23	-.05	46.60	<.001
	Warmth4	1346	.71	.18	-.40	.46	40.64	<.001




05
CHAPTER



05
CHAPTER

General Discussion

General Discussion

This thesis examined the association between parenting and children's emotional and behavioral problems. Our focus was to explain the possible mechanisms underlying this association, including maternal and child characteristics, as well as the family environment, in order to extend existing models of parenting and developmental psychopathology. We addressed this using a comprehensive approach that included repeated measurements and a variety of statistical methods. **Chapter 2** addressed early predictors of the caregiver system and its impact during middle childhood. **Chapter 3** emphasized how maternal characteristics are associated with offspring outcomes during adolescence. Both chapters were conducted within the Generation R sample. **Chapter 4** focused on a broader spectrum of contextual variables across different cultures that could affect parenting and, consequently, a child's socioemotional development. In this chapter, data from Generation R (Dutch sample), ELPI (Chilean sample), and PSKC (Korean sample) were used.

In this discussion, I present in greater depth some of the main findings of this thesis, in light of the existing literature, by integrating findings from the different chapters. Specifically, I focus on the role of maternal and family characteristics in the onset of emotional and behavioral problems, cultural context, and its relationship with parenting, and how the organization of mental health problems develops over time. Additionally, I discuss methodological considerations, implications, and future directions in more detail.

Do mother, child, or contextual characteristics influence the early caregiver system? Understanding the impact and consequences of early mother-child interaction.

Belsky's theory (1984) posits that parenting is influenced by a combination of individual traits, historical background, and contextual factors. This multifactorial approach provides a more extensive understanding of parenting predictors by considering the interplay among personal characteristics, past experiences, and the contextual environment in which the relationship between children and their parents operates (Taraban & Shaw, 2018). For instance, from past studies, we know that a history of maltreatment might affect the individual who experienced it as well as the next generation (Bosquet Enlow et al., 2018; Loheide-Niesmann et al., 2024; Moog et al., 2023). One of the mechanisms by which this could be

transmitted is through parenting, particularly through the level of sensitivity exhibited in mother-child interactions (Ma et al., 2022; Savage et al., 2019). However, in Chapter 2.1, in our attempt to understand maternal sensitivity in the first decade of the child's life, none of the studied maternal characteristics, including childhood maltreatment and psychopathology, predicted differences in maternal sensitivity over time. Additionally, child behavior and a predisposition to certain behaviors (temperament and genetic predisposition to psychopathology) were also not associated with maternal sensitivity, providing no support for our hypothesis about the influence of maternal, child, and contextual characteristics on maternal sensitivity. Several explanations might be related to these null results. For instance, we relied on individual and proximal variables without considering broader contextual factors, such as poverty, unemployment, housing difficulties, or perceived social support. This broader range of factors might influence mothers' responses to their children's needs. Additionally, our lack of finding significant predictors might be explained by the inclusion of variables restricted to their availability in the prenatal phase. More research is needed to identify predictors across the childhood years, to better capture the dynamic nature of parent and child behaviors and their mutual influences on each other.

Despite null results regarding the predictors of maternal sensitivity over time, we observed a general decrease in maternal sensitivity over the childhood years. This pattern aligns with findings from past research, suggesting that maternal responsiveness is not static but rather evolves in relation to the child's developmental stages and the context in which the relationship is embedded (Campbell et al., 2007; Mills-Koonce et al., 2008). Our study contributes to previous research by highlighting the normative changes that might occur in maternal sensitivity within the general population. Considering child development, parent-child interactions change when children grow older and become more independent, with children potentially needing less from their parents in terms of sensitivity, or perhaps needing support in a different way (Kerns & Brumariu, 2016). Our findings reinforce the importance of considering the different needs of children throughout development when examining different aspects of parent-child interaction, such as maternal sensitivity. Potentially, current maternal sensitivity assessments are less equipped to measure maternal sensitivity at older ages, as children's needs evolve. More research is needed to bridge the gap from middle childhood through adolescence, including more frequent assessments of parental sensitivity.

Additionally, it is important to consider that maternal sensitivity may be less stable and static than we assume, with the one-timepoint assessment not capturing fluctuations over different situations and during specific periods (e.g., stress at the moment) (Verhees et al., 2021). Consequently, this may impede the accurate representation of the construct's continuity. Lastly, the short observation period we used may not accurately capture the complexity of parenting behavior and potentially masks some subtle differences in sensitivity, thus neglecting to represent the nature of day-to-day interactions (Borairi et al., 2024). Therefore, future work should continue examining multiple predictors of maternal sensitivity in more diverse samples across different settings, including the measurement of daily interactions.

Furthermore, when we explored early relational processes such as infant attachment and maternal sensitivity in a sub-sample of Dutch-origin dyads **(Chapter 2.2)**, we found that these early mother-child interactions did not explain the association between maternal childhood maltreatment and offspring emotional and behavioral problems during childhood. Rather, our results indicated an intergenerational effect of maternal childhood maltreatment on children's externalizing and internalizing problems at 10 years, with only an indirect effect for externalizing and internalizing problems via maternal psychopathology. This finding is consistent with previous research and highlights the relevance of maternal mental health as a long-lasting consequence of life events such as maltreatment experiences, reflecting that mental health might have an important role as a mechanism (Greene et al., 2020; Loheide-Niesmann et al., 2024). In addition, it is important to note that our findings demonstrated that the effect of maternal mental health problems may be cumulative, given their influence during pregnancy and in middle childhood on the mental health of the offspring in a cascading way (Clemens et al. , 2024).

The null results regarding attachment are similar to other findings, with no significant associations as a mediator between maternal childhood maltreatment and child outcomes (Ahlfs-Dunn et al., 2022; Alto et al., 2021). One possible explanation for the lack of significance is that infant attachment in a high socioeconomic context might not necessarily be affected by the presence of a history of maltreatment in mothers, in which the presence of certain protective factors might neutralize the effect of such experiences. Alternatively, in our sample, the low prevalence of severe maltreatment cases may indicate that our sample represents a low-risk population, in which past maltreatment experiences

in these mothers represent an isolated risk factor and likely insufficient on its own to alter how mothers bond with their children (Assink et al., 2018). Thus, the inclusion of additional protective factors may improve our understanding of the mechanisms underlying the transmission of maltreatment consequences, given that mothers who have survived maltreatment in childhood tend to break the cycle rather than repeat it (Morelen et al., 2018).

Both studies suggested that maternal characteristics are not sufficient to explain differences in the early caregiver system. Given the evolutionary roots of attachment and the tendency of children to seek security and protection from the caregiver (Ainsworth et al., 1978), a context might need more impediments for the dyads to be harmed. In this line, the isolated effect of past maltreatment experiences in the mother may not necessarily be transmitted to the next generation (Madigan et al., 2025), especially in the presence of protective factors such as family stability or high socioeconomic status, as our subsample is embedded. Our findings highlight the complexity of intergenerational maltreatment, highlighting the need to include additional protective factors that help identify the mechanisms that drive the break of the cycle.

Towards the identification of developmental psychopathology and unhealthy behaviors: Are maternal characteristics and family environment underlying mechanisms?

Extensive literature has focused on how maternal characteristics may affect child development. Yet, many studies failed to incorporate family components to identify potential mechanisms and, in this way, to have a more comprehensive overview of the environment as an important predictor. Additionally, research has focused on early childhood when investigating the impact of parenting, thereby precluding conclusions about effects across later developmental stages of child development (Cooke et al., 2022). Several studies showed that maternal mental health and behavior, specifically maternal depression and harsh parenting, are critical mechanisms in emergent emotional and behavioral problems in offspring (Harris et al., 2023; Khan & Renk, 2018; Marçal, 2021; Midouhas & Oliver, 2023; Zhang et al., 2024). To further explain these associations, I analyzed a broader range of maternal characteristics and family functioning over time, including the specific parenting practice of sensitivity, which has been shown to be the most relevant predictor of infant attachment (Madigan et al., 2024).

In our effort to better understand which maternal characteristics are associated with emotional and behavioral problems, we identified several associations across childhood and early adolescence. In early childhood, we found that maternal sensitivity was associated with children's self-regulation but not with eating behavior or BMI later in adolescence **(Chapter 3.1)**. Furthermore, we showed that a mother's history of childhood maltreatment was associated with more emotional and behavioral problems at age 13 years in the offspring, and this association was explained by family functioning over time **(Chapter 3.2)**. These findings add to prior research by revealing the critical role of maternal sensitivity in regulatory functioning in early childhood and that family components might contribute to the transmission of the consequences of maternal childhood maltreatment across generations.

In consideration of how parenting may reduce the risk of children's emotional and behavioral problems, research indicates a link between parenting styles and outcomes in children. Specifically, parental sensitivity has been associated with positive adaptive behaviors in offspring (Humphreys & Garon-Bissonnette, 2025). Our studies reveal that maternal sensitivity correlates with child outcomes throughout childhood, yet effect sizes were small. Additionally, we showed longer-term consequences of maternal experiences of maltreatment during her own childhood, as these also impacted offspring outcomes beyond childhood into adolescence. Although we looked at different maternal characteristics, these studies have in common that both maternal sensitivity and a history of childhood maltreatment were connected to emotion regulation competencies, which play a crucial role in the emergence of internalizing and externalizing problems (Brenning et al., 2022; Su et al., 2022).

Overall, our work advances prior literature, highlighting the important role of family functioning across childhood. As we aim to understand how the most proximal system in the context of the child is related to the onset of children's and adolescents' problems, it is fundamental to move beyond the study of only individual maternal characteristics. Our findings support prior studies in our sample that also found significant associations between family functioning, parenting, and children's psychopathology (Flink et al., 2012; Henrichs et al., 2011; Xerxa et al., 2020). It is noteworthy that the construct of family functioning within Generation R refers to a mother's perception of family support, mostly from her partner. This perceived social support has been demonstrated to be associated with subjective well-being (Gülaçti, 2010) and parenting behaviors (Fierloos et al., 2023; Taylor

et al., 2015) and is a suggested resilience factor decreasing the intergenerational transmission of psychopathology (Xerxa et al., 2025). Furthermore, our results are comparable with an earlier finding suggesting that mothers with higher social support from their partners and friends displayed more sensitive behaviors to their infants (Kivijärvi et al., 2004) and a benefit for maternal mental health (Hitzler et al., 2022). This may propose that contextual variables play a more critical role in parenting than only individual maternal characteristics. Thus, it is recommended to add contextual information when studying maternal sensitivity, as this reflects a more accurate representation of the immediate context surrounding the mother-child relationship.

Do cultural factors shape parenting and the home environment?

Based on the bioecological model proposed by Bronfenbrenner (1994), the context must be considered to identify and understand child development more accurately. It is necessary to acknowledge that child development does not occur in isolation; instead, the combination of different levels of individual and contextual factors better explains the development of emotional and behavioral problems. Studies suggest that parenting is shaped by different beliefs about raising a child, with these beliefs varying across cultural contexts (Ardelt & Eccles, 2001; Bornstein & Cheah, 2013; DePasquale & Gunnar, 2020). For instance, values such as collectivism and individualism have different relevance for Western and non-Western cultures when studying parenting (Tamis-LeMonda et al., 2008).

In this thesis, we conducted two cross-cultural studies. The first one **(Chapter 4.1)** showed how child emotional and behavioral problem trajectories in Latin American and European contexts follow different patterns. In the Chilean population, we found evidence that mothers of children with the most problematic behaviors displayed markedly lower emotional responses when compared to mothers of children in the low-risk group. Furthermore, these mothers provided fewer learning materials, had a lower educational level, and displayed more depressive symptoms. In the Dutch population, children with a stable high level of behavioral problems had mothers with more depressive symptoms and who showed fewer emotional responses. These findings suggest that slightly different aspects are relevant to the development and maintenance of behavior problems across cultural contexts, with the emotional environment playing a large role in both Chile and the Netherlands, while the broader home environment, including

learning materials and socioeconomic context being more important in Chile than in the Netherlands.

