



## Research Paper

## Sociodemographic predictors of depression among economically vulnerable mothers in urban Uruguay



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## ABSTRACT

**Background:** Depression is a leading cause of disability worldwide, affecting women twice as much as men. In Latin America, rates are double the global average. Uruguay, despite investing in mental health, has the continent's highest and still-rising suicide rate.

**Methods:** We examine predictors of depression among a sample of economically vulnerable mothers in Uruguay ( $N = 467$ ). Depression was measured using the Center for Epidemiologic Studies Depression Scale (CES-D). Sociodemographic predictors were added in blocks using hierarchical regression with robust standard errors.

**Results:** On average, survey respondents were 29 years of age ( $SD = 6.65$ ), with children aged 24 months ( $SD = 5.97$ ). The average CES-D score was 6.9 (range 0–46), with 12 % of respondents at risk ( $CES-D \geq 16$ ). Mothers who had completed middle or secondary school had lower levels. In contrast, experiencing a negative economic shock in the past year and receiving government assistance were associated with higher depression. Mothers receiving government assistance were 8 percentage points more likely to be at risk of depression, suggesting a subgroup prevalence of ~ 20 % - a figure that aligns closely with prior estimates in similar populations. Among subgroups, mothers (not receiving assistance) who worked part-time had higher CES-D scores than those working full-time.

**Limitations:** We rely on self-reported, cross-sectional data.

**Conclusions:** Indicators of economic strain predict increased depression levels among mothers in Uruguay. Higher education and full-time employment were protective factors. The elevated risk among mothers receiving government assistance highlights the need for integrated mental health and social support interventions.

## Introduction

Depression is a psychopathology that negatively impacts adults and their families through multiple, interconnected pathways, and poses a risk to healthy family functioning (Guerrero-Muñoz et al., 2021). Clinical depression is the second most prevalent cause of illness-induced disability worldwide, and the first among women (Ferrari et al., 2013; WHO-UNFPA, 2008; Kessler, 2003). Maternal depression is a pressing global policy issue (Audet et al., 2018), amplified by how women carry the burden of mental health disorders at more than double the rate of men (Kessler, 2003; Bromet et al., 2011; Burt and Stein, 2002). Across 40 countries in Latin America, depression is estimated at 12 % of prevalence in the adult population, considerably higher than the 5 % of

prevalence globally (Buedo and Daly, 2024; Errazuriz et al., 2023).

Uruguay has a small population of 3.5 million people and is considered a socio-cultural outlier in the region, mainly due to its departure from religious affiliations and a higher and more equitable income distribution (World Bank, 2024; Politi, 2023). Despite increased economic stability, Uruguay reports the highest suicide rate on the continent, which continues to grow despite governmental investment in mental health (Axios, 2023; Pan American Health Organization, 2018; World Health Organization, 2020). While research on depression in Uruguay is limited, studies have estimated a prevalence rate as high as 29 % in urban populations (Casarotti, 2002; Lista, 2008; Ardoino et al., 2015). Importantly, 95 % of the country's population is concentrated in urban areas, pointing to a widespread yet understudied phenomenon

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(Pan American Health Organization, 2018; World Bank, 2022). Past studies have found that 29 % of the urban Uruguayan population suffered from depression (Casarotti, 2002; Lista, 2008), with women most affected (Lista, 2008). Social stigmatization of mental health disorders serves as a barrier to addressing the issue (Politi, 2023).

Affective disorders such as depression can compromise a mother's caregiving ability, with depression notably being linked with dysfunction in parenting and family processes, including within the context of Uruguay (Shonkoff et al., 2012; Barthel et al., 2015; Guerrero-Muñoz et al., 2021; Ardoino et al., 2015). Across the world, nearly a quarter-billion children under five years-of-age are at risk of not meeting their developmental potential due to poverty (Lu et al., 2016). Understanding how to best support mothers and other primary caregivers in challenging contexts requires a deeper understanding of maternal well-being. Research on maternal depression is especially critical, given its wide-ranging impacts on both mother and child. Studies have found that mothers with depression are more likely to have infants who are underweight or stunted, experience linear growth impairments in the first year of life, and face harsher disciplinary practices involving physical and psychological aggression (Farías-Antúnez et al., 2018; Kumar et al., 2025). Moreover, maternal depression can alter children's biological sensitivity to stress well into adulthood, contributing to an intergenerational cycle of poor mental health (Barthel et al., 2015; Barry et al., 2015).

