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Parental self-efficacy, depressive symptoms, and executive functioning in Chilean preschoolers: the role of stress

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Abstract

Introduction: Executive functions (EF), such as inhibitory control and working memory, are pivotal for cognitive development in early childhood. While evidence from WEIRD populations is extensive, research in Latin American contexts like Chile characterized by high parental stress and significant caregiving gender gaps remains limited. This study examined how parental self-efficacy and depressive symptoms relate to children's EF, testing parental stress as a statistical intermediary.

Methodology: A secondary data analysis was conducted using the third wave of the Longitudinal Early Childhood Survey (ELPI; N=2,225). Caregivers reported on depressive symptoms (CESD-10), parental stress (PSI), and self-efficacy (PSCS), while children's EF was assessed using the Stroop H&F Task. Hypotheses were tested through structural equation modeling (SEM).

Results and Discussion: Parental stress was negatively associated with children's EF scores (β=−.062, p=.012). Parental self-efficacy was linked to lower levels of parental stress (β=−.284, p<.001), whereas depressive symptoms were linked to higher parental stress (β=.465, p<.001). Significant indirect paths were found parental self-efficacy showed a positive association with better EF through reduced stress (β=.018, p=.015). Likewise, depressive symptoms were indirectly related to poorer EF via increased stress (β=−.029, p=.012).

Conclusions: Findings suggest that parental stress is a critical factor in understanding neurocognitive development in preschoolers. Supporting caregiver mental health and self-efficacy may mitigate the impact of environmental stressors on children's executive functioning in the Chilean context.

Highlights

- Examined parental stress as an intermediary link between caregiver well-being and child executive functions.
- Higher parental self-efficacy is associated with lower stress and better child cognitive outcomes (β=.018).
- Caregiver depressive symptoms relate indirectly to poorer executive functioning via increased stress (β=−.029).
- Parental stress is a critical target for interventions to support early neurocognitive development in Chile.

Introduction

During the preschool stage, significant changes occur in executive functioning (Reilly et al., 2022a). Executive functions (EF) are a set of complex and multidimensional cognitive skills that guide goal-directed behavior (Reilly et al., 2022b), and that influence multiple important outcomes, such as academic performance (Peng & Kievit, 2020), emotional regulation (Mohammed et al., 2022) and social skills (Hilton et al., 2022). There are three fundamental components of EF in childhood (Khan et al., 2024): Working memory (WM), a cognitive system that allows for the retention of information while performing complex tasks such as reasoning, comprehension, or learning (Baddeley, 2010), and which is associated with processes and skills such as reading comprehension, fluid intelligence, and mathematical abilities, contributing to self-regulation and academic performance (Engle, 2018); (b) inhibitory control (IC), this refers to the ability to suppress a dominant response in favor of a more adaptive one, allowing for the ability to shift and choose how to react, as well as to control attention, behavior, thought, and emotion in response to a stimulus. (Diamond, 2020; Montoya et al., 2019); and (c) cognitive flexibility, which corresponds to the ability to switch from an old response to a new one (Caporaso et al., 2019).

Problems related to executive functions (EF) are common among Chilean children and adolescents. 38.3% of primary school students show an insufficient level of performance in mathematics, a figure that rises to 5.5% among secondary school students (Agencia de Calidad de la Educación, 2024). On average, Chilean children exhibit high levels of externalizing problems (Ugarte et al., 2021), and 23.9% present attention deficit hyperactivity disorder (ADHD) (de la Barra et al., 2013). Therefore, early stimulation of executive functions (EF) is a priority in Chilean preschool education. (Ministerio de Educación, 2018).

It has been observed that the development of executive functions (EF) in childhood could be affected by parental stress (Delvecchio et al., 2020), a negative psychological response to the obligations of being a father or mother (Barroso et al., 2018). Studies in various populations have reported that parental stress predicts lower overall executive functioning performance in children (de Cock et al., 2017; Park et al., 2023; Qian et al., 2024). For example, in preschoolers, Wagner et al. (2016) they found that children of parents who reported higher parental stress showed lower performance in overall executive functioning. This could occur because parental stress facilitates the adoption of negative parenting styles (Fonseca et al., 2020; Mak et al., 2020), such as parental control and emotional distancing in parenting (de Cock et al., 2017), factors associated with poorer executive functioning in childhood (Lee, 2023; Vučković et al., 2021). Parental stress can also increase the risk of maltreatment, including physical aggression or neglect (Bauch et al., 2022; Crum & Moreland,

2017), which hinders their cognitive development (Lund et al., 2020). Regarding parental stress, the situation in countries like Chile is alarming, as 38% of caregivers of preschoolers nationwide have reported moderate to high parental stress. (Santelices et al., 2021).