The second study **(Chapter 4.2)** focused on fathers in the Netherlands and South Korea. We found that paternal warmth protected against child self-control problems in both countries, suggesting that this aspect of parenting serves as a *universal protective* factor across cultures. Additionally, our results indicated that paternal control was associated with more self-control problems in Dutch children than in Korean children. These findings emphasize the need of include not only mothers in child development research since this results shows the universal importance of fathers' parenting for children's development across cultures.

Together, these two studies support the conceptual premise that there are both universal and culture-specific aspects in which parental warmth and emotional support are core features of the parent-child relationship across cultures. Apparently, even though culture tends to influence parenting beliefs, nurturing environments are universally beneficial for various child outcomes (Biglan et al., 2012; Evans, 2006; Farah et al., 2008). Considering that warmth involves providing comfort and support during interactions with the child, this parental characteristic has been linked to a variety of advantageous outcomes in children worldwide (Madigan et al., 2024). Indeed, recent research has found that parental emotional warmth is a key component of positive parenting practices associated with positive parental mental health, which in turn increases children's perceptions of the parental emotional warmth that they receive (Liu et al., 2023). This benefit might be evident even in later stages of child development, represented in an increase in emotional well-being in adolescents and their families in the presence of parental warmth and autonomy support (Bülow et al., 2022).

Methodological considerations

Selection bias

When interpreting our results, one important consideration is the representativeness of the sample used in our studies. The participants are part of the Generation R study, a prospective cohort study. The inclusion criteria of the sample were mothers of multi-ethnic origin who delivered between 2002 and 2006 and lived in the study area of Rotterdam. Since the loss to follow-up is expected in longitudinal studies, some retention strategies have been

implemented to reduce the percentage of lost to follow-up, such as reminders for questionnaires, reimbursement of transport costs, individual feedback if needed, and additional help (for further details, see Kooijman et al 2016). However, when we describe those who were lost to follow-up, we identified that they usually had lower educational levels, less income, and more often a non-Dutch origin. In this regard, it seems that the selection of the participants included in the studies is associated with well-functioning families of high economic status. Therefore, the generalizability of the results in this thesis needs to be taken with some caution. In fact, this "healthy sample", characterized by fewer behavioral and health problems, might not necessarily represent the same associations and level of functioning as other populations. Additionally, some of our non-significant or weaker-than-expected relationships may also be due to this selection towards a healthier study population. The selection may have led to lower frequency rates and, consequently, lowered the statistical power of the data to detect statistically significant differences (Jaddoe et al., 2010).

Information bias

One of the difficulties in asking about situations that happened in the past is accurately recalling them. In this thesis, we assessed the maternal history of maltreatment using self-reports for experiences that might have happened or not happened at least 15 years ago. This significant time gap might induce recall bias. Potentially, the experiences of maltreatment might be underreported due to repression, loss, or distortion of memory, leading to an underestimation of the prevalence of experiencing any type of maltreatment when mothers were below 18 years old (Maughan & Rutter, 1997). To reduce the possibility of this type of bias, we used the Childhood Trauma Questionnaire to measure past maltreatment experiences, a well-validated instrument (Bernstein et al., 1994) that maximizes accuracy in recall since the events are asked in a concrete way rather than a vague experience (Bernstein et al., 1994). Past research has demonstrated that the subjective experience provided by participants can explain the subsequent presence of psychopathology, thus making it a reliable tool to measure maltreatment in the past, even in the absence of an objective measure of maltreatment (Danese & Widom, 2023).

Additionally, another potential source of information bias could be over-reporting. For instance, the report of maltreatment experiences may be overestimated, as may happen if someone recalls mostly negative behavior. Such overreporting

may appear in the presence of depression (Brewin et al., 1993), which may also influence the report of children's emotional and behavioral problems. Therefore, the results must be interpreted with caution, and for future research, it is desirable to have multiple informants.

Statistical techniques

To better understand the complexity of child development, it is important to include several variables at multiple levels and time points that could explain a particular phenomenon. Nowadays, several statistical methods are becoming increasingly sophisticated in order to deal with complex data and gain a detailed understanding of what we want to test. In this thesis, we employed various techniques, including structural equation modelling (SEM), linear mixed models (LMM), and latent growth modelling (LGM). Each of them brings advantages and disadvantages.

Regarding the strengths of the statistical techniques used in this thesis, we found that some of the benefits of using SEM lie in its flexibility, allowing us to handle systems of simple or multiple linear regression equations. This permitted us to identify different longitudinal paths among the variables and, in this way, to understand the developmental cascade of child psychopathology (**Chapters 2.2, 3, and 4.2)**. Besides, its capability of dealing with latent variables, the quantification of both direct and indirect effects, and the path diagrams provides a more readable form to understand the relationships among a multitude of study variables (Nachtigall et al., 2003). Then, when we wanted to examine the trajectory of maternal sensitivity over time, LMM provided us with the convenience of identifying whether changes in maternal sensitivity were related to the effect of time by modelling its variation **(Chapter 2.1)**. Additionally, in longitudinal measurements, subjects' observations over time are usually correlated. LMM adjusts for this correlation between repeated observations by modelling individual variability (Hoekstra & Twisk, 2015). In this way, the mixed effects modelling allows a researcher to examine the condition of interest while simultaneously considering variability within and across participants. After that, since we had a considerably high number of participants in the Generation R and ELPI study cohorts **(Chapter 4.1)**, the use of latent growth modeling allowed us to identify different trajectories and risk factors of emotional and behavioral problems, with the advantage of analyzing unobserved subgroups within different populations that have different growth patterns over time (Jung & Wickrama, 2008). Besides,

time-varying models are of central interest when studying psychological phenomena from a within-person perspective (Haslbeck et al., 2020).

Although these statistical methods adequately addressed our research questions, some limitations must be acknowledged. First, concerning the disadvantages of the approaches used in this thesis, it could be argued that SEM has been criticized for its constraints in drawing causal inferences (Ahmad et al., 2026). Moreover, SEM does not take into account the modeling of time variability by ignoring the variance changes (i.e. the variances are assumed to be equal), while newer approaches include the time of the observations as continuous variables in the same model (e.g. Dynamic structural equation models (Asparouhov & Muthén, 2024)). Second, linear mixed models may be a better alternative when data are collected across different settings or when encountering other random effects beyond our control, rather than focusing solely on intraindividual variability as we did. Moreover, the inclusion of too many interaction terms and predictors increases model complexity, and if not supported by the data, it may lead to a loss of power (Matuschek et al., 2017). Third, latent growth analysis is another technique we used, which has some pitfalls as well. It may not accurately classify individuals within the cluster, as classifications may vary depending on the characteristics of the sample. Because we used a "healthy sample" (Generation R participants), the classifications may not have been particularly sensitive (Kamata et al., 2018; Twisk & Hoekstra, 2012). Therefore, further research is necessary to compare our results with those of others using the same approach.

In sum, it is important to emphasize that all methodological approaches yield valuable insights as long as they are aligned with the research question. The most suitable statistical technique that one can choose would probably be a good solution, since nowadays each technique is robust enough to test our hypothesis. Notably, different approaches can be used as complementary understandings on a given phenomenon, such that their conjunction will bring more insights than the focus on a single method, especially in the developmental psychology field (Kuper et al., 2025). In this regard, more replications would allow us to test whether a particular statistical technique better explains our hypothesis or, as I mentioned, whether the application of different statistical techniques to explain the same phenomena might yield valuable insights. Some more philosophical questions remain. For instance, is the use of a single technique at a time with such a complex set of variables the wisest decision? Or do we base our statistical choices solely on our own methodological limitations? The combination of techniques in one single

paper is not a common practice. However, future directions would incentivize the practice of integrating more than a single technique to explain our hypothesis, although this could mean bringing us different and unexpected (contradictory) results.

Parent-child interaction in close-up

One of the biggest challenges in attachment research and parenting studies is to identify and accurately classify parenting behavior. Nowadays, it is difficult, or in most cases impossible, to replicate studies such as Mary Ainsworth's, which was conducted in Uganda and Baltimore and involved hours of observation of interactions between different dyads in their natural environments. One of the notable differences between Ainsworth's study and replications is that the observation periods in the last studies are extremely short compared to the over 15 hours of observation time per dyad in Ainsworth's study (Pederson et al., 2014). At present, such intensive and naturalistic observations are rare, and parental sensitivity is usually observed in small time frames (Mesman & Emmen, 2013). For instance, we assessed about 8 minutes of interaction to codify parent-child interaction in a laboratory setting. But the question is: Is that particular moment the appropriate one for that dyad to be evaluated? How representative is maternal sensitivity at this snapshot? Did mothers behave differently because of an awareness that they and their children were being observed? One possible explanation for the non-significant results with our maternal sensitivity data is that the snapshots of interaction captured through free play and specific tasks may not have been representative of the actual interaction. Although the psychometric properties of sensitivity subscales are well established, and research has suggested that there is no need to develop new tools to measure sensitivity (Mesman & Emmen, 2013), adding more aspects of parenting behavior might complement the understanding of parent-child interaction. Additionally, since culture is an important determinant of parenting, some questions remain less explored when considering how well sensitive behaviors are captured or whether we are considering similar essential elements in different cultures when explaining parenting (Bozicevic et al., 2025). Furthermore, our findings may also reflect the complexity of parenting studies, suggesting that the analysis and evaluation of parenting behavior should be conducted with a more comprehensive lens. For instance, the use of Experience Sampling Methods (ESM) might provide a better understanding of the bidirectional influences, as previously shown by Bülow et al. (2022) the fact that, at the individual level, children can benefit from parental

components in different ways. This approach also aligns with the need to improve our understanding of subtle fluctuations in parenting behaviors and their interaction with contextual variables.

Clinical implications

The clinical implications derived from this thesis aim to benefit child emotional development by enhancing practices of various key actors, including caregivers and clinicians. However, transitioning from theory to empirical research and clinical practice, and vice versa, presents numerous significant challenges.

When we define parenting, a wide range of behaviors is part of the description. Maternal sensitivity is one of the parenting variables that has been linked to early infant attachment (Cooke et al., 2022; De Wolff & Van IJzendoorn, 1997; Madigan et al., 2024), and as such, is crucial in the foundation of early relationships. Additionally, the benefit of investigating maternal sensitivity relies on its malleability and, consequently, a skill that has the potential for improvement (Bakermans-Kranenburg et al., 2019). In this thesis, parenting is seen as a predictor of different child outcomes. For instance, in **Chapter 3.1**, we included this variable in the context of healthy eating behaviors and BMI. Although we did not find a direct association, we found that maternal sensitivity was associated with self-regulation, which in turn was related to BMI in early adolescence. These results suggest that including parents in the context of dietary interventions for children might reinforce and improve the regulatory processes underlying eating behaviors (Brotman et al., 2012). This suggestion is, for example, in line with common clinical practice and guidelines in child psychiatry to include a family approach and always involve parents in the general treatment of psychopathology. Regardless of whether a target intervention population is clinical or not, the systemic approach seems essential (Stolper et al., 2024).

Another implication is based on **Chapter 3.2**, where we identified that the experience of childhood maltreatment has long-lasting consequences for mental health within individuals and may, as such, extend into the next generation, as a negative predictor of children's well-being. Thus, early detection of the consequences of mothers who have experienced maltreatment in the past might help interventions to break the cycle of potential maltreatment. Additionally, maternal childhood trauma has been considered an important moderator in parenting intervention effectiveness (van der Asdonk et al., 2021). Consequently,

alleviating those experiences might also help in current parenting behavior. Along these lines, early detection and preventive interventions may be important to implement, particularly for prospective parents. Recognition by the medical team (such as general practitioners, midwives, or gynecologists) of potential past traumatic experiences among parents-to-be can initiate early support for young mothers and fathers. This approach can focus on supporting attachment and sensitivity within the public health services (e.g., municipal health services (GGD) and well-baby/child health clinics (Consultatiebureau)) by fostering resilience and strengthening protective factors.