Current research from Uruguay also confirms a higher prevalence of depression among women (Lista et al., 2008). Depression is the leading cause of disease-related disability among women globally, with pregnancy representing a period of heightened vulnerability. During this time, the risk of lifetime recurrence increases, and prevalence rates of antenatal depression range from 10 % to 47 % (Kessler, 2003; Ajinkya et al., 2013; Barthel et al., 2015). In a study of 18 countries, belonging to the female gender was a stronger predictor of depression than socioeconomic status or family situation (Bromet et al., 2011).

#### *Economic conditions and depression*

Economic conditions and depression have a bi-directional causal relationship: economic hardship can heighten depressive symptoms, while depression can limit economic productivity and earning potential (Ridley et al., 2020; Patel et al., 2018). A social safety net, as the term "net" implies, is intended to "catch" families that fall into poverty, particularly families with young children, thus protecting them from severe hardships (De Gregoria et al., 2021). This can consist of ensuring families always have access to housing, food, education, or healthcare, despite economic setbacks. Conversely, sudden and severe hardships manifest as 'shocks,' including environmental disasters, sudden income loss, or health crises, which pose an increasing threat to families in poverty who are particularly vulnerable to the severe repercussions of these challenges. Experiencing a negative economic shock, such as a job loss or a sudden decline in income, is strongly associated with increased risk of depression due to heightened financial stress, social isolation, and psychological distress (Frasquilho et al., 2016; Alem and Tato, 2023; Ridley et al., 2020). Families in poverty face liquidity constraints and uninsurable background risks, which increase the risk of negative income and health shocks. Economic insecurity can trigger chronic stress, leading to dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis, which is linked to higher cortisol levels and depressive symptoms (Lund et al., 2010). In Uruguay, job displacement not only reduces household income but also undermines social identity (Bucheli & Rossi, 2019).

Studies have shown that economic recessions correlate with higher rates of depression and suicide, with unemployment being a significant predictor (Frasquilho et al., 2016). Additionally, individuals facing financial difficulties may delay or forgo mental health care, worsening their condition, despite Uruguay's relatively strong healthcare system (Ridley et al., 2020). Research on Latin America suggests that economic

downturns, such as the 2002 financial crisis in Uruguay, significantly increased mental health issues, with rising suicide rates and depressive disorders linked to financial distress (Balsa and Rossi, 2018). However, protective factors such as social support, unemployment benefits, and access to mental health services can help mitigate these adverse effects (McKee-Ryan et al., 2005). Predictors of depressive symptoms among mothers have included perceived economic hardships, increased exposure to income shocks, chronic stress, higher education status, increased age, and single marital status: all of which are linked to a wider social safety net (Audet et al., 2018; Kumar et al., 2023; Barthel et al., 2015).

#### *Sociodemographic predictors of maternal mental health symptoms*

Stressors, such as economic pressure, have a direct influence on women's psychological distress levels (Ardoino et al., 2015). This, in turn, is strongly associated with the quality of maternal care. Conversely, partner support plays a dual role in moderating this impact. It serves as a direct moderator by mitigating maternal distress levels and an indirect one by enabling fathers and co-parents to provide support in child-rearing when the mother experiences depression (Ardoino et al., 2015). The literature has found that married mothers are in better mental and physical health than unmarried mothers one year after birth (Cooper et al. 2009; Meadows et al. 2008). Partnered mothers generally report lower levels of depression, likely due to shared caregiving, financial stability, and emotional support, while single mothers face a higher risk of depressive symptoms (Audet et al., 2018; Barthel et al., 2015). In Uruguay, where single motherhood has been rising since the late 1990s (Esteve et al., 2012), it is important to assess how family structure interacts with economic stressors to influence depressive symptoms. Studies in Latin America indicate that single mothers often rely on extended family networks for financial and childcare support, yet they also face higher financial strain and social stigma (Guarin et al., 2023). Investigating the role of two-parent households within this context is particularly important considering the trends in increased single-parent households in Uruguay, as well as neighboring Latin American countries.