Parental stress could be influenced by parental self-efficacy, that is, the caregiver's perception of their ability to effectively perform their parental roles and respond to the developmental challenges of their children (Remondi et al., 2023), This includes promoting greater autonomy and closeness with the family on the part of the child (Bandura et al., 2001). Thus, it has been shown that parental stress decreases as caregivers perceive higher parental self-efficacy (Fang et al., 2022; Hong & Liu, 2021). A study conducted during the COVID-19 pandemic showed that parental self-efficacy was strongly and inversely related to parental stress among caregivers during that period (Oppermann et al., 2021). Similarly, a moderate to strong negative correlation has been identified between mothers' parenting self-efficacy and their perception of parental stress (Lin et al., 2022; Tognasso et al., 2022). In this way, if parental self-efficacy is low, caregivers may perceive the child's behaviors or other parenting challenges as more stressful (Crnic & Ross, 2017). Therefore, in the presence of a demanding child, caregivers with a strong sense of parental self-efficacy may be able to respond more effectively to their emotional needs (Fang et al., 2024).

Following the parental stress model formulated by Abidin (1990), another factor that increases parental stress is depressive symptomatology in the caregiver, although this relationship is complex and may be bidirectional. Similarly, but in contrast to parental self-efficacy, the dysfunctional cognitions associated with depressive symptoms could promote more negative interpretations of daily life events, including those related to parenting, leading to a greater perception of stress (Thomason et al., 2014). For example, studies have found that caregivers with depressive symptoms tend to interpret ambivalent behaviors of their children, such as rejection or detachment (Lovejoy et al., 2000), Various studies show a significant relationship between depressive symptoms in parents and an increase in parental stress, suggesting that the presence of depression may contribute to a greater perception of difficulties in parenting (Daundasekara et al., 2021; Thomason et al., 2014). A study concluded that parental stress stemming from depressive symptoms could explain the occurrence of internalizing problems, such as emotional distress, and externalizing problems, such as behavioral issues like aggression toward peers in the child (Chen, 2023). In this regard, it is important to consider the interaction between depression and parental stress, as it can have negative consequences on affect, behavior, and cognition (Fredriksen et al., 2019). Early prevention and treatment of depression in parents could reduce parenting-related stress and improve family dynamics (Ribas et al., 2024), contributing to the cognitive development of children (Tachibana et al., 2012).

Most of the evidence explaining the associations between caregiver variables and their potential impact on the cognitive and emotional development of children comes from developed countries (Lanjekar et al., 2022). Due to the complexity of these interactions, the relevance of family structures and dynamics, and the unique characteristics of each cultural group, it is necessary to understand how these relational patterns are configured in Latin American countries, such as Chile.

Local studies reveal alarming levels of parental stress, positioning Chile among countries with a high global burden of psychiatric disorders, a situation exacerbated by low public investment and restricted access to mental health services (Araneda-Urrutia, 2022; Carollo et al., 2025). From a subjective well-being perspective, data indicate that parents in Chile report significantly lower positive affect and a higher prevalence of negative affect compared to those without children (Novoa et al., 2021). Furthermore, Chile presents a distinct scenario regarding parenting due to the gender roles that shape family structures. According to UN Women (2021), a gender gap persists: while women devote approximately 22.1% of their day to caregiving, men dedicate only 9.9%. This disparity stems from a cultural construct in which women assume the primary responsibility for childcare (Zegers & Reynolds, 2022).

A better understanding of these relationships would allow for the development of caregiver support proposals at local and regional levels. Systemic-family intervention evaluations have shown a significant impact on children's cognitive development (Jeong et al., 2021). At the local level, it is necessary to develop evidence that accounts for these interactions in order to promote relevant intervention strategies.

Therefore, this article has two objectives: the first is to evaluate the mediating role of parental stress in the relationship between parental self-efficacy and executive functioning in Chilean preschoolers; the second is to examine the mediating role of parental stress in the relationship between caregiver depressive symptoms and executive functioning in Chilean preschoolers. It was hypothesized that (H1) parental self-efficacy would be indirectly and positively associated with children's executive functioning through parental stress; and that (H2) caregiver depressive symptoms would be indirectly and negatively associated with children's executive functioning through parental stress.