Although the effect sizes for maternal influences were not large, they are still considered important, as findings may reflect larger individual differences. Indeed, some mothers may develop problems after experiencing maltreatment, while others are more resilient. Protective factors, such as healthy relationships, a good family atmosphere, experiencing social support, and a high socioeconomic status, may alleviate the consequences of experiencing a highly stressful event in childhood. Additionally, in the same study, we found that family functioning was one of the mechanisms that explained these effects on the next generation. Consequently, early interventions to foster healthy family dynamics, through the active participation of partners, fathers, and the extended family, might help break the cycle of the consequences of childhood maltreatment (Hitzler et al., 2022).

Finally, based on our studies, parental warmth can serve as a protective factor by being associated with an emotional regulatory process and reducing the increase in children's emotional and behavioral problems over the years, as we identified in our cross-cultural study **(Chapter 4.1)**. This conclusion applies to various types of parenting worldwide. In this regard, some reflections are important and worth mentioning when considering parenting in a context. Are there any parenting principles that can be universal across different cultures? Research on parenting indicates that parental warmth and emotional support are key components (Bülow et al., 2022; Butterfield et al., 2021), as our results consistently demonstrate. Hence, our findings suggest a focus on key aspects of parenting and maternal mental health. As such, early detection of maternal mental health and mother-child interactions may help attenuate the risk of problems in the family system. This support may improve the current situation, but, most importantly, reduce the likelihood of emotional and behavioral problems in the next generation. Therefore, policymakers might use this information to develop guidelines for how

to act and support mothers and children to alleviate stress-related responses. For example, to encourage the importance of social support impacting parenting skills; create public awareness campaigns on the identification of early signs of post-partum depression and psychological distress in mothers and children; and finally, to inform parents to identify that the family atmosphere is an essential resource of emotional support. Thus, prioritizing parental mental health seems crucial for the overall well-being of the family and later transmission of risks for psychopathology in the next generation.

Future directions

Many questions remain unclear to fully understand the association between parenting and the development of emotional and behavioral problems in children and adolescents. This journey is certainly still ongoing, and future scholars and academics (including me) have the duty to continue disentangling these associations. In this thesis, I covered some of the multiple questions that clinicians and researchers in the field of parenting have explored over the years. In this section, I will focus on a few points that may guide our future endeavors.

Since parenting is a construct that is affected by many variables over time, it would be important to explore further environmental variables that might influence parenting not only in the early phases but also over the course of the years. Despite the focus of most parenting research on early life, it is relevant to integrate a more comprehensive approach at least until adolescence, since this relationship is constantly evolving (Humphreys & Garon-Bissonnette, 2025). Thus, future research might focus on middle childhood, as few studies have explored attachment and sensitivity during this period of child development. As such, it remains unclear how the link between these parental factors and child behavior evolves over time, highlighting the need for longer follow-up also into adolescence and young adulthood. Additionally, a wide range of predictors on parenting is needed since our results differed when all of the predictors were considered to predict maternal sensitivity, and multiple testing correction was applied. Thus, emphasizing the importance of the inclusion of multiple determinants of parenting is fundamental (Smith, 2010; Taraban & Shaw, 2018). In addition to this idea, future research might, for instance, benefit from an idiographic approach to examine the bidirectional processes of parenting and offspring's well-being in order to identify the distinctive ways in which parents and adolescents influence each other's lives (Boele et al., 2023). For example, research using Experience

Sampling Methods (ESM) found differences within adolescents over time in their perception of parental support, which was partially explained by the emotional state of the adolescent (Janssen et al., 2021). Along these lines, understanding idiosyncratic processes through a multilevel approach appears to be informative for tailoring preventive interventions for families and adolescents. Further research is needed to amplify the knowledge on specific parental characteristics as a key promotor of well-being in families.

Furthermore, other questions remain undisclosed: Is it reasonable to think that parenting is exclusively for mothers? Are we including the right mix of caregivers in our research? In this thesis, we have also considered the role of fathers in some of our studies; however, we were unfortunately limited by the lack of information available on fathers. Nowadays, the father's involvement in the lives of their children has increased by 3 to 6 times over a single generation (Bakermans-Kranenburg et al., 2019; Deneault et al., 2022). Therefore, more efforts to include fathers must be considered (Zhu et al., 2025). On a similar note, the diversity of families nowadays – such as families with new partners, coparenting, and same-sex parenting (gay and lesbian couples) – emphasizes the need for considering a broader concept of parenting and family composition within child development research. Moreover, in the life of a child, there are more caregivers beyond mothers and fathers, such as the extended family, which could offer new insights into the influences on child development. The role of extended family networks in sensitive caregiving is frequently not considered. However, in some non-Western contexts, extended family support is a common practice, valued as essential for the well-being of the family system (Prag et al., 2023). By recognizing the contributions of various close members of the inner circle of the child, such as extended family members, teachers, and community figures, interventions can be tailored to address the unique needs and dynamics of each child's contextual environment. This comprehensive approach can lead to more effective prevention strategies and interventions, ultimately enhancing the support systems available for children. Only then will we increase the overall understanding of risk and resilience factors in a child's life by identifying how parents and the family environment work together, rather than focusing only on individual characteristics.

From a cultural perspective, the beliefs and values held by a community can significantly influence various aspects of life, particularly in the context of child-rearing. That's why another critical area for future research is to reconsider the assessment of parent-child interaction worldwide. Generally, settings and

scales are developed and tested in a white, middle-class population, as a recent systematic review showed that most tools measuring caregiver-child interaction have not been culturally validated for use in low- and middle-income countries (Bozicevic et al., 2025). This brings another issue regarding what we know as "the norm" in studies of attachment and child development. In fact, a meta-analysis showed that approximately 1 million participants in child development research are significantly skewed toward white participants from North America and Western Europe (Singh et al., 2023). Thus, many unrepresentative populations remain uncovered. This may lead to the fact that the information available about maternal sensitivity behavior represents North American and Western European population, suggesting that the evolution of the concept of maternal sensitivity might have failed to account for cultural differences (Dawson, 2018). Although there is some support for a global concept of the "ideal sensitive mother", cultural variations may exist in the activities mothers worldwide attempt to achieve to be as sensitive as their culture expects.

Finally, another relevant field to pay attention to is the study of trauma and the intergenerational transmission of its consequences. Such studies could further clarify the extent to which maternal and paternal maltreatment experiences can be perpetuated over time and through which mechanisms. For this, studies assessing the same construct across multiple generations (e.g., in mothers, fathers, and adolescents) would be helpful, while evaluating multiple potential mechanisms is also needed (Ma et al., 2022; Sirparanta et al., 2025; Su et al., 2022). Such information may provide more insights into breaking the cycle of maltreatment.

Conclusion

Living in a society requires the acquisition and development of socioemotional skills, which are an inherent part of life. These skills are built in early infancy, primarily with the help of parents and the immediate context surrounding a child. Consequently, understanding the precursors of emotional and behavioral problems from infancy to adolescence, including maternal characteristics, family environment, and contextual factors, may help identify them comprehensively. In this thesis, we intend to disclose three essential messages. First, in highly stressful circumstances, such as having experienced childhood maltreatment, a mother's mental health may have been impaired, potentially affecting the next generation. Second, the perceived low family support over the years was one of the most

important mechanisms contributing to (the onset of) emotional and behavioral problems in adolescence. Third, warmth seems to be an important and universal parenting characteristic across cultural contexts, as it relates to socioemotional trajectories and self-regulation in children. In sum, our understanding of children's socioemotional development from a bioecological model of human development leads to a broader view of identifying targets for intervention, thereby helping to reduce risk factors at different levels (maternal sensitivity, family functioning, and maternal mental health) rather than treating isolated symptomatology at one level.

References

Ahlfs-Dunn, S. M., Benoit, D., & Huth-Bocks, A. C. (2022). Intergenerational transmission of trauma from mother to infant: the mediating role of disrupted prenatal maternal representations of the child. *Attachment & Human Development*, *24*(2), 229-251. https://doi.org/10.1080/14616734.2021.1933769

Ahmad, S., Shah, K., & Debbouche, A. (2026). Structural equation modeling for causal effect estimation with machine learning. *Journal of Computational and Applied Mathematics*, *475*, 117020. https://doi.org/https://doi.org/10.1016/j.cam.2025.117020

Alto, M. E., Warmingham, J. M., Handley, E. D., Rogosch, F., Cicchetti, D., & Toth, S. L. (2021). Developmental pathways from maternal history of childhood maltreatment and maternal depression to toddler attachment and early childhood behavioral outcomes. *Attachment & human development*, *23*(3), 328-349. https://doi.org/10.1080/14616734.2020.1734642

Ardelt, M., & Eccles, J. S. (2001). Effects of mothers' parental efficacy beliefs and promotive parenting strategies on inner-city youth. *Journal of Family Issues*, *22*(8), 944-972. https://doi.org/10.1177/019251301022008001

Asparouhov, T., & Muthén, B. (2024). *Continuous Time Dynamic Structural Equation Models*. statmodel. https://www.statmodel.com/download/CTRDSEM.pdf

Assink, M., Spruit, A., Schuts, M., Lindauer, R., van der Put, C. E., & Stams, G. J. J. M. (2018). The intergenerational transmission of child maltreatment: A three-level meta-analysis. *Child Abuse & Neglect*, *84*, 131-145. https://doi.org/10.1016/j.chiabu.2018.07.037

Bakermans-Kranenburg, M. J., Lotz, A., Alyousefi-van Dijk, K., & Van IJzendoorn, M. (2019). Birth of a father: Fathering in the first 1,000 days. *Child Development Perspectives*, *13*(4), 247-253. https://doi.org/10.1111/cdep.12347

Belsky, J. (1984). The determinants of parenting: A process model. *Child Development*, *55*, 83-96. https://doi.org/10.2307/1129836

Bernstein, D. P., Fink, L., Handelsman, L., Foote, J., Lovejoy, M., Wenzel, K., Sapareto, E., & Ruggiero, J. (1994). Initial reliability and validity of a new retrospective measure of child-abuse and neglect. *American Journal of Psychiatry*, *151*(8), 1132-1136. https://doi.org/10.1176/ajp.151.8.1132

Biglan, A., Flay, B. R., Embry, D. D., & Sandler, I. N. (2012). The critical role of nurturing environments for promoting human well-being. *American Psychologist*, *67*(4), 257-271. https://doi.org/10.1037/a0026796

Boele, S., Bülow, A., Beltz, A. M., de Haan, A., Denissen, J. J. A., & Keijsers, L. (2023). The direction of effects between parenting and adolescent affective well-being in everyday life is family specific. *Scientific Reports*, *13*(1). https://doi.org/10.1038/s41598-023-43294-5

Borairi, S., Deneault, A. A., Madigan, S., Fearon, P., Devereux, C., Geer, M., Jeyanayagam, B., Martini, J., & Jenkins, J. (2024). A meta-analytic examination of sensitive responsiveness as a mediator between depression in mothers and psychopathology in children. *Attachment & human development*, *26*(4), 273-300. https://doi.org/10.1080/14616734.2024.2359689

Bornstein, M. H., & Cheah, C. S. L. (2013). The place of "culture and parenting" in the ecological contextual perspective on developmental science. In *Parenting beliefs, behaviors, and parent-child relations* (pp. 3-34). Psychology Press.