Educational attainment is another crucial determinant of maternal mental health. Higher education levels are consistently associated with lower rates of depression, possibly because education increases access to stable employment, social mobility, and coping resources (Peele and Wolf, 2020). In Uruguay, where 45 % of mothers with children aged 0–36 months have completed middle school (INE, MSP, and UNICEF, 2018), educational disparities may contribute to mental health outcomes. Studies suggest that lower educational attainment is linked to increased psychological distress due to limited employment opportunities and reduced awareness of mental health care (Fisher et al., 2012; Patel et al., 2018).

#### *Governmental support and maternal depression*

Government assistance programs, including cash transfers, food subsidies, childcare support, and healthcare coverage, provide critical financial relief, helping mothers manage household responsibilities while reducing the psychological burden associated with economic precarity. Uruguay's extensive social safety net offers various forms of support to low-income families, such as *Asignaciones Familiares* (Family Allowances) and *Plan de Equidad* (Equity Plan), which aim to alleviate economic disparities and provide direct financial assistance to vulnerable populations (Bucheli and Vigorito, 2017). These programs have been shown to improve maternal well-being by reducing financial stressors and increasing economic security, both of which are linked to lower risks of depression (Balsa and Rossi, 2018). Studies on conditional and unconditional cash transfers in Latin America also indicate that social assistance improves mental health by increasing a household's ability to meet basic needs, reducing parental stress, and enabling mothers to invest more in their children's education and health (Bastagli

et al., 2016; Haushofer and Shapiro, 2016; Wolf et al., 2024).

Beyond financial relief, governmental support also plays an indirect role in improving maternal mental health through access to healthcare services. Uruguay's Sistema Nacional Integrado de Salud (SNIS) ensures that low-income mothers have access to public healthcare services, including mental health support (Pan American Health Organization, 2018). Despite these protective mechanisms, recent research suggests that the stigma associated with receiving government aid may counteract some of these benefits. Nicolau (2022) found that participation in social assistance programs in Latin America, including Uruguay, may lead to increased feelings of shame and self-consciousness, which may contribute to depressive symptoms. This suggests that while governmental support provides critical economic and healthcare benefits, the psychological impact of welfare stigma should be addressed through approaches and policies that normalize and destigmatize assistance programs.

### The current study

This study investigates predictors of depressive symptoms among mothers of young children in Uruguay, contributing to a sparse evidence base on maternal mental health in early childhood within this national context (Ardoino et al., 2015). By identifying the social and economic factors associated with maternal mental health, we contribute to the growing literature on the role of poverty and family dynamics in shaping depression risk (Kumar et al., 2023), with implications for social protection and early childhood programs in Latin America. We contribute to the limited evidence base on maternal depression in South America, helping to address research gaps caused by the overrepresentation of Western, Educated, Industrialized, Rich, and Democratic (WEIRD) contexts in psychological research (Brass and Charlton, 2022; Henrich et al., 2010). We address the following research questions:

- What is the prevalence of depression among mothers in economically vulnerable populations in Uruguay?
- To what extent do maternal and household sociodemographic factors predict (a) the severity of maternal depressive symptoms and (b) the likelihood of being at risk for depression?
- Do these associations differ for certain subgroups, such as those that have experienced a negative income shock, rely on government assistance, or are from a two-parent household?