Method

Participants

For this study, a secondary data analysis was conducted using the third wave of the Early Childhood Longitudinal Study. (ELPI 2017–2018; Ministerio de Desarrollo Social, 2018). The ELPI is a nationally representative survey that aims to characterize the development of Chilean children and adolescents (ages zero to 12), considering environmental characteristics and those of the primary caregiver. For the third wave, through stratified random sampling, information was collected from 17,307 children and caregivers across 210 different municipalities throughout Chile.

The reduction from the initial ELPI sample (n = 17,307) to the final analytical sample (n = 2,225) is primarily due to the strict age inclusion criteria (36–71 months), the exclusion of children with pre-existing developmental or sensory disabilities, and the requirement of complete data across all psychometric scales used in the structural model.

Inclusion and Exclusion Criteria

For the present study, the inclusion criteria were: (a) children aged between 36 and 71 months, (b) absence of intellectual, sensory (visual, auditory, or speech), or mobility difficulties in the child as reported by the caregiver, and (c) having a parent (mother or father) as the primary caregiver. Children taking medication for concentration were excluded. Additionally, cases with invalid data on the caregiver's educational level were removed from the database. The final analytical sample consisted of 2,225 cases.

Procedures

Data from the ELPI were accessed using the open-access link available on the Chilean Ministry of Social Development website (https://observatorio.ministeriodesarrollosocial.gob.cl/elpi-tercera-ronda).

All procedures of the third wave of the ELPI were approved by the Ethics Committee of the Pontifical Catholic University of Chile. Data were collected through home visits between November 2017 and June 2018. For preschoolers, primary caregivers signed informed consent forms agreeing to their participation as well as that of their child. This document assured the anonymity of responses, the freedom of the child and caregiver to withdraw from the study at any stage, and the scientific use of the information.

Previously trained evaluators administered the measurement instruments. Executive function assessments in children were conducted using tablets. The administration of the caregiver survey and the child evaluation took approximately 90 minutes. Caregivers and children were not directly compensated for participation. Additional details can be found in the study's methodological report (Ministerio de Desarrollo Social, 2018).

Instruments

Executive functioning. Was measured using the computerized Heart & Flowers task (Diamond et al., 2007) which assesses working memory, inhibitory control, and cognitive flexibility. To complete the task, the child observes a touchscreen where one of two stimuli is presented: a flower or a heart. The stimuli appear on either the left or right side of the screen in no particular pattern. The first component of the task is the congruent condition, in which the child must touch the same side of the screen where the heart stimulus appears, within a set time limit. The second component is the incongruent condition, in which the child must touch the opposite side of the screen when the flower stimulus appears. The third component is the mixed condition, in which the child must touch the same side of the screen for the heart and the opposite side for the flower. The maximum response time for each stimulus was 1,500 milliseconds. The congruent and incongruent conditions each consisted of 12 trials, while the mixed condition included 32 trials (Ministerio de Desarrollo Social, 2018). The number of correct responses in each condition was analyzed. A higher number of correct responses in the congruent, incongruent, and mixed conditions indicates better performance in WM, IC, and CF, respectively. The Hearts & Flowers task has demonstrated high reliability in Chilean children (Rosas et al., 2019a).

Parental stress. Was measured using the Parenting Stress Index Short Form (PSI-SF; Abidin, 1995). It assesses parental stress through 36 items organized into three subscales: Parenting Distress (PD), Parent–Child Dysfunctional Interaction (PCDI), and Difficult Child (DC). Responses follow a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). PD is defined as anxiety due to personal factors related to parenting; PCDI refers to the caregiver's perception of negative interactions with their child; and DC corresponds to the caregiver's perception of how difficult it is to deal with the child's behavior. An example item is "Child gets upset easily over the smallest things." Higher scores on each scale indicate greater levels of Parenting Distress, Parent–Child Dysfunctional Interaction, and Difficult Child. The PSI-SF subscales have shown evidence of construct validity, concurrent validity, and good reliability among Chilean caregivers (Aracena et al., 2016). In this study, the Cronbach's alpha coefficients for the PD, PCDI, and DC subscales were .880, .870, and .750, respectively.

Parental self-efficacy. Was measured using the efficacy subscale of the Parenting Sense of Competence Scale (PSCS; Johnston & Mash, 1989). It consists of eight items that capture the caregiver's perceived ability to solve problems in their parenting role. The response format uses a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). An example item is "I meet my own personal expectations for expertise in caring for my child." Higher scores on this instrument indicate higher levels of perceived parental self-efficacy. In the present study, this subscale demonstrated good reliability (Cronbach's alpha = .820). Additionally, confirmatory factor analysis (CFA) showed that the unidimensional structure of this subscale had a good fit to the data [χ^2 (20) = 322.475, p < .001; CFI = .977, TLI = .968, RMSEA = .048 (90% CI = .044 – .053), & SRMR = .054], with factor loadings ranging from .351 to .718.