Bosquet Enlow, M., Englund, M. M., & Egeland, B. (2018). Maternal childhood maltreatment history and child mental health: mechanisms in intergenerational effects. *Journal of Clinical Child and Adolescent Psychology*, *47*, S47-S62. https://doi.org/10.1080/15374416.2016.1144189

Bozicevic, L., Lucas, C., Magai, D. N., Ooi, Y., Maliwichi, L., Sharp, H., & Gladstone, M. (2025). Evaluating caregiver-child interactions in low- and middle-income countries: a systematic review of tools and methods. *Journal of Reproductive and Infant Psychology*, *43*(5), 1301-1336. https://doi.org/10.1080/02646838.2024.2321615

Brenning, K., Soenens, B., Vansteenkiste, M., De Clercq, B., & Antrop, I. (2022). Emotion Regulation as a Transdiagnostic Risk Factor for (Non)Clinical Adolescents' Internalizing and Externalizing Psychopathology: Investigating the Intervening Role of Psychological Need Experiences. *Child Psychiatry & Human Development*, *53*(1), 124-136. https://doi.org/10.1007/s10578-020-01107-0

Brewin, C. R., Andrews, B., & Gotlib, I. H. (1993). Psychopathology and early experience - a reappraisal of retrospective reports. *Psychological Bulletin*, *113*(1), 82-98. https://doi.org/10.1037/0033-2909.113.1.82

Bronfenbrenner, U. (1994). Ecological models of human development. In *International Encyclopedia of Education* (2 ed., Vol. 3). Oxford: Elsevier.

Brotman, L. M., Dawson-McClure, S., Huang, K. Y., Theise, R., Kamboukos, D., Wang, J., Petkova, E., & Ogedegbe, G. (2012). Early childhood family intervention and long-term obesity prevention among high-risk minority youth. *Pediatrics*, *129*(3), e621-628. https://doi.org/10.1542/peds.2011-1568

Bülow, A., Neubauer, A. B., Soenens, B., Boele, S., Denissen, J. J. A., & Keijsers, L. (2022). Universal ingredients to parenting teens: parental warmth and autonomy support promote adolescent well-being in most families. *Scientific Reports*, *12*(1). https://doi.org/10.1038/s41598-022-21071-0

Butterfield, R. D., Silk, J. S., Lee, K. H., Siegle, G. S., Dahl, R. E., Forbes, E. E., Ryan, N. D., Hooley, J. M., & Ladouceur, C. D. (2021). Parents still matter! Parental warmth predicts adolescent brain function and anxiety and depressive symptoms 2 years later. *Development and Psychopathology*, *33*(1), 226-239. https://doi.org/10.1017/S0954579419001718

Campbell, S. B., Matestic, P., von Stauffenberg, C., Mohan, R., & Kirchner, T. (2007). Trajectories of maternal depressive symptoms, maternal sensitivity, and children's functioning at school entry. *Developmental Psychology*, *43*(5), 1202-1215. https://doi.org/10.1037/0012-1649.43.5.1202

Clemens, V., Wernecke, D., Fegert, J. M., Genuneit, J., Rothenbacher, D., & Braig, S. (2025). Maternal child maltreatment and trajectories of offspring behavioural and emotional difficulties from age 4 to 7 years - results from a prospective birth cohort study. *European Child & Adolescent Psychiatry*, *34*(3), 1039-1050. https://doi.org/10.1007/s00787-024-02534-3

Cooke, J. E., Deneault, A. A., Devereux, C., Eirich, R., Fearon, R. M. P., & Madigan, S. (2022). Parental sensitivity and child behavioral problems: A meta-analytic review. *Child Development*, *93*(5), 1231-1248. https://doi.org/10.1111/cdev.13764

Danese, A., & Widom, C. S. (2023). Associations between objective and subjective experiences of childhood maltreatment and the course of emotional disorders in adulthood. *Jama Psychiatry*, *80*(10), 1009-1016. https://doi.org/10.1001/jamapsychiatry.2023.2140

Dawson, N. K. (2018). From Uganda to Baltimore to Alexandra Township: How far can Ainsworth's theory stretch? *S Afr J Psychiatr*, *24*, 1137. https://doi.org/10.4102/sajpsychiatry.v24i0.1137

Deneault, A. A., Cabrera, N. J., & Bureau, J. F. (2022). A meta-analysis on observed paternal and maternal sensitivity. *Child Development*, *93*(6), 1631-1648. https://doi.org/10.1111/cdev.13832

DePasquale, C. E., & Gunnar, M. R. (2020). Parental sensitivity and nurturance *Future of Children*, *30*(2), 53-70. <Go to ISI>://WOS:000611015200004

De Wolff, M. S., & Van IJzendoorn, M. H. (1997). Sensitivity and attachment: A meta-analysis on parental antecedents of infant attachment. *Child Development*, *68*(4), 571-591. https://doi.org/10.2307/1132107

Evans, G. W. (2006). Child development and the physical environment. *Annual Review of Psychology*, *57*, 423-451. https://doi.org/10.1146/annurev.psych.57.102904.190057

Farah, M. J., Betancourt, L., Shera, D. M., Savage, J. H., Giannetta, J. M., Brodsky, N. L., Malmud, E. K., & Hurt, H. (2008). Environmental stimulation, parental nurturance and cognitive development in humans. *Developmental Science*, *11*(5), 793-801. https://doi.org/10.1111/j.1467-7687.2008.00688.x

Fierloos, I. N., Windhorst, D. A., Fang, Y., Hosman, C. M. H., Jonkman, H., Crone, M. R., Jansen, W., & Raat, H. (2023). The association between perceived social support and parenting self-efficacy among parents of children aged 0-8 years. *Bmc Public Health*, *23*(1). https://doi.org/10.1186/s12889-023-16710-8

Flink, I. J. E., Jansen, P. W., Beirens, T. M. J., Tiemeier, H., Van IJzendoorn, M. H., Jaddoe, V. W. V., Hofman, A., & Raat, H. (2012). Differences in problem behaviour among ethnic minority and majority preschoolers in the Netherlands and the role of family functioning and parenting factors as mediators: the Generation R Study. *Bmc Public Health*, *12*. https://doi.org/10.1186/1471-2458-12-1092

Greene, C. A., Haisley, L., Wallace, C., & Ford, J. D. (2020). Intergenerational effects of childhood maltreatment: A systematic review of the parenting practices of adult survivors of childhood abuse, neglect, and violence. *Clinical Psychology Review*, *80*. https://doi.org/10.1016/j.cpr.2020.101891

Gülaçti, F. (2010). The effect of perceived social support on subjective well-being. *Innovation and Creativity in Education*, *2*(2), 3844-3849. https://doi.org/10.1016/j.sbspro.2010.03.602

Harris, M., MacMillan, H., Mepham, J., Joshi, D., Wekerle, C., Atkinson, L., & Gonzalez, A. (2023). Maternal childhood maltreatment history and child behavior problems: developmental patterns and mediation via maternal depressive symptoms and parenting behavior. *Child Maltreatment*, *28*(2), 254-264. https://doi.org/10.1177/10775595221074364

Haslbeck, J. M. B., Bringmann, L. F., & Waldorp, L. J. (2020). A tutorial on estimating time-varying vector autoregressive models. *Multivariate Behavioral Research*, *56*(1), 120-149. https://doi.org/10.1080/00273171.2020.1743630

Henrichs, J., Schenk, J. J., Kok, R., Ftitache, B., Schmidt, H. G., Hofman, A., Jaddoe, V. W. V., Verhulst, F. C., & Tiemeier, H. (2011). Parental family stress during pregnancy and cognitive functioning in early childhood: The Generation R Study. *Early Childhood Research Quarterly*, *26*(3), 332-343. https://doi.org/10.1016/j.ecresq.2011.01.003

Hitzler, M., Behnke, A., Gündel, H., Ziegenhain, U., Kindler, H., Kolassa, I. T., & Zimmermann,

J. (2022). Sources of social support for postpartum women with a history of childhood maltreatment: Consequences for perceived stress and general mental health in the first year after birth. *Child Abuse & Neglect*, *134*. https://doi.org/10.1016/j.chiabu.2022.105911

Hoekstra, T., & Twisk, J. W. R. (2015). The analysis of individual health trajectories across the life course: Latent class growth models versus mixed models. *A life course perspective on health trajectories and transitions*, 179-195. https://doi.org/10.1007/978-3-319-20484-0_9

Humphreys, K. L., & Garon-Bissonnette, J. (2025). Parent-child interactions in Infancy and early childhood. *Annual Review of Developmental Psychology*, *7*(1), 117-140. https://doi.org/10.1146/annurev-devpsych-111323-102255

Jaddoe, V. W. V., van Duijn, C. M., van der Heijden, A. J., Mackenbach, J. P., Moll, H. A., Steegers, E. A. P., Tiemeier, H., Uitterlinden, A. G., Verhulst, F. C., & Hofman, A. (2010). The Generation R Study: design and cohort update 2010. *European Journal of Epidemiology*, *25*(11), 823-841. https://doi.org/10.1007/s10654-010-9516-7

Janssen, L. H. C., Elzinga, B. M., Verkuil, B., Hillegers, M. H. J., & Keijsers, L. (2021). The Link between parental support and adolescent negative mood in daily life: between-person heterogeneity in within-person processes. *Journal of Youth and Adolescence*, *50*(2), 271-285. https://doi.org/10.1007/s10964-020-01323-w

Jung, T., & Wickrama, K. A. S. (2008). An introduction to latent class growth analysis and growth mixture modeling. *Social and Personality Psychology Compass*, *2*(1), 302-317. https://doi.org/10.1111/j.1751-9004.2007.00054.x

Kamata, A., Kara, Y., Patarapichayatham, C., & Lan, P. (2018). Evaluation of analysis approaches for latent class analysis with auxiliary linear growth model. *Frontiers in Psychology*, *9*. https://doi.org/10.3389/fpsyg.2018.00130

Kerns, K., & Brumariu, L. (2016). Attachment in middle childhood. In J. Cassidy & P. Shaver (Eds.), *Handbook of Attachment.* (Vol. 3, pp. 349–365). Guilford.