## Methods

### Participants and procedure

The data in this study were collected during the endline survey of a parenting intervention program offered to families with children who were enrolled in "Children and Family Care Centers" (CAIF) of Uruguay (Balsa et al., 2023). CAIF centers are publicly funded, privately managed early childhood centers whose purpose is "to guarantee the protection and promote the rights of children from their conception until the age of 3, prioritizing the access of those who come from families in poverty and/or social vulnerability."<sup>1</sup> The program, called *Crianza Positiva*, combined an intensive and highly structured group-based parenting workshop of eight weekly sessions, with a subsequent "top-up" text and audio e-messaging component that incorporates insights from behavioral science (Gómez, 2022). The workshop treatment group included families enrolled in centers eligible to implement the *Crianza Positiva* workshop, whereas the workshop control group consisted of families in centers that could not implement right away. The program was promoted during regional monthly meetings organized by administrators of public early childhood centers in Uruguay. These centers were invited to

implement the *Crianza Positiva* workshop with families of children aged 0 to 2 years. Program participation was determined on a first-come, first-served basis, with randomization occurring among the initial centers that expressed interest.

The original evaluation study included two treatment arms and a control group (total  $N = 777$ ). Treatment arm 1 (workshop + messages) included families that were assigned to the workshop and the messages ( $N = 237$ ); treatment arm 2 (workshop only) included families assigned to the workshop but not to the messages ( $N = 292$ ); and the control arm included families neither assigned to the workshop nor to the messages ( $N = 250$ ). Of the 777 families surveyed during the endline data collection of the *Crianza Positiva* intervention, 467 had complete information on all items of the CES-D scale and were therefore included in the present analysis. The analytic sample was restricted to these 467 families due to item-level non-response on the CES-D; complete data was required to calculate a valid total depression score. A comparison of key sociodemographic characteristics between the full sample and the analytic subsample is provided in Supplementary Table 1. The two groups were similar across most indicators, with no statistically significant differences observed except for a slightly higher proportion of mothers (compared to other caregivers) and a marginally statistically significant higher asset index in the analytic sample.

The follow-up assessment was conducted >9 months after families completed the workshop, and between 1 and 3 months after completion of the e-messaging intervention. The questionnaire was paper-administered and completed silently by the respondent in the presence of the interviewer. Mothers were contacted in advance to arrange the date of the survey, which could be administered at home or at the early childhood center, depending on family preferences. The assessment took approximately 40 min to complete. Enumerators were recruited based on their educational background, requiring that they either had completed or were close to completing a university degree in Psychology. They had specific training to administer the surveys for this project.

### Measures

#### Mother characteristics

Sociodemographic variables of the main caregiver included an indicator for being the mother of the child, mother's age, mother's education level (mother completed middle school or completed secondary school), and employment status (unemployed/part-time employed/full-time employed). Descriptive statistics for all study variables are

**Table 1**  
Descriptive statistics of the sample.

Variable	Number of observations	Mean	Std. Dev.
<i>Caregiver's information</i>			
Mother of the child	467	0.931	0.253
Mother's age	464	29.233	6.649
Mother completed middle school	466	0.348	0.477
Mother completed secondary school	466	0.294	0.456
Mother Works full time	459	0.401	0.491
Mother Works part time	459	0.214	0.410
<i>Household's information</i>			
Receives assistance from government	467	0.664	0.473
Mother and father live together	464	0.772	0.420
Family had a negative shock in past 12 months	467	0.535	0.499
Number of other children in the household	446	0.964	1.159
Other adults in the household	448	0.181	0.385
Asset index	450	0.263	0.139
<i>Child's information</i>			
Age of child in months	464	24.343	5.970
Premature	466	0.084	0.277
<i>Outcomes</i>			
CES-D total score	467	6.929	7.678
Risk of depression	467	0.120	0.325

<sup>1</sup> [www.plancaif.org.uy/plan-caif/que-es-plan-caif](http://www.plancaif.org.uy/plan-caif/que-es-plan-caif).

presented in Table 1.