Caregiver Depressive Symptoms. These were measured using the Center for Epidemiological Studies Depression Scale 10 (CESD-10; Andresen et al., 1994). The scale includes 10 items that assess the frequency of depressive symptoms during the past week. The response format is a four-point Likert scale (0 = rarely or none of the time, 3 = most or all of the time). An example item is "I felt depressed." Higher scores on this scale indicate greater levels of depressive symptoms. In the present study, CFA suggested removing the third item ("I felt hopeful about the future") due to its low factor loading (.102). The unidimensional structure without this item showed good fit to the data [χ^2 (27) = 86.503, p < .001; CFI = 1.000, TLI = 1.000, RMSEA = .022, & SRMR = .025], with factor loadings ranging from .363 to .811. The reliability of the scale was good (Cronbach's alpha = .820).

Sociodemographic Variables. Caregivers reported their sex (male, female), age in years, employment status (employed, unemployed, inactive), type of household (single-parent, two-parent), highest level of education attained (0 = no formal education, 6 = completed higher education), region of residence, household income, and whether they belonged to or descended from an Indigenous group (yes, no). They also reported the child's sex (boy, girl), age in months, and type of educational institution attended (not attending, daycare or nursery, pre-kindergarten/kindergarten, special education).

Statistical Analysis

Descriptive statistics were calculated for the variables of interest. Data loss in the ELPI dataset was minimal (.80%), and Little's MCAR test indicated that the data followed a completely random pattern [χ^2 (5) = 1.29, p = .935]. Multicollinearity was ruled out (highest Variance Inflation Factor [VIF] = 2.839). Scatterplot analyses did not suggest violation of the linearity assumption.

The hypotheses were tested using structural equation modeling (SEM). A priori power analysis indicated that the sample size met the minimum requirement (947) to detect a small effect size of .01 with a power of .80 (Byrne, 2012). The following criteria were used to assess good model fit (Wang & Wang, 2020): non-significant χ^2, Comparative Fit Index (CFI) > .95, Tucker Lewis Index (TLI) > .95, Root Mean Square Error of Approximation (RMSEA) < .06 and Standardized Root Mean-Square Residual (SRMR) < .08. Factor loandings > .30 were considered acceptable (Brown, 2015). The analysis was adjusted for the caregiver's educational level, the child's sex and age, and whether the child attended an educational institution.

Finally, structural invariance was tested across the child's sex, preschool attendance, and household type (single-parent vs. two-parent). For this purpose, increasingly restrictive multigroup structural equation models were estimated in the following sequence: (a) configural invariance, in which the measurement models share the same structure across groups; (b) metric invariance, constraining factor loadings to be equal; (c) scalar invariance, constraining item intercepts; (d) residual invariance, constraining residual variances; and (e) structural invariance, constraining the equality of paths and covariances among latent factors. For each new estimation, model fit indices were compared against the configural model using the following criteria: ΔCFI and ΔTLI < .010, ΔRMSEA < .015, and ΔSRMR < .030 (Kline, 2023).

All analyses were conducted using R version 4.3.1 (R Core Team, 2023) Using an alpha level of .05. For the SEM analysis, the *lavaan* package was used (Rosseel, 2012).

Results

Sample Characteristics

Table 1 presents the characteristics of the children included in the study. Most were girls, attended a preschool or nursery center, lived in the central macrozone of Chile, and came from two-parent households. The children's average age was 53.6 months (*SD* = 1.4). Regarding caregivers (predominantly mothers), most were women, employed, had completed secondary education or less, and did not identify as belonging to an Indigenous group. The mothers average age was 32.03 years (*SD* = 6.87). Means, standard deviations, and correlations among the variables are presented in Table 2.

Table 1
Sample Characteristics.