Khan, M., & Renk, K. (2018). Understanding the pathways between mothers' childhood maltreatment experiences and patterns of insecure attachment with young children via symptoms of depression. *Child Psychiatry & Human Development*, *49*(6), 928-940. https://doi.org/10.1007/s10578-018-0808-6

Kivijärvi, M., Räihä, H., Virtanen, S., Lertola, K., & Piha, J. (2004). Maternal sensitivity behavior and infant crying, fussing and contented behavior:: The effects of mother's experienced social support. *Scandinavian Journal of Psychology*, *45*(3), 239-246. https://doi.org/10.1111/j.1467-9450.2004.00400.x

Kuper, N., Andresen, P. K., Beck, E. D., Costantini, G., Hamaker, E. L., Wright, A. G. C., & Zimmermann, J. (2025). From persons to general principles: Methodological decisions for idiographic and nomothetic research. *European Journal of Personality*, *39*(4), 635-661. https://doi.org/10.1177/08902070241278020

Liu, G. Z., Zhao, Z. F., Li, B. B., Pan, Y. G., & Cheng, G. (2023). Parental psychological well-being and parental emotional warmth as mediators of the relationship between family socioeconomic status and children's life satisfaction. *Current Psychology*, *42*(27), 23958-23965. https://doi.org/10.1007/s12144-022-03568-z

Loheide-Niesmann, L., Riem, M. M. E., & Cima, M. (2024). The impact of maternal childhood maltreatment on child externalizing behaviour and the mediating factors underlying this association: a three-level meta-analysis and systematic review. *European Child & Adolescent Psychiatry*, *33*(8), 2445-2470. https://doi.org/10.1007/

s00787-022-02117-0

Ma, X., Biaggi, A., Sacchi, C., Lawrence, A. J., Chen, P. J., Pollard, R., Matter, M., Mackes, N., Hazelgrove, K., Morgan, C., Harding, S., Simonelli, A., Schumann, G., Pariante, C. M., Mehta, M., Montana, G., Rodriguez-Mateos, A., Nosarti, C., & Dazzan, P. (2022). Mediators and moderators in the relationship between maternal childhood adversity and children's emotional and behavioural development: a systematic review and meta-analysis. *Psychol Med*, *52*(10), 1817-1837. https://doi.org/10.1017/S0033291722001775

Madigan, S., Deneault, A. A., Duschinsky, R., Bakermans-Kranenburg, M. J., Schuengel, C., Van IJzendoorn, M. H., Ly, A., Fearon, R. M. P., Eirich, R., & Verhage, M. L. (2024). Maternal and paternal sensitivity: Key determinants of child attachment security examined through meta-analysis. *Psychological Bulletin*, *150*(7), 839-872. https://doi.org/10.1037/bul0000433

Madigan, S., Turgeon, J., Racine, N., Zhu, J., Alink, L. R. A., Ereyi-Osas, W., Jang, G., & Fearon, R. M. P. (2025). Patterns of continuity and discontinuity of childhood maltreatment across generations: A meta-analysis. *Development and Psychopathology*. https://doi.org/10.1017/S0954579425000239

Marçal, K. E. (2021). Pathways to adolescent emotional and behavioral problems: an examination of maternal depression and harsh parenting. *Child Abuse & Neglect*, *113*. https://doi.org/10.1016/j.chiabu.2020.104917

Matuschek, H., Kliegl, R., Vasishth, S., Baayen, H., & Bates, D. (2017). Balancing Type I error and power in linear mixed models. *Journal of Memory and Language*, *94*, 305-315. https://doi.org/10.1016/j.jml.2017.01.001

Maughan, B., & Rutter, M. (1997). Retrospective reporting of childhood adversity: Issues in assessing long-term recall. *Journal of Personality Disorders*, *11*(1), 19-33. https://doi.org/10.1521/pedi.1997.11.1.19

Mesman, J., & Emmen, R. A. G. (2013). Mary Ainsworth's legacy: a systematic review of observational instruments measuring parental sensitivity. *Attachment & human development*, *15*(5-6), 485-506. https://doi.org/10.1080/14616734.2013.820900

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). https://doi.org/10.1371/journal.pone.0282108

Mills-Koonce, W. R., Gariepy, J. L., Sutton, K., & Cox, M. J. (2008). Changes in maternal sensitivity across the first three years: are mothers from different attachment dyads differentially influenced by depressive symptomatology? *Attach Hum Dev*, *10*(3), 299-317. https://doi.org/10.1080/14616730802113612

Moog, N. K., Cummings, P. D., Jackson, K. L., Aschner, J. L., Barrett, E. S., Bastain, T. M., Blackwell, C. K., Enlow, M. B., Breton, C., Bush, N. R., Deoni, S. C. L., Duarte, C. S., Ferrara, A., Grant, T. L., Hipwell, A. E., Jones, K., Leve, L. D., Lovinsky-Desir, S., Miller, R. K., . . . Collaborators, E. (2023). Intergenerational transmission of the effects of maternal exposure to childhood maltreatment in the USA: a retrospective cohort study. *Lancet Public Health*, *8*(3), E226-E237. https://doi.org/10.1016/S2468-2667(23)00025-7

Morelen, D., Rosenblum, K. L., & Muzik, M. (2018). Childhood maltreatment and motherhood: implications for maternal well-being and mothering. In M. Muzik & K. L. Rosenblum (Eds.), *Motherhood in the Face of Trauma: Pathways Towards Healing and Growth* (pp. 23-37). Springer International Publishing. https://doi.

org/10.1007/978-3-319-65724-0_2

Nachtigall, C., Kroehne, U., Funke, F., & Steyer, R. (2003). (Why) Should we use SEM? Pros and cons of structural equation modeling. *Methods of Psychological Research*, *8*(2), 1-22.

Pederson, D. R., Bailey, H. N., Tarabulsy, G. M., Bento, S., & Moran, G. (2014). Understanding sensitivity: lessons learned from the legacy of Mary Ainsworth. *Attachment & human development*, *16*(3), 261-270. https://doi.org/10.1080/14616734.2014.900094

Prag, A., Donald, K. A., Weldon, E., Halligan, S. L., Stein, D. J., & Malcolm-Smith, S. (2023). Has maternal sensitivity been comprehensively investigated in sub-Saharan Africa? A narrative scoping review. *Acta Neuropsychiatr*, 1-18. https://doi.org/10.1017/neu.2023.20

Savage, L. É., Tarabulsy, G. M., Pearson, J., Collin-Vézina, D., & Gagné, L. M. (2019). Maternal history of childhood maltreatment and later parenting behavior: A meta-analysis. *Development and Psychopathology*, *31*(1), 9-21. https://doi.org/10.1017/S0954579418001542

Singh, L., Cristia, A., Karasik, L. B., Rajendra, S. J., & Oakes, L. M. (2023). Diversity and representation in infant research: Barriers and bridges toward a globalized science of infant development. *Infancy*, *28*(4), 708-737. https://doi.org/10.1111/infa.12545

Sirparanta, A. E., Touati, C. D., Cyr, C., & Miljkovitch, R. (2025). Parental history of childhood maltreatment and offspring attachment insecurity and disorganization: Two meta-analyses. *Trauma Violence & Abuse*, *26*(3), 420-435. https://doi.org/10.1177/15248380241282995

Smith, M. (2010). Good parenting: Making a difference. *Early Human Development*, *86*(11), 689-693. https://doi.org/10.1016/j.earlhumdev.2010.08.011

Stolper, H., van Doesum, K., & Steketee, M. (2024). An integrated family approach in the practice of adult and child mental health care. *Frontiers in Psychiatry*, *15*. https://doi.org/10.3389/fpsyt.2024.1298268

Su, Y., D'Arcy, C., & Meng, X. (2022). Intergenerational effect of maternal childhood maltreatment on next generation's vulnerability to psychopathology: A systematic review with meta-analysis. *Trauma Violence Abuse*, *23*(1), 152-162. https://doi.org/10.1177/1524838020933870

Tamis-LeMonda, C. S., Way, N., Hughes, D., Yoshikawa, H., Kalman, R. K., & Niwa, E. Y. (2008). Parents' goals for children: The dynamic coexistence of individualism and collectivism in cultures and individuals. *Social Development*, *17*(1), 183-209. https://doi.org/10.1111/j.1467-9507.2007.00419.x

Taraban, L., & Shaw, D. S. (2018). Parenting in context: Revisiting Belsky's classic process of parenting model in early childhood. *Developmental Review*, *48*, 55-81. https://doi.org/10.1016/j.dr.2018.03.006

Taylor, Z. E., Conger, R. D., Robins, R. W., & Widaman, K. F. (2015). Parenting practices and perceived social support: Longitudinal relations with the social competence of mexican-origin children. *Journal of Latina-O Psychology*, *3*(4), 193-208. https://doi.org/10.1037/lat0000038

Twisk, J., & Hoekstra, T. (2012). Classifying developmental trajectories over time should be done with great caution: a comparison between methods. *Journal of Clinical Epidemiology*, *65*(10), 1078-1087. https://doi.org/10.1016/j.jclinepi.2012.04.010

van der Asdonk, S., Cyr, C., & Alink, L. (2021). Improving parent-child interactions in maltreating families with the Attachment Video-feedback Intervention: Parental childhood trauma as a moderator of treatment effects. *Attachment & human development*, *23*(6), 876-896. https://doi.org/10.1080/14616734.2020.1799047

Verhees, M. W. F. T., Ceulemans, E., Bakermans-Kranenburg, M. J., & Bosmans, G. (2021). State attachment variability: Between- and within-person level associations with trait attachment and psychological problems. *Brain Sciences*, *11*(10), 1264. https://doi.org/10.3390/brainsci11101264

Xerxa, Y., Hillegers, M. H. J., Mesman, E., Tiemeier, H., & Jansen, P. W. (2025). Intergenerational transmission of psychopathology across three generations: the role of social support. *European Child & Adolescent Psychiatry*, *34*(4), 1329-1340. https://doi.org/10.1007/s00787-024-02562-z

Xerxa, Y., Rescorla, L. A., Serdarevic, F., Van IJzendorn, M. H., Jaddoe, V. W., Verhulst, F. C., Luijk, M. P. C. M., & Tiemeier, H. (2020). The complex role of parental separation in the association between family conflict and child problem behavior. *Journal of Clinical Child and Adolescent Psychology*, *49*(1), 79-93. https://doi.org/10.1080/15374416.2018.1520118

Zhang, L. D., Wang, R. J., & Chen, L. (2024). The impact of harsh parental discipline and emotional warmth on adolescent problem behaviors. *Psychology Research and Behavior Management*, *17*, 2309-2319. https://doi.org/10.2147/Prbm.S466830

Zhu, J., Deneault, A. A., Seal, H., Lucchese-Lavecchia, G., Madigan, S., & Bureau, J. F. (2025). Examining the link between parental relationship functioning and parent sensitivity: a meta-analysis. *Attachment & human development*, *27*(3), 368-395. https://doi.org/10.1080/14616734.2024.2441146


06
CHAPTER

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CHAPTER

Summary/ samenvatting

Summary

Parenting plays an essential role in child development. As the family is the most immediate environment in a child's life, parents exert a profound influence on their development. Therefore, it is crucial to support and improve healthy parenting and family environments. Previous studies have focused on early childhood and have already identified several protective and risk factors as predictors of different emotional and behavioral problems in children. In this thesis, through a longitudinal design, we explored beyond existing findings by identifying early determinants of parenting and of offspring's emotional and behavioral problems over time, and by exploring the cultural context and its relationship with socio-emotional development. A better understanding of maternal, child, and contextual variables involved in child socio-emotional development may aid in the identification of important targets for early detection and intervention to support families. For that, we used data from 3 different prospective cohort studies: the Generation R study, the Early Childhood Longitudinal Survey (ELPI), and the Panel Study on Korean Children (PSKC).

Initially, to gain greater insight into the role of early predictors of mother-child interactions in **Chapter 2.1**, we explored predictors of maternal sensitivity trajectories in the first 10 years. We examined how maternal characteristics, child variables, and contextual factors contributed to explaining changes in maternal sensitivity over time. In this study, we used longitudinal data from the Generation R Study, which followed participants until the age of 10. The study involved a sub-sample of 1236 participants with in-depth assessments of observed maternal sensitivity. Our analyses identified no significant predictors of maternal sensitivity trajectories over time. However, suggestive trends in the trajectories of maternal sensitivity over time were consistent with previous studies, indicating that maternal sensitivity decreased overall. These findings underscore the importance of repeated measures in maternal sensitivity, suggesting that while levels may decline, the influence of certain factors remains limited.

Then we explored how early relational processes, such as infant attachment and maternal sensitivity, mediated the transgenerational transmission of maternal history of maltreatment on children's mental health at 10 years **(Chapter 2.2)**. This study again used the sub-sample of Dutch origin participants in Generation R. Our findings showed no significant associations of these early relational experiences as mediators. Instead, our results indicated an intergenerational effect of maternal

childhood maltreatment on children's externalizing and internalizing problems at 10 years, with only an indirect effect via maternal psychopathology. This finding is consistent with previous research and highlights the relevance of maternal mental health as a long-lasting consequence of life events such as maltreatment experiences.

To gain a deeper understanding of the family's role during adolescence, we examined in **Chapter 3.1** whether maternal sensitivity was associated with BMI and regulatory eating behaviors, and whether children´s self-regulation mediated this relationship. For this, we again relied on the same Generation R sub-sample. We found that higher maternal sensitivity was associated with better child self-regulation, while better self-regulation was associated with a lower BMI. No direct associations between maternal sensitivity and BMI were found. The findings highlighted maternal sensitivity's critical role in children's regulatory behaviors and self-regulation as a mechanism explaining variation in BMI. The results suggest the inclusion of parents in interventions aiming to reduce BMI by improving children's self-regulation.