#### Household information

We collected information on the number of household members, parents' cohabitation status (mother and father living together or not), received government assistance, and the region of residence. The household asset index was constructed using a weighted sum approach. Specifically, we first created binary indicators for the ownership of different household assets, and then each asset was assigned a weight based on its relative rarity in the sample. The weight for each asset was calculated as one minus the mean ownership rate, meaning that less common assets contribute more to the index. The final index was computed as a weighted sum of asset ownership, normalized by the total sum of deprivation scores. Therefore, the index reflects relative wealth in terms of asset availability, with higher values indicating greater ownership of less common assets. The range from 0 to 0.77 results from this weighting process rather than a simple percentage of owned items. These included an oven, refrigerator, water heater, TV, DVD, subscription to cable TV, laundry washer, laundry heater, dishwasher, microwave, air conditioner, government-awarded laptop, other laptops, access to Wi-fi, household phone line, motorcycles, and cars. The index ranged from 0 to 0.77, with higher values indicating higher availability of assets.

Participants reported on whether any of the following "negative shocks" occurred over the past 12 months: loss of employment, decreases in income, debt, death of a family member, divorce, problems with the law, accident or serious illness, and substance abuse. Based on these outcomes, we defined a dichotomous variable ("yes" or "no") indicating if the household had experienced any shock in the past 12 months. The participant was assigned a score of 1 if they said yes to any of the above.

#### Child characteristics

Participants reported on the age (in months) of the child and whether the child was born preterm (with <37 weeks of gestation).

#### Depressive symptoms

Depressive symptoms and status were measured using the 20-item Center for Epidemiologic Studies Depression Scale (CES-D), originally developed for use in general population surveys to screen for depressive symptomatology (Radloff, 1977). We also drew on adaptations validated for low-income and cross-cultural populations (Andresen et al., 1994; Zhang et al., 2012). The CES-D is a 20-item self-report scale that is administered using a time-defined categorical scale of experiencing a symptom as "rarely/less than one day", "sometimes/1–2 days", "occasionally/3–4 days", and "mostly/5–7 days" within the past week. There are four reverse-coded items. We computed an aggregate depression score by adding up the score for all questions ( $M = 6.9$ ,  $SD = 7.7$ , range = 0–60), as well as a binary indicator for risk of depression, capturing 12 % of the sample at risk of depression (CES-D score  $\geq 16$ ). This scale has widely been implemented to capture depression in caregiver/parenting populations across cultural contexts (Pinquart and Sorensen, 2003; Roth et al., 2008). While the CES-D has not been formally validated in Uruguay specifically, it has demonstrated strong psychometric properties in Spanish-speaking and Latin American populations (Ruiz-Grosso et al., 2012), as well as among diverse Hispanic/Latino samples in the United States, supporting its cross-language reliability and validity (González et al., 2017).

This measure uses time-based frequency categories to assess depressive symptoms. The use of binary scales in self-reported questionnaires is being challenged by a dimensional approach advocated by the National Institute for Mental Health's Research Domain Operating Criteria (Cuthbert and Insel, 2013). Likert responses, especially for sensitive questions in communities that have a strong social stigmatization against mental health issues, can capture nuances and help respondents to accurately address the items (Isaac et al., 2007; Kumar

et al., 2023). Such a scale captures a symptomatology spectrum, which has been recommended by researchers (Aminpoor et al., 2012; Patel et al., 2018). This method has been advocated for more than a decade, with emphasis on low-income settings and has been implemented and validated in such contexts (Aminpoor et al., 2012; Kumar et al., 2022; Patel et al., 2018).

#### Analytic plan

First, we conducted descriptive statistics for all predictor and outcome variables. Next, we examined how mother and household sociodemographic characteristics predicted both indicators of maternal depression in separate models: the CES-D aggregate depression score and a dummy variable for risk of depression.

For each outcome variable,  $y_{ic}$ , we estimate the following ordinary least squares regression:

$$y_{ic} = \beta_0 + X'_{ic}\beta_1z + \varepsilon_{ic}$$

where  $i$  refers to the household and  $c$  refers to the CAIF center and  $X'_{ic}$  is a vector of sociodemographic characteristics. Sociodemographic characteristics were included using a hierarchical regression in which blocks of variables were subsequently introduced. We used robust standard errors that adjust for clustering in the CAIF center. We adjusted for a comprehensive set of caregiver, household, and child characteristics to mitigate confounding. These included maternal age, education level, employment status, co-residence with the child's father, receipt of government assistance, recent negative economic shocks, number of household members, household asset index, and child age and prematurity. These covariates were selected based on theoretical relevance and prior literature linking them to both mental health and socioeconomic vulnerability. Furthermore, because participants were enrolled in a randomized controlled trial rather than self-selecting into the program, this design feature helps reduce selection bias and strengthens the internal validity of our findings.