Variable	***n* (%)**
Child sex	
Boy	1.094 (49.17)
Girl	1.131 (5.83)
Child age in months, *M* = 53.6, *DE* = 1.4, rango = 35	
Child education	
Not attending institution	297 (13.35)
Preschool or daycare	845 (37.98)
Pre-kinder/Kinder	1071 (48.13)
Special education	12 (.54)
Macro-region	
North	248 (11.15)
Central	1391 (62.52)
Central-South	368 (16.54)
South	248 (11.15)
Austral	185 (8.31)
Household type	
Single-parent	595 (27.14)
Two-parent	1.597 (72.86)
Caregiver sex	
Male	42 (1.92)
Female	2.150 (98.08)
Caregiver age, *M* = 32.03, *DE* = 6.87, rango = 49	
Caregiver occupation	
Employed	1371 (62.55)
Unemployed	141 (6.43)
Inactive	680 (31.02)
Caregiver education	
High school or lower	1303 (39.10)
Some college/university	298 (13.59)
College/University completed	591 (26.96)
Household income, *M* = 406,780, *DE* = 556,129, rango = 10,666.191	
Caregiver ethnicity (si = indigenous)	
Sí	217 (9.90)
No	1975 (9.10)
Note: *M* = Mean, *DE* = Standard deviation.	

Table 2
Means, Standard Deviations, and Pearson Correlations among Variables.

Variable	*M*	*DE*	1	2	3	4	5	6	7	8	9	10	11
1. Working Memory	4.75	4.09											
2. Inhibitory Control	3.93	3.65	.72**										
3. Cognitive Flexibility	7.77	7.01	.67**	.70**									
4. Parenting Distress	25.68	9.17	− .09**	− .07**	− .08**								
5. Parent-Child Dysfunctional Interaction	18.81	7.00	− .01	− .01	.03	.60**							
6. Difficult Child	23.91	8.30	− .06**	− .05*	− .05*	.58**	.60**						
7. Parental Self-Efficacy	3.73	5.13	.03	.02	.02	− .34**	− .30**	− .32**					
8. Depressive Symptoms	6.25	5.24	− .02	− .02	− .04	.50**	.28**	.34**	− .24**				
9. Child's Age	53.60	1.40	.64**	.51**	.48**	− .04*	.00	− .03	− .01	.00			
10. Child's Sex	1.51	.50	− .02	− .04	− .05*	− .03	− .04*	− .06**	.04	.00	− .04		
11. Educational Setting	.87	.34	.22**	.17**	.17**	− .00	.02	.04	− .06**	− .01	.39**	.02	
12. Caregiver's Education	4.36	1.31	.01	− .02	− .03	− .18**	− .25**	− .15**	.04	− .14**	− .02	.01	.08**

Note: *M* = Mean, *SD* = Standard Deviation. * $p < .05$. ** $p < .01$.

SEM

The results of the invariance analysis showed that the tested model demonstrated measurement and structural equivalence according to gender, educational attainment, and household type (Table 3). The first structural equation model tested in the overall sample showed a relatively poor fit to the data [χ^2 (44) = 534.911, $p < .001$; CFI = .937, TLI = .914, RMSEA = .072 (90% CI = .067–.078), SRMR = .048]. Modification indices suggested the sequential inclusion of covariance terms between the error terms of PCDI and DC (MI = 111.286), and IC and CF (MI = 134.025). These residual correlations were conceptually justified, as they represent dimensions of the constructs of parental stress and executive functioning and were also measured using similar methods. Therefore, these covariances were included in the final model (Fig. 1). The final model showed good fit to the data [χ^2 (42) = 302.578, $p < .001$; CFI = .967, TLI = .953, RMSEA = .053 (90% CI = .048–.059), SRMR = .045]. Factor loadings for executive functioning and parental stress indicators ranged from .711 to .946, supporting their contribution to the measurement of the latent constructs. The model explained 46.3% of the variance in executive functioning (R^2 = .463).

Table 3
Goodness-of-fit indices for the invariance models.

Model	$\chi^2(df)$	CFI	TLI	RMSEA (90% IC)	SRMR	ΔCFI	ΔTLI	ΔRMSEA	ΔSRMR
Grouping variable: Sex									
Configural	324.520 (70)	.968	.952	.058 (.051 – .064)	.049	-	-	-	-
Metric	338.664 (74)	.966	.952	.058 (.051 – .064)	.051	− .002	.000	.000	+ .002
Scalar	352.248 (80)	.965	.955	.056 (.050 – .062)	.052	− .003	+ .003	− .002	+ .003
Residual	346.234 (88)	.965	.959	.054 (.048 – .060)	.053	− .003	+ .007	− .004	+ .014
Structural	352.590 (96)	.965	.962	.051 (.045 – .057)	.054	− .003	+ .010	− .007	+ .004
Grouping variable: Attendance in education (yes / no)									
Configural	324.520 (70)	.968	.952	.058 (.051 – .064)	.049	-	-	-	-
Metric	346.528 (74)	.966	.952	.058 (.051 – .064)	.051	− .002	.000	.000	+ .002
Scalar	352.248 (80)	.965	.955	.056 (.050 – .062)	.052	− .003	+ .003	− .002	+ .003
Residual	346.234 (88)	.965	.959	.054 (.048 – .060)	.063	− .003	+ .007	− .004	+ .014
Structural	372.536 (88)	.965	.959	.054 (.048 – .060)	.053	− .003	+ .007	− .004	+ .004
Grouping variable: Type of household (Single-parent or two-parent)									
Configural	324.520 (70)	.968	.952	.058 (.051 – .064)	.049	-	-	-	-
Métric	338.664 (74)	.966	.952	.058 (.051 – .058)	.051	− .002	.000	.000	+ .002
Scalar	352.248 (80)	.965	.955	.056 (.050 – .062)	.052	− .003	+ .003	− .002	+ .003
Residual	346.234 (88)	.965	.959	.054 (.048 – .060)	.053	− .003	+ .007	− .004	+ .004
Structural	352.590 (96)	.965	.962	.051 (.045 – .057)	.054	− .003	+ .010	− .007	+ .005
Notes:									
Δ = Change in the indicator.									