In **Chapter 3.2**, we studied how family variables explain the relationship between maternal childhood maltreatment and offspring's emotional and behavioral problems at the age of 13 years, using structural equation modelling. Drawing upon the full Generation R sample, this chapter revealed a direct association between maternal childhood maltreatment and emotional and behavioral problems in adolescence and family variables such as family functioning and harsh parenting explaining part of this association. Results further showed that women exposed to childhood maltreatment might not only experience negative consequences themselves but may also be more likely to be exposed to poor family functioning in her current family, which in turn affects emotional and behavioral problems in their children. This suggests that maternal mental health problems may accumulate over time in these families. Early intervention in mothers who experienced maltreatment, even before the baby is born, may help to reduce the odds of negative consequences on children's socioemotional development.

After focusing on maternal predictors of children's emotional and behavioral problems, we incorporated the cultural context into our models. **Chapter 4** offers a more contextual perspective by examining socioemotional development and emotion regulation variables in two multi-cohort studies. In **Chapter 4.1**, using data from populations in Chile and the Netherlands, we explored emotional and

behavioral problem trajectories among children and how the home environment explains those trajectories. We found more stable trajectories of lower emotional and behavioral problems in the Dutch sample than in the Chilean sample, where the trajectories started higher and then decreased at later ages. We also identified that in the Chilean population, home environment variables such as maternal involvement, learning materials, educational level, and depressive symptoms were predictors of those trajectories. In contrast, in the Dutch population, only maternal involvement and depressive symptoms were significant predictors. The results underscore the importance of considering the context and the home environment regarding emotional and behavioral problems in children. The next study in **Chapter 4.2** focused on fathers in the Netherlands and South Korea. We found that paternal warmth protected against child self-control problems in both countries, suggesting that paternal warmth serves as a universal protective factor across cultures. On the contrary, results indicated that paternal control was associated with more self-control problems in Dutch children than in Korean children. These findings emphasize the universal importance of paternal parenting in promoting children's self-control and underscore the need to support father involvement in child development across cultures.

Finally, **Chapter 5** synthesized the main findings from all the studies in this thesis. We discussed (1) the role of predictors of the caregiver system during childhood, (2) the understanding of maternal determinants of children's emotional and behavioral problems, and (3) how parenting must be considered within a cultural context. Moreover, methodological considerations such as selection bias, information bias, statistical techniques, and the difficulties in conceptualizing and codifying parenting were discussed. Future directions should focus on the inclusion of fathers and the extended family, as the (cultural) context can be an important contribution to disentangling the association between parenting variables and children's emotional development.

Taken together, this thesis sheds light on the interplay of early determinants affecting parenting and the onset of emotional and behavioral problems in children over the lifespan. Additionally, by incorporating contextual variables that establish the goal of future research, we aim to bridge the gap between risk factors and poor emotional development. Overall, in this thesis, we identified that protective factors such as perceived family support and parental warmth were key predictors of children's socioemotional development; however, these associations may differ across different cultural contexts. Thus, the call is to pay attention to

contextual variables and cultural context, recognizing that child development results from the ongoing interaction of multiple systems throughout a child's life, rather than from isolated factors.

Nederlandse Samenvatting

Ouderschap speelt een essentiële rol in de ontwikkeling van kinderen. Omdat het gezin de meest directe omgeving in het leven van een kind is, oefenen ouders een diepgaande invloed uit op hun ontwikkeling. Daarom is het cruciaal om een gezonde opvoeding en een gezonde gezinsomgeving te ondersteunen en te verbeteren. Eerdere studies hebben zich gericht op de vroege kindertijd en hebben al verschillende beschermende en risicofactoren geïdentificeerd als voorspellers van diverse emotionele en gedragsproblemen bij kinderen. In dit proefschrift hebben we, door middel van een longitudinaal onderzoek verder gekeken dan de bestaande bevindingen door vroege determinanten van opvoeding en emotionele en gedragsproblemen bij kinderen in de loop van de tijd te identificeren, en door de culturele context en de relatie daarvan met de sociaal-emotionele ontwikkeling te onderzoeken. Een beter begrip van de maternale, kind- en contextuele variabelen die betrokken zijn bij de sociaal-emotionele ontwikkeling van kinderen kan helpen bij het identificeren van belangrijke aandachtspunten voor vroege detectie en interventie ter ondersteuning van gezinnen. Hiervoor hebben we gebruikgemaakt van gegevens uit drie verschillende prospectieve cohortstudies: de Generation R-studie, de Early Childhood Longitudinal Survey (ELPI) en de Panel Study on Korean Children (PSKC).

Om in eerste instantie meer inzicht te krijgen in de rol van vroege voorspellers van moeder-kind interacties in **hoofdstuk 2.1**, onderzochten we voorspellers van de ontwikkeling van moederlijke sensitiviteit in de eerste tien jaar. We onderzochten hoe moederlijke kenmerken, kindvariabelen en contextuele factoren bijdroegen aan het verklaren van veranderingen in moederlijke gevoeligheid in de loop van de tijd. In deze studie gebruikten we longitudinale gegevens van de Generation R Study, waarbij deelnemers tot hun tiende levensjaar werden gevolgd. De studie omvatte een subgroep van 1200 deelnemers met diepgaande metingen van de geobserveerde moederlijke sensitiviteit. Onze analyses identificeerden geen significante voorspellers van de ontwikkeling van moederlijke gevoeligheid in de loop van de tijd. Onze studie liet echter wel een trend zien dat de moederlijke sensitiviteit in de loop van de tijd afnam, consistent met eerdere studies. Deze bevindingen benadrukken het belang van herhaalde metingen van moederlijke

gevoeligheid, wat suggereert dat hoewel de niveaus kunnen dalen, de invloed van bepaalde factoren beperkt blijft.

Vervolgens onderzochten we hoe vroege relationele processen, zoals hechting in de kindertijd en maternale sensitiviteit, de transgenerationele overdracht van een geschiedenis van mishandeling door de moeder op de mentale gezondheid van kinderen op 10-jarige leeftijd beïnvloeden **(hoofdstuk 2.2)**. Ook in dit onderzoek werd gebruikgemaakt van de subgroep van deelnemers van Nederlandse afkomst uit Generatie R. Onze bevindingen lieten geen significante verbanden zien tussen deze vroege relationele ervaringen als mediators. In plaats daarvan wezen onze resultaten op een intergenerationeel effect van mishandeling door de moeder in haar kindertijd op externaliserende en internaliserende problemen bij kinderen op 10-jarige leeftijd, met slechts een indirect effect via psychopathologie bij de moeder. Deze bevinding is consistent met eerder onderzoek en benadrukt het belang van de mentale gezondheid van de moeder als een langdurig gevolg van levensgebeurtenissen zoals mishandeling.

Om een dieper inzicht te krijgen in de rol van het gezin tijdens de adolescentie, onderzochten we in **hoofdstuk 3.1** of de sensitiviteit van de moeder samenhing met de BMI en regulerend eetgedrag, en of de zelfregulatie van kinderen deze relatie medieerde. Hiervoor maakten we opnieuw gebruik van dezelfde subgroep van Generatie R. We ontdekten dat een hogere mate van maternale sensitiviteit samenhing met een betere zelfregulatie bij kinderen, terwijl een betere zelfregulatie samenhing met een lagere BMI. Er werden geen directe verbanden gevonden tussen maternale sensitiviteit en BMI. De bevindingen benadrukten de cruciale rol van maternale sensitiviteit in het regulerend gedrag en de zelfregulatie van kinderen als een mechanisme dat de variatie in BMI verklaart. De resultaten suggereren dat ouders betrokken moeten worden bij interventies die gericht zijn op het verlagen van de BMI door de zelfregulatie van kinderen te verbeteren.

In **hoofdstuk 3.2** onderzochten we vervolgens hoe gezinsvariabelen de relatie tussen mishandeling van de moeder in haar kindertijd en emotionele en gedragsproblemen bij haar kinderen op 13-jarige leeftijd verklaren, met behulp van structurele vergelijkingsmodellen. Gebruikmakend van de volledige Generation R-steekproef, liet dit hoofdstuk een direct verband tussen mishandeling van de moeder in haar kindertijd en emotionele en gedragsproblemen in de adolescentie zien. Gezinsvariabelen zoals gezinsfunctioneren en een hardvochtige opvoeding verklaren een deel van dit verband. De resultaten toonden verder aan dat vrouwen

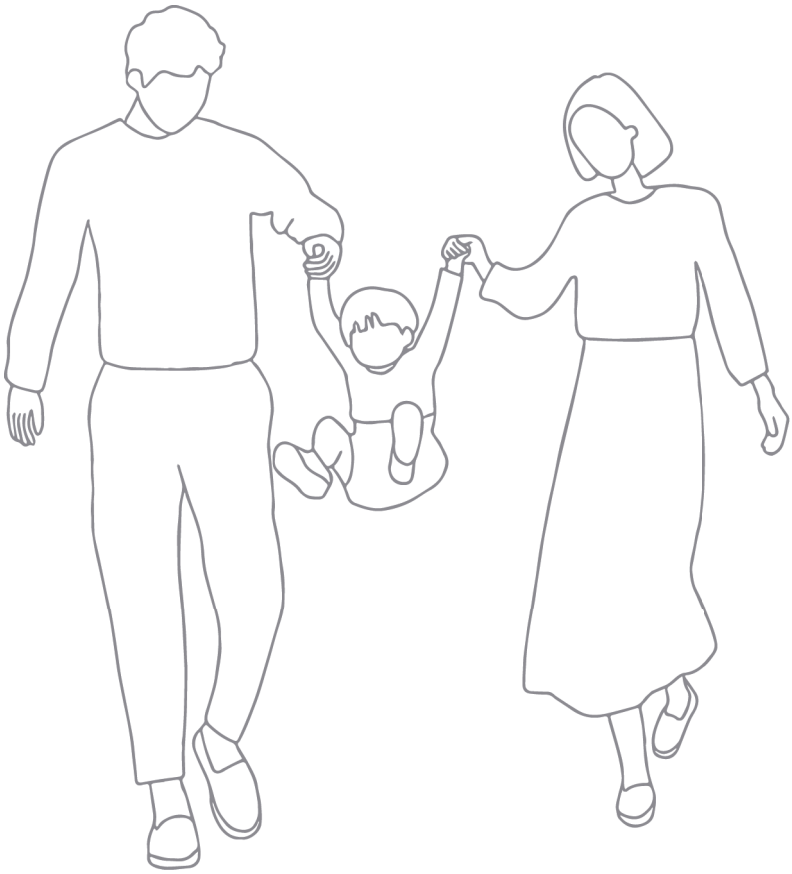
die in hun kindertijd mishandeling hebben meegemaakt, niet alleen zelf negatieve gevolgen ondervinden, maar mogelijk ook vaker te maken hebben met een slecht functionerend gezin, wat vervolgens emotionele en gedragsproblemen bij hun kinderen veroorzaakt. Dit suggereert dat psychische problemen bij moeders in deze gezinnen zich in de loop der tijd kunnen opstapelen. Vroege interventie bij moeders die mishandeling hebben meegemaakt, zelfs vóór de geboorte van de baby, kan de kans op negatieve gevolgen voor de sociaal-emotionele ontwikkeling van kinderen verkleinen.