We used OLS to model both the continuous CES-D score and the binary indicator for risk of depression. While logistic regression is often used for binary outcomes, we opted for OLS to ensure consistency across models and to enhance interpretability. The linear probability model allows for coefficients to be interpreted as straightforward percentage point changes in the likelihood of depression. Given the moderate prevalence of depression in our sample and our use of robust standard errors, OLS offers a reliable and policy-relevant framework for estimating both outcomes (Angrist and Pischke, 2008). Some predictor variables had missing values (3 %–11 %), leading to variations in sample size across regression models. Since missingness was below 15 % and prior research suggests that analyses with or without imputation tend to yield similar results under such conditions (Dong and Peng, 2013), we proceeded with complete case analysis. All models controlled for treatment status from the *Crianza Positiva* intervention to account for baseline group differences.

Finally, we estimated fully interacted models to formally test whether associations between sociodemographic predictors and maternal depression differed by (1) cohabitation status, (2) exposure to a negative shock, and (3) receipt of government assistance. We also conducted subgroup analyses by running the full model separately within each of these categories to explore how patterns of association varied across different household contexts.

Approximately 40 % of the baseline sample was missing CES-D outcome data at follow-up, primarily due to non-response or inability to recontact families. As shown in Supplementary Table 1, the analytic sample was broadly comparable to the full baseline sample across most measured characteristics. The only statistically significant differences were a slightly higher proportion of mothers (as opposed to other caregivers) and a marginally higher asset index in the analytic sample. To address potential bias due to differential attrition, we ran a sensitivity



analysis using inverse probability weighting (IPW). We first estimated the probability of follow-up using a logistic model with a rich set of baseline predictors: caregiver characteristics (mother's age, education, and employment), household indicators (receipt of government assistance, parental co-residence, recent negative economic shocks, number of children and other adults in the home, asset index), and child characteristics (age and prematurity). Observations were then weighted by the inverse of the predicted probability of being observed. The main regression models were re-estimated using these weights. Results remained consistent in both magnitude and significance, suggesting that attrition bias is unlikely to affect the main conclusions.

## Results

Table 1 shows descriptive statistics of the sample. The sample was predominantly female, with 96 % percent of the sample self-identified as female and 93 % were the biological mother of the child. Additionally, 40 % of respondents reported that they were working full-time, while 21 % reported working part-time. In terms of mothers' education, on average, 35 % of mothers completed middle school and 29 % completed secondary school.

In 77 % of households, the mother and the father of the child lived together. Sixty-six percent of households received assistance from the government and 54 % of households in the sample experienced at least one negative shock in the survey's previous year. Additionally, 96 % of families had at least one more child in the household apart from the one in the intervention, and 18 % of households had other adults (aside from parents) living with the child. The average asset index is 0.26 (range 0 to 0.77), with higher values indicating higher availability of assets. Children were 24 months old on average and 8 % of them were born prematurely.

## Sociodemographic predictors of depressive symptoms

Tables 2 and 3 present the results from the hierarchical regression models predicting the CES-D score and risk of depression, respectively. Caregiver's information, household's information, and child's information were included in a stepwise procedure. Model 7 shows the result from the full model.