Direct Effects

Parental stress was negatively and significantly related to executive functioning (β = − .062, B = − .029, SE = .011, p = .012), while parental self-efficacy (β = .017, B = .013, SE = .013, p = .351) and depressive symptoms (β = .017, B = .012, SE = .016, p = .441) were not directly related to executive functioning (Fig. 1). However, parental self-efficacy was significantly associated with lower levels of parental stress (β = − .284, B = − .463, SE = .043, p < .001), and mothers' depressive symptoms were associated with higher levels of parental stress (β = .465, B = .741, SE = .040, p < .001).

The correlation between depressive symptoms and parental self-efficacy was negative, small, and significant (r = − .239, p < .001). Additionally, there was a positive, moderate, and significant correlation between inhibitory control and cognitive flexibility (r = .322, p < .001).

Indirect Effects

Parental self-efficacy was indirectly associated with better executive functioning through parental stress (β = .018, B = .013, SE = .005, p = .015). Similarly, depressive symptoms were associated with lower executive functioning via parental stress (β = − .029, B = − .021, SE = .009, p = .012).

Discussion

The objectives of this research were, firstly, to evaluate the mediating role of parental stress in the relationship between parental self-efficacy and executive functioning in Chilean preschoolers; and secondly, to examine the mediating role of parental stress in the relationship between mothers' depressive symptoms and executive functioning in Chilean preschoolers.

The results indicated that higher parental self-efficacy was associated with lower levels of parental stress, which in turn was related to better executive functioning performance in preschoolers. These findings are consistent with previous research showing that lower parental stress levels are associated with better executive function in childhood, thereby reinforcing the importance of promoting positive parenting styles (Wagner et al., 2016). Specifically, our results confirmed that parental self-efficacy was indirectly associated with better executive functioning through parental stress (β = .018, B = .013, SE = .005, p = .015), suggesting that the confidence caregivers have in their parenting role may act as a protective factor by buffering stress levels.

It is important to mention that parental stress is harmful to the development of executive function. These processes impact cognitive development related to future outcomes, such as social relationships, which are important for children's executive functioning later in life (de Cock et al., 2017; Park et al., 2023; Qian et al., 2024). On the other hand, higher parental self-efficacy is associated with positive parenting behaviors, which reduce parental stress (Fang et al., 2024; Remondi et al., 2023).

In turn, the results suggest that mothers' depressive symptoms were indirectly related to lower executive function scores in preschoolers through parental stress. This finding is consistent with evidence indicating that the presence of depressive symptoms in mothers is associated with higher parental stress and poorer executive functioning in preschoolers (Fredriksen et al., 2019; Ribas et al., 2024; Tachibana et al., 2012). This path was statistically supported in our model, showing that depressive symptoms were associated with lower executive functioning via parental stress (β = − .029, B = − .021, SE = .009, p = .012). This reinforces the idea that maternal mental health does not affect cognitive development in isolation, but rather through the strain it places on the caregiving environment. Depressive symptoms are associated with parental stress related to behavioral and emotional problems exhibited by their children (Lim & Shim, 2021). The presence of depressive symptoms in mothers could affect early stimulation, which in turn would negatively impact the development of executive functioning in children (Baker & Kuhn, 2018; Han et al., 2024). In tasks such as poorer performance in following complex instructions, switching between activities with different cognitive demands, or regulating impulsive behaviors regularly (Bernier et al., 2010).