Nadat we ons hadden gericht op maternale voorspellers van emotionele en gedragsproblemen bij kinderen, hebben we de culturele context in onze modellen opgenomen. **Hoofdstuk 4** biedt een meer contextueel perspectief door sociaal-emotionele ontwikkeling en emotieregulatie variabelen te onderzoeken in twee multicohortstudies. In **hoofdstuk 4.1**, met behulp van gegevens uit populaties in Chili en Nederland onderzochten we de ontwikkeling van emotionele en gedragsproblemen bij kinderen en hoe de thuisomgeving deze ontwikkeling verklaart. We vonden stabielere trajecten met minder emotionele en gedragsproblemen in de Nederlandse steekproef dan in de Chileense steekproef, waar de trajecten hoger begonnen en vervolgens op latere leeftijd afnamen. We stelden ook vast dat in de Chileense populatie variabelen in de thuisomgeving, zoals de betrokkenheid van de moeder, leermaterialen, opleidingsniveau en depressieve symptomen, voorspellend waren voor deze trajecten. In de Nederlandse populatie waren daarentegen alleen de betrokkenheid van de moeder en depressieve symptomen significante voorspellende factoren. De resultaten benadrukken het belang van het in overweging nemen van de context en de thuisomgeving met betrekking tot emotionele en gedragsproblemen bij kinderen. De volgende studie in **hoofdstuk 4.2** richtte zich op vaders in Nederland en Zuid-Korea. We vonden dat vaderlijke warmte bescherming bood tegen problemen met zelfbeheersing bij kinderen in beide landen, wat suggereert dat vaderlijke warmte een universele beschermende factor is in verschillende culturen. Daarentegen bleek dat vaderlijke controle juist geassocieerd was met meer problemen met zelfbeheersing bij Nederlandse kinderen dan bij Koreaanse kinderen. Deze bevindingen benadrukken het universele belang van vaderlijke betrokkenheid bij het bevorderen van zelfbeheersing bij kinderen en onderstrepen de noodzaak om vaders in alle culturen te ondersteunen bij hun ontwikkeling.

Hoofdstuk 5 vatte de belangrijkste bevindingen van alle onderzoeken in

dit proefschrift samen. We bespraken (1) de rol van voorspellende factoren van het zorgsysteem tijdens de kindertijd, (2) het begrip van de maternale determinanten van emotionele en gedragsproblemen bij kinderen, en (3) hoe opvoeding binnen een culturele context moet worden beschouwd. Daarnaast werden methodologische overwegingen zoals selectiebias, informatiebias, statistische technieken en de moeilijkheden bij het conceptualiseren en coderen van opvoeding besproken. Toekomstig onderzoek zou zich moeten richten op de inclusie van vaders en de uitgebreide familie, aangezien de (culturele) context een belangrijke bijdrage kan leveren aan het ontrafelen van het verband tussen opvoedingsvariabelen en de emotionele ontwikkeling van kinderen.

Samengevat werpt dit proefschrift licht op de wisselwerking tussen vroege determinanten die van invloed zijn op de opvoeding en het ontstaan van emotionele en gedragsproblemen bij kinderen gedurende hun leven. Daarnaast willen we, door contextuele variabelen te integreren die het doel van toekomstig onderzoek bepalen, de kloof overbruggen tussen risicofactoren en een gebrekkige emotionele ontwikkeling. In dit proefschrift hebben we vastgesteld dat beschermende factoren zoals waargenomen gezinssteun en ouderlijke warmte belangrijke voorspellers zijn van de sociaal-emotionele ontwikkeling van kinderen; deze verbanden kunnen echter verschillen per culturele context. Daarom is het belangrijk om aandacht te besteden aan contextuele variabelen en de culturele context, en te erkennen dat de ontwikkeling van een kind het resultaat is van de voortdurende interactie van meerdere systemen gedurende het leven van een kind, in plaats van geïsoleerde factoren.





APPENDICES

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List of publications

Part of this thesis

Chapter 2.1

Bravo, P., Jansen, P., Bakermans-Kranenburg, M., Shahisavandi, M., Cárcamo, R., Tiemeier, H., Hillegers, M., Van IJzendoorn, M., Neumann, A. (2025). Predictors of maternal sensitivity towards their children across the first 10 years of life: a prospective population-based study. *Manuscript under review*

Chapter 2.2

Bravo, P., Van IJzendoorn, M., Bakermans-Kranenburg, M., Cárcamo, R., & Jansen, P. (2025). Are early infant attachment, maternal sensitivity, and maternal psychopathology the link between maternal childhood maltreatment and child emotional and behavioral problems? Results from a longitudinal study. *Manuscript under review*

Chapter 3.1

Bravo, P., Kim, Y., Xerxa, Y., Koopman-Verhoeff, M. E., Cárcamo, R., Oldehinkel, A., Hillegers, M., & Jansen, P. (2023). Maternal history of maltreatment and offspring's emotional and behavioral problems in adolescence: Do family factors contribute to the intergenerational risk transmission?. *Child abuse & neglect, 141,* 1-15. https://doi.org/10.1016/j.chiabu.2023.106228

Chapter 3.2

Bravo, P., Cárcamo, R., Santos, S., Ringoot, A., Van IJzendoorn, M. H., Hillegers, M. H., & Jansen, P. W. (2023). Maternal sensitivity in early childhood and body mass index in adolescence: A population-based study on the role of self-regulation as a mediator. *Appetite, 182*. https://doi.org/10.1016/j.appet.2022.106418

Chapter 4.1

Bravo, P., Jansen, P. W., Hillegers, M. H. J., & Cárcamo, R. A. (2025). Children's Mental Health Trajectories Across Cultures and the Buffering Effect of the Early Family Environment: Evidence from Two Longitudinal Studies in Early Childhood. *The Journal of Genetic Psychology,* 1–15. https://doi.org/10.1080/00221325.2025.2537420

Chapter 4.2

Kim, Y., **Bravo, P.,** Richards, J. S., Kim, J. H., Hillegers, M. H., Jansen, P. W., & Oldehinkel, A. J. (2025). Father's Parenting and Child Self-Control: A Comparison Between the Netherlands and South Korea. *Child Psychiatry & Human Development,* 1-14. https://doi.org/10.1007/s10578-025-01903-6

Not part of this thesis

Platts, C. R., Groh, A. M., Runze, J., **Bravo, P.,** Bakermans-Kranenburg, M. J., Van IJzendoorn, M. H., & Roisman, G. I. (2026). Does variation in the μ-opioid receptor gene (OPRM1) moderate the association between maternal sensitivity and child attachment? A preregistered attempted replication and extension of Tchalova et al. (2024). *Attachment & Human Development*, 1–17. https://doi.org/10.1080/14616734.2026.2690651

Bravo, P., García, K. & Nuñez, D. (2026) Specific psychological factors associated with suicidal ideation: a transdiagnostic approach to psychological responses in adolescents. *BMC Psychology, 14*. https://doi.org/10.1186/s40359-026-04073-9

Oliveros, J., Muñoz, R., Spencer, R., Fresno, A., **Bravo, P.,** Vergara-Barra, P., & Wendland, J. (2023). Propiedades Psicométricas de la Escala de Evaluación Socioemocional Breve de Infantes y Niños (BITSEA) en una muestra de niños y niñas chilenos. *Terapia psicológica, 41(1), 63-85*. https://dx.doi.org/10.4067/s0718-48082023000100063

Campos, S., Nuñez, D., **Bravo, P.,** Fresno, A., & Olff, M. (2022). Preliminary evidence for internal structure, sensitivity and specificity of a brief PTSD and Complex PTSD measure in adolescents. *Canadian Journal of Behavioural Science*. https://doi.org/10.1037/cbs0000322

Spencer, R., Fresno, A. & **Bravo, P.** (2021). Experiencias traumáticas, sistema de apego y desarrollo humano en Cárcamo, R & Silva, J. (Ed.), *Apego y Parentalidad (1 ed., pp. 1–156). Editorial Mediterráneo.*

Fresno, A., Arias, V., Núñez, D., Spencer, R., Ramos, N., Espinoza, C., **Bravo, P.,** Arriagada, J., & Brunet, A. (2020). Using Exploratory Structural Equation Modeling (ESEM) to Examine the Internal Structure of Posttraumatic Stress Disorder Symptoms. *The Spanish Journal of Psychology, 23*. https://doi.org/10.1017/SJP.2020.46

Nunez, D., Campos, S., Spencer, R., Faúndez, M., Fresno, A & **Bravo, P.** (2020). Specific psychotic experiences and depressive symptoms in chilean adolescents: a multiple mediation model of their impact on suicidal ideation,*Schizophrenia Bulletin, Volume 46, Issue Supplement_1,* Pages S38–S39, https://doi.org/10.1093/schbul/sbaa031.088

Nunez, D., Campos, S., Spencer, R., Faúndez, M., Fresno, A & **Bravo, P.** (2020). Bidirectional influences between psychotic experiences and suicidal ideation in chilean adolescents: the role of depressive symptoms as mediators, *Schizophrenia Bulletin, Volume 46, Issue Supplement_1,* Pages S144–S145, https://doi.org/10.1093/schbul/sbaa030.340

PhD portfolio

PhD Student:	Patricia Stefanía Bravo Tapia
PhD period:	2020 – 2025
Erasmus MC Department:	Child and Adolescent Psychiatry
Promotor(s):	Prof.dr. M.H.J. Hillegers Prof.dr. P.W. Jansen
Copromotor(s):	Prof.dr. R. A. Cárcamo Leiva
PhD training:	Master of Science in Health Sciences, Specialization in Epidemiology Netherlands Institute for Health Sciences (NIHES), the Netherlands

Required and electives courses (NIHES)	**Year**	**EC**
Erasmus MC - HS11 Quality of Life Measurement	2020	0.90
Erasmus MC - ESP01 Principles of Research in Medicine and Epidemiology	2020	0.70
Erasmus MC - ESP41 Introduction to Global Public Health	2020	0.70
Erasmus MC - ESP11 Methods of Public Health Research	2020	0.70
Erasmus MC - ESP70 Fundamentals of Medical Decision Making	2020	0.70
Erasmus MC - ESP65 The Practice of Epidemiologic Analysis	2020	0.70
Erasmus MC - ESP61 Social Epidemiology	2020	0.70
Erasmus MC - CC01 Study Design	2020	4.30
Erasmus MC - CC02 Biostatistical Methods I: Basic Principles	2020	5.70
Erasmus MC - CE01 Clinical Translation of Epidemiology	2020	2.00
Erasmus MC - CE02 Clinical Epidemiology	2020	3.70
Erasmus MC - EP01 Principles in Causal Inference	2020	1.40
Erasmus MC - EP03 Biostatistical Methods II: Classical Regression Models	2020	4.30
Erasmus MC - CE08 Repeated Measurements	2021	1.70
Erasmus MC - EP16 Missing Values in Clinical Research	2021	1.70
LLS Intervision (LLS05)	2021	0.40
Utrecht University - Advance course on using Mplus	2021	1.50
Erasmus MC - ESP48 Causal Inference	2021	1.40
Erasmus MC - ESP69 Causal Mediation Analysis	2021	1.40
LLS Portfolio (LLS04)	2021	0.20
Erasmus MC Graduate School - Scientific Integrity	2023	0.00
Introduction to Medical Writing (SC02)	2021	2.00
Using R for Statistics in Medical Research (BST02)	2021	1.40
LLS Scientific Integrity (SC10)	2021	0.30
LLS Intercultural communication (SC13)	2021	0.20
M Research (M-RES)	2021	33.0