For CES-D scores, receiving assistance from the government and family having a negative shock in the past 12 months were consistently significant predictors for higher CES-D scores, when included in Model 2 ( $b = 1.90, p < 0.05$  and  $b = 1.64, p < 0.05$ ), Model 4 ( $b = 1.60, p < 0.05$  and  $b = 1.65, p < 0.05$ ), Model 5 ( $b = 1.94, p < 0.05$  and  $b = 1.71, p < 0.05$ ), and Model 7 ( $b = 1.58, p < 0.01$  and  $b = 1.75, p < 0.05$ ). The number of other children in the household also predicted a significant 0.65-point increase in CES-D scores when household information is included separately and with child's information (Model 2;  $b = 0.66, p < .10$  and Model 5;  $b = 0.66, p < .10$ , respectively). Results also show that caregiver education served as a consistent protective factor for depression symptomatology. In particular, mothers who completed secondary school and middle school had a significantly lower CES-D score (Model 1;  $b = -3.49, p < .01$  and  $b = -1.78, p < 0.10$  and Model 6;  $b = -3.72, p < 0.01$  and  $b = -1.98, p < 0.10$ ). Only mothers who completed secondary school had significantly lower CES-D scores in the full model ( $b = -2.11, p < 0.10$ ). Similarly, OLS results predicting the risk of depression show that households receiving assistance from the government was a consistent predictor throughout Model 2 ( $b = 0.08, p < 0.05$ ), Model 4 ( $b = 0.07, p < 0.05$ ), Model 5 ( $b = 0.08, p < 0.05$ ), and Model 7 ( $b = 0.08, p < 0.05$ ). Completion of secondary school was a protective factor against the risk of depression when caregiver information was included separately (Model 1;  $b = -0.10, p < .05$ ) and with child's information (Model 6;  $b = -0.10, p < .05$ ). Contrary to the previous set of analyses, mothers who completed middle school, families with negative shock in the past 12 months, and the number of other children in the household were not

**Table 2**  
OLS regression results predicting depressive symptoms.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Caregiver's information</i>							
Mother's age	-0.044 (0.063)			-0.031 (0.069)		-0.038 (0.063)	-0.019 (0.069)
Mother completed middle school	-1.777 (1.009)			-1.103 (1.124)		-1.979 (1.024)	-1.214 (1.135)
Mother completed secondary school	-3.486 (1.014)			-1.901 (1.212)		-3.722 (1.036)	-2.110 (1.228)
Mother works full time	-0.611 (1.001)			0.068 (1.122)		-0.573 (1.010)	0.013 (1.124)
Mother works part time	-0.503 (0.932)			0.115 (0.982)		-0.384 (0.936)	0.179 (1.001)
<i>Household's information</i>							
Receives assistance from government		1.901 (0.806)		1.596 (0.802)	1.935 (0.812)		1.581 (0.806)
Mother and father live together		0.449 (1.042)		0.136 (1.074)	0.382 (1.047)		0.060 (1.073)
Family had a negative shock in past 12 months		1.639 (0.724)		1.646 (0.729)	1.705 (0.720)		1.753 (0.724)
Number of other children in the household		0.661 (0.376)		0.651 (0.443)	0.655 (0.373)		0.615 (0.440)
Other adults in the household		1.295 (0.951)		0.772 (0.988)	1.251 (0.971)		0.734 (1.017)
Asset index		-2.895 (4.076)		-0.521 (4.393)	-2.705 (4.087)		-0.226 (4.416)
<i>Child's information</i>							
Age in months			-0.072 (0.060)		-0.065 (0.061)	-0.092 (0.059)	-0.073 (0.062)
Premature			0.371 (1.058)		0.446 (1.107)	0.109 (1.082)	0.585 (1.140)
Constant	9.302 (2.005)	3.624 (1.573)	7.874 (1.593)	5.255 (2.364)	5.260 (2.252)	11.650 (2.635)	6.883 (2.959)
N	455	417	463	405	415	451	403

Notes: Standard errors in parentheses. \*  $p < .1$ , \*\*  $p < .05$ , \*\*\*  $p < 0.1$ .