The study results are consistent with previous research highlighting parental stress as a key predictor of child development, particularly in the cognitive domain. Previous studies have identified the impact of parental stress on executive function (Delvecchio et al., 2020; Qian et al., 2024; Wagner et al., 2016), specifically, the mediating role between parental self-efficacy, depressive symptoms, and the bidirectional interaction between both constructs (Crnic & Ross, 2017).

This finding takes on particular relevance in the Chilean and Latin American context, where levels of parental stress have shown alarming figures. In Chile, a study from the National Mental Health Survey during the pandemic (MINSAL, 2021), reported that over 40% of adults declare experiencing high levels of stress, and various local studies have found that about 30% of primary mothers exhibit high levels of parental stress (Olhaberry & Farkas, 2012; Santelices et al., 2021; Vidal et al., 2021). These indicators highlight the need to develop support mechanisms that promote both the emotional wellbeing of mothers and an environment conducive to early stimulation. Given the importance of executive functions (EF) in the present and future lives of children such as self-regulation in the classroom, problem solving, and decision-making understanding the factors associated with their development is essential for designing preventive strategies. In this regard, considering the mental health status of mothers is not only important for the comprehensive development of the child but also serves as a pathway to promote family mental health.

This study emphasizes the relevance of designing intervention programs that foster parental self-efficacy and reduce mother stress and depressive symptoms. Strategies such as positive parenting workshops and psychological support for mothers could be essential to improving both parental wellbeing and children's cognitive development. A meta-analysis found that participation in positive parenting workshops is associated with significant improvements in cognition during early childhood (Prime et al., 2023). In this way, a systematic review found that studies including interventions to promote parental self-efficacy and positive parenting fostered cognitive development in

children, specifically in countries such as the United States (Albanese et al., 2019). In contexts like Chile, where mothers report high levels of parental stress, these interventions could be particularly effective if adapted to the population's needs.

Recently, Lohndorf et al. (2026) used the ELPI dataset to examine how maternal characteristics and the home environment are linked to children's executive function development in Chile. While their work provides an important longitudinal foundation, our study offers a distinct contribution by focusing on caregivers' psychological characteristics and exploring parental stress as an intermediate pathway between parental self-efficacy, depressive symptoms, and preschoolers' executive functioning. This approach allows a more fine-grained understanding of the psychological processes through which caregivers' well-being may be associated with children's early executive skills in this national sample, complementing rather than duplicating previous analyses.

Strengths and Limitations

Although the cross-sectional design is a limitation for causal inference, the pathways identified in this study align with the Family Stress Model, where psychological distress serves as a primary mechanism linking environmental stressors to child outcomes (Newland et al., 2013). By utilizing a large-scale national sample (N = 2,225), our study extends this well-documented longitudinal framework to the Chilean context. Furthermore, in such a representative sample, even small effect sizes hold significant public health and social policy relevance, as they reflect dynamics occurring at a population level (Funder & Ozer, 2019).

This study has several strengths. First, it uses a large, nationally representative sample of Chilean mothers and preschoolers, which enhances the external validity of the findings and their relevance for public policies and early childhood programs at the national level. Second, it focuses on caregivers' psychological characteristics that are potentially modifiable through intervention (parental self-efficacy, depressive symptoms, and parental stress), providing actionable evidence for the design of parenting-support and mental-health strategies. Third, executive functioning was assessed with a performance-based task (Hearts & Flowers), and parental stress and related constructs were measured with instruments that have demonstrated validity and reliability in Chilean samples (Aracena et al., 2016b; Rosas et al., 2019b), which strengthens the robustness of the results. Finally, by examining parental stress as an intermediate pathway between caregivers' well-being and preschoolers' executive functioning, this study contributes a novel perspective that complements prior research using the ELPI dataset in Chile.

The study also has limitations. First, its cross-sectional design restricts the ability to draw firm causal inferences, so the reported associations should be interpreted as correlational (Kim, 2021). Future research using longitudinal designs could clarify temporal ordering and bidirectional relations among parental self-efficacy, depressive symptoms, stress, and children's cognitive development (Han et al., 2024). Second, the use of self-report measures for stress and depressive symptoms may introduce reporting biases, such as social desirability (Bollweg & Okan, 2022), which can be constant or random in descriptive or inferential analyses (Bauhoff, 2023). Third, although we adjusted for key sociodemographic covariates, some potentially relevant contextual factors (e.g., characteristics of the home learning environment or play space in early childhood) were not available for this age group in the ELPI survey. Finally, the low participation of male caregivers means that the findings predominantly reflect mothers' experiences and should be generalized to fathers and other caregiver figures with caution; future studies would benefit from more gender-balanced samples to better capture paternal contributions to children's executive functioning.