Seminars and workshops	
Research meetings Generation R Study	2022
Behavior group meetings	2020-2024
CAPP Science Café on the topic 'Parental sensitivity', *oral presentation*	2023
Conferences. and presentations	
19th International congress of the European Society for Child and Adolescent Psychiatry, Maastricht, The Netherlands, *poster presentation.*	2022
VNOP-CAS Research Days Researchers in Development, Utrecht, The Netherlands, *oral presentation.*	2022
Vereniging Nederlandse OntwikkelingsPsychologie (VNOP) Conference, Utrecht, The Netherlands, *oral presentation.*	2022
27th Biennial Meeting of the International Society for the Study of Behavioural Development (ISSBD), Lisbon, Portugal, *symposium.*	2024
International Attachment Conference (IAC), Rouen, France, *poster presentation.*	2024
VIII Congreso de la red iberoamericana de apego (RIA),Santiago, Chile, *symposium.*	2024
Teaching activities	
Tutor supervisor de Minor Bachelor's degree in Medicine: Child & Adolescent Psychiatry. "De brug tussen kindergeneeskunde, neurologie, psychiatrie en psychologie"	2020
Tutor supervisor internship from the program "Honors Research Internship"	2023
Tutor supervisor internship from the program "Queriodo Honours Class (QHC)"	2024
Peer review	
Peer review of articles for scientific journals (Current psychology, BMC Public Health)	2024

About the author

Patricia Bravo Tapia was born on September 3rd 1990 in Talca, Chile. Since she was young, she desired to understand human behavior. In 2009, she started her career in psychology, aiming to help others heal from emotional suffering. In 2014, she became a clinical psychologist at the University of Talca and continued her clinical and academic education by obtaining a specialization in emotional trauma and, in 2017, a master's degree in research methods at the same university. During her internship, she developed a particular interest in child and youth psychology and in research on parenting and child development. This interest led her to pursue an academic career, participating as a research assistant in various research projects on maternal sensitivity, child maltreatment, and trauma. In 2019, she was awarded a scholarship by the National Agency for Research and Development (ANID) of the Government of Chile to fund her PhD program at the Department of Child and Adolescent Psychiatry, Erasmus MC-University Medical Center Rotterdam, the Netherlands. Patricia's primary motivation is to understand the predictors of parenting and children's emotional development and to improve children's mental health by supporting their parents. Her combined clinical and scientific background has given her a valuable opportunity to pursue this goal during her PhD. She also coordinated and organized the maternal sensitivity codifications at 10 years and, in 2021, obtained her Master of Science in Epidemiology from the Netherlands Institute for Health Sciences (NIHES). She will continue her journey in academia by spreading her knowledge to future mental health professionals.

Words of gratitude/dankwoord

To my PhD supervisors

Dear Pauline, I don't think I can do justice to expressing my gratitude in words for all the support and help you've given me throughout this process. I guess this journey wouldn't be the same without your supervision. I still remember the first day we met in person in the Dopio Café outside the Erasmus-MC. You were waiting for me to welcome me, show me around the building, and introduce me to the people. Shortly after my arrival, the pandemic hit us hard, but luckily, we lived just a 2-minute walk away! Then the supervisions were over coffee at your house, with time for walks in the beautiful Heemraadspark. You were always checking in on how I was doing and how I was feeling in that moment, without my family close by. I have learned so much from you, not only about research but, most importantly, from your way of being. The ability to provide clarity in times when the mess was all around my head, and to offer calmness, motivation, and inspiration. You are a remarkable person, not only a good supervisor. Thanks to your clear and critical thinking, I got my things done and was motivated to always think in new ways to approach problems. Definitely, with your guidance, I was able to improve and see my growth as a researcher. I will always remember going to your office with new ideas. You listened to them carefully, guided me in the right direction, and gently reminded me that finishing my papers was probably the better idea at that moment — haha, I loved that. Finally, I deeply thank you for your support during my pregnancy; I never felt pressured to rush things at a time when everything was new to me. Thank you for your words of support at that moment, for being there and visiting us when my baby was born. All those memories are part of my journey and will be instilled in my heart forever.

Rodrigo, I will always be grateful that our paths crossed. You are an inspiration and an example of how someone who lived literally at the end of the world can achieve so much in the field of child development and contribute in that way to our country. Indeed, the fact that you were eager to build a prospective study in Magallanes, brings me here with the idea of contributing with new knowledge and ways to implement the idea there. Thus, thanks to you, a lot of this journey is happening. Something I have learned especially from you is the capacity to be open and generous with the knowledge. I guess good supervisors are not only those who are good at one topic, but also those who can share what they know and open new paths for the next generation, with the ultimate aim of creating a

better world. I also appreciate all you did to have a space for me in academia in Valdivia and to invite me to participate in your projects. It's definitely an honor for me to learn from you and help build new technology through research for parents and children in Chile. Seguimos.

Manon, thank you very much for your support in accepting me as a part of the team. I really appreciated your feedback during my PhD, especially your clinical eye, which gave my project a sharp psychiatric perspective and enhanced its clinical implications. The discussions about what we can improve and how, for instance, the differences between my country and the Netherlands lead to important reflections for our endeavor as professionals in mental health. Thanks for the inspiration and for sharing your clinical wisdom with me.

To other important researchers in my career, I stand on giant shoulders.

To Marian and Marinus, thank you for inspiring my work. Since I was in Chile, I always felt motivated by all the research you have done throughout the years to help parents and children. I cannot feel luckier than I do to be working with you. It was always a pleasure listening to your thoughts and opinions, which, all the time, enriched my papers. I hope to continue collaborating with you. Your legacy reflects the complexity of parenting and the evolution of research over time. This thesis definitely draws a lot of inspiration from you. I appreciate all the collaborations that you were willing to supervise, and I hope this journey doesn't end here. There is still a lot to do, especially in Chile, where spreading your knowledge is necessary.

To Andrés and Rosario, thank you for cultivating the seed of research and child development in me. You were the first mentors in my career. I appreciate all the projects you invite me to participate in and for showing me, when I was studying for my bachelor's degree, that although we were far away in our little town, I could eventually access the same opportunities as other students outside Chile. This thesis also, in part, represents the fusion of the topics you both led while I was studying psychology. Thank you for the opportunities; without them, I probably would never have had the chance to enter this academic world. Standing on giant shoulders has allowed me to build a solid foundation to continue this journey now as colleagues (Now I'm the Fresno of developmental psychology).

To Alex, we met in the last part of my PhD, and I have to say I am definitely grateful that you were there to help me in moments when I was struggling with some of the analysis. Thank you for giving me clarity and for being patient with me whenever I have questions. Without a doubt, I think you are a great supervisor and a very generous person, with all the knowledge you have, and always willing to help. You are a notable contributor to the field of genetics and to the formation of future Ph.D. students. Thank you a lot for your support! I hope we can continue collaborating in the future.

To the Generation R team

To the research team I was part of, special thanks for all the nice moments we shared at the dining table over lunch. I especially remember that before COVID, all the places I visited in the Netherlands were thanks to those who had been there before me (Dutch and foreigners): we went to restaurants, cinemas, new cities, bars, and museums. I do remember the first 2 months there, every single weekend there was a new activity that we planned and just went to, why not? Also, once we decided to celebrate Valentine's Day together and we ended up in a Japanese restaurant full of girls! Such nice memories. I also think the atmosphere in the behavior group meetings was very respectful, with everyone supporting one another. This type of group is not always easy to find, so I truly appreciate everyone's willingness to help and encourage others, especially when things did not go as planned. Thank you to the leaders of our group Pauline, Charlotte, Ryan and Hanan and the colleagues, thanks you all! Sarah, Holly, Andrea, Ivonne, Rosa, Hugo, Kim, Fer, Julia, Elizabeth, Iman, Dogukan, Tim, Anna, Elize, Runyu, Isabel, Lorenza, Rosa, Clair, Lisa, Carolina, Olga, Nathalie, Yuchan, Mannan, Novika, Mónica, Gisselle, Bing, Yuna, Anita.

To my friends & family from my two pieces of the world

Monica, thank you for being there since day 1! Thanks to you, I knew the city, and I had a place to stay (your ex-room in Claes de Vrieselaan). I love the friendship we built through the years. We have celebrated birthdays, New Year's, Christmas, and happy news. But also, we were there in moments when things got more complicated. You are always going to have a special space in my heart! Thank you for everything. Txema, I couldn't mention you since you are attached to Monica, but anyway, I always found you an interesting character, difficult to forget. Thanks for the happy moments we shared together and for making a cake for my birthday.

Bing, always remember my first day at the EMC, and we met in the elevator, we were so lost, and now you are my paranymph, thanks for all the support. Natalia, qué te digo, mejor en español porque son muchas las cosas ilícitas que hicimos. Thank you, my friend, for being there, and although far away, we have never lost contact since we met. You are a crack, doing so many things all the time, but still always having the time to have fun and enjoy life with the good things that we used to do (eat and drink). Thank you for the glass collection I have at home (good old times). Our movie requires a second part. Wait for me; I will be back soon! Nathalie, I always appreciated having a Latin American friend close by. Thanks for the good moments and for showing me the city when I arrived. Nice conversations and celebrations with you in Schoonhoven, thank you for your kindness! Vani, amiga querida, ha sido un placer haber conocido a una compatriota con la que pueda sentirme tan en familia como tú. Gracias por toda la ayuda que me has dado durante los años que estuve en Breda, por el apañe y la compañía, y por estar siempre dispuesta a ayudar. Ya volveremos a hacer los asaditos de Pancho en tu casa o en la mía. Alicia, thanks for being the other minion in a land of giants. I have such nice memories with you, deep talks, stupid jokes, laughs, and sharing the desire to embark on the adventure of living in the Netherlands. We created such nice memories together in a short but important period of our lives. Facheritas forever.

To my Dutch Tulp family, I couldn't ask more from you guys. I have the feeling that we have been through a lot of different things, new family members, illness, happiness, moving, arriving, difficult moments, celebrations…I am glad that in all those moments, we were together, facing the bad moments, and enjoying the good ones. Thanks to you, I never felt alone in this country, and thanks to me, you tried better flavours (it's a win-win in the end). Thank you very much for being part of this process and my life. I love you all! Henk, Elly, Evelien, Thijs, Robert, Leanna, Joanna, and little Hendrick.

Para mi familia chilena. Gracias por todo el apoyo durante el tiempo que estuve lejos. Por la ayuda para desarmar mi casa y poner todo en 2 maletas cuando me vine, y luego, cada vez que viajé a verlos, el recibimiento llenaba el espacio con la energía que necesitaba cada año para seguir aquí. Gracias por todo el apoyo que nos han dado con nuestro pequeño, como dice el dicho, para criar se necesita una aldea y ustedes son la nuestra. Gracias a mi tía Erika y Carlos que siempre estuvieron ahí presentes con su linda energía. Gracias a mi hermana por siempre apoyarme en todas las locuras y alentarme a poder hacer lo que parece

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To all who contribute and bring new colors to my history.
Gracias…totales.

A special word on the trauma history of Chile

After completing this thesis, I have been reflecting on how traumatic experiences can affect the next generation and on the role of early relationships in a person's life. When the environment provides more protective factors, the likelihood of this transmission tends to decrease. But what happens when an entire country is exposed to an extremely stressful event, such as a dictatorship? In Chile, in 1973, Pinochet became one of the cruelest dictators in the history of South America. Although 53 years have passed since then, 17 of them were lived under his regime, and democracy was only restored in 1990. This trauma is far from dissipated, even though several generations have emerged since that time. As researchers and clinical psychologists, we have the responsibility to continue studying how emotional and behavioral problems can manifest after such traumatic experiences, even if a person has not directly experienced them. In this thesis, we showed that the transmission of consequences to the next generation can be buffered by the family. However, when trauma occurs at a macro level, which mechanisms explain its transmission? In such cases, what role can the government or the community play in buffering these effects and providing a nurturing environment? These reflections lead me to consider the role that each of us has in helping to break the cycle of this historical trauma and in bringing new colors to one of the darkest moments in Chilean history. This thesis is dedicated to those who witnessed and endured the hardships of that time and to future generations who, in one way or another, have suffered from its legacy.

Our life is colered by our experiences