**Table 3**  
OLS regression results predicting risk of depression.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Caregiver's information</i>							
Mother's age	−0.001 (0.003)			−0.001 (0.003)		−0.001 (0.003)	−0.001 (0.003)
Mother completed middle school	−0.041 (0.043)			−0.021 (0.050)		−0.045 (0.043)	−0.024 (0.050)
Mother completed secondary school	−0.099** (0.041)			−0.054 (0.053)		−0.104** (0.042)	−0.059 (0.054)
Mother works full time	−0.022 (0.041)			−0.010 (0.045)		−0.021 (0.041)	−0.011 (0.044)
Mother works part time	0.005 (0.045)			0.014 (0.047)		0.008 (0.045)	0.016 (0.048)
<i>Household's information</i>							
Receives assistance from government		0.081** (0.035)		0.073** (0.035)	0.083** (0.035)		0.074** (0.035)
Mother and father live together		0.001 (0.046)		−0.013 (0.048)	−0.001 (0.047)		−0.015 (0.048)
Family had a negative shock in past 12 months		0.029 (0.031)		0.028 (0.031)	0.030 (0.031)		0.031 (0.031)
Number of other children in the household		0.021 (0.016)		0.022 (0.018)	0.021 (0.016)		0.020 (0.019)
Other adults in the household		0.030 (0.046)		0.006 (0.046)	0.030 (0.047)		0.006 (0.047)
Asset index		−0.013 (0.153)		0.064 (0.173)	−0.007 (0.154)		0.071 (0.174)
<i>Child's information</i>							
Age in months			−0.001 (0.002)		−0.002 (0.003)	−0.002 (0.002)	−0.002 (0.003)
Premature			0.009 (0.055)		0.014 (0.058)	0.007 (0.058)	0.021 (0.062)
N	455	423	463	411	421	451	409

Notes: Standard errors in parentheses.

\*  $p < .1$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

statistically significant predictors of the risk of depression. To explore whether the relationship between maternal depression and key socio-demographic predictors varied by family structure, negative shocks, and receipt of government assistance, we estimated fully interacted models. Then we ran the full models on three sets of subgroups to examine whether the predictive power of each independent variable differed for different groups.

After applying inverse probability weighting to account for potential attrition bias, we re-estimated all models using the weighted sample. These weighted results (see Supplementary Tables S8 and S9) closely mirrored the unweighted estimates in both magnitude and statistical significance, reinforcing the robustness of our findings and suggesting that differential attrition is unlikely to have substantially biased our conclusions.

#### Family structure

We only interpret coefficient differences that were statistically significant in the fully interacted models (see Supplementary Table S2). For family structure and depressive symptoms, asset index was associated with higher depressive symptoms and for families where parents do not live together compared to families where parents live together ( $b = 22.10$  vs.  $-5.10$ ;  $p < .05$ ). A similar pattern was observed for risk of depression ( $b = 0.77$  vs.  $-0.09$ ;  $p < .10$ ). No other predictors differed across the two subgroups (see Supplementary Table S3).

#### Negative shocks

Fully interacted results showed that there are no significant differences among the associations between predictors and depression symptoms and risks of depression among households experiencing negative shocks vs. not (see Supplementary Table S4 & S5).

#### Government assistance status

To explore whether the relationship between maternal depression and key sociodemographic predictors varied by receipt of government

assistance, we estimated fully interacted models (see Supplementary Table S6). For mothers working part-time, depressive symptoms differed by government assistance status. Among those not receiving assistance, part-time work was associated with significantly higher depressive symptoms ( $b = 2.64$ ,  $p < .10$ ) and greater risk of depression ( $b = 0.16$ ,  $p < .05$ ). In contrast, among those receiving assistance, part-time work was associated with lower depressive symptoms ( $b = -3.40$ ,  $p < .10$ ) and lower risk ( $b = -0.20$ ,  $p < .05$ ). These results suggest that government assistance may buffer the psychological burden of part-time employment. No other interaction terms were statistically significant, indicating that the effects of other predictors, such as education, household structure, or exposure to shocks, did not vary by assistance status (see Supplementary Table S7).

#### Discussion

This study explored the prevalence and predictors of depressive symptoms and depression risk among a sample of economically vulnerable mothers in urban Uruguay. The case of Uruguay is especially noteworthy given its status as a high-income country with persistent socioeconomic disparities—and the highest suicide rate