Conclusion

Addressing issues associated with children's cognitive development requires a comprehensive and systemic approach that considers both the individual characteristics of children and adolescents and environmental and contextual factors. Likewise, parental stress plays a crucial role in the interaction between parental self-efficacy, mental health, and cognitive development in preschool-aged children. The findings of this study can inform current programs implemented to promote the integral development of children in countries like Chile and other similar contexts.

Declarations

Author Contribution

All authors (N.Q.M., M.P.O., I.C.E., M.F.R.M., and N.A.F.) contributed to the study conception and design. Material preparation and data analysis were performed by N.Q.M. The first draft of the manuscript was written by N.Q.M., and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript

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Figures

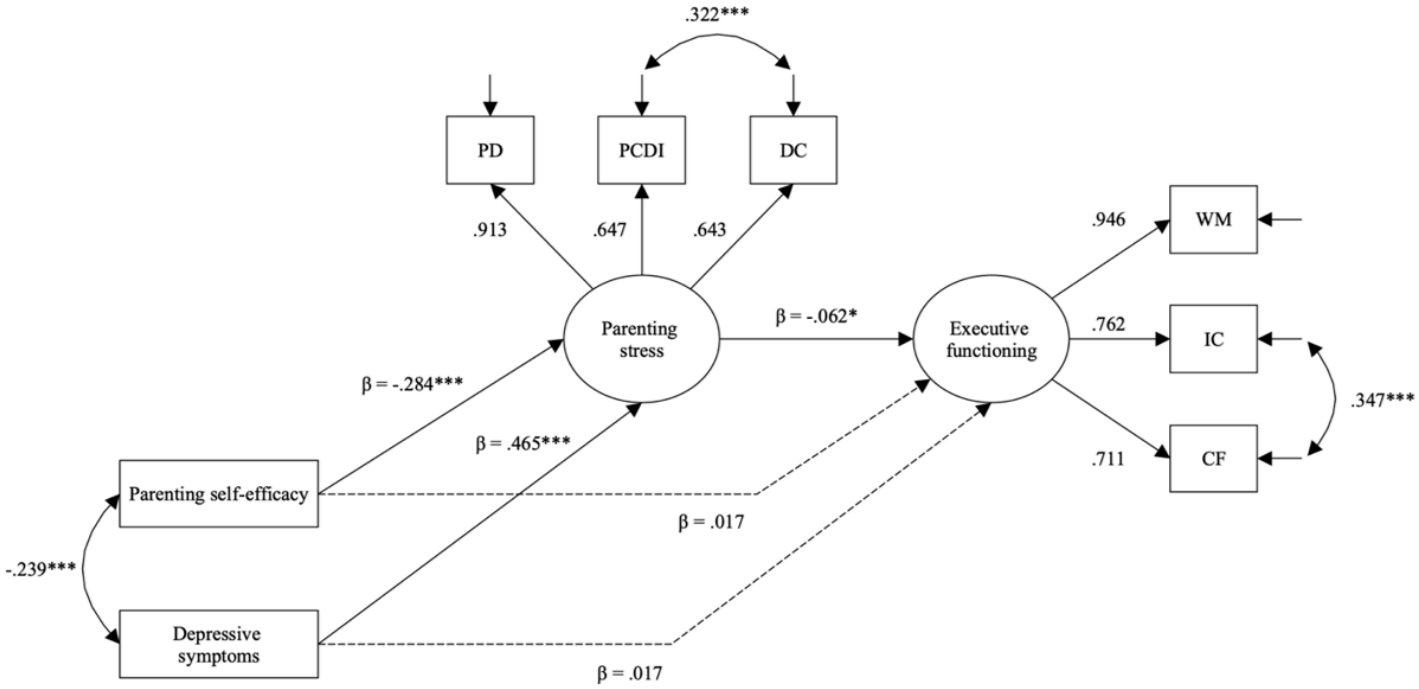


Figure 1

Structural relationships among parental self-efficacy, mother depressive symptoms, parental stress, and executive functioning in Chilean children aged 36 to 71 months (ELPI 2017).

Notes: Dotted lines indicate nonsignificant relationships.

CF = Cognitive Flexibility; DC = Difficult Child; IC = Inhibitory Control; PCDI = Parent-Child Dysfunctional Interaction; PD = Parenting Distress; WM = Working Memory.

* = significant at the .05 level

** = significant at the .01 level

*** = significant at the .001 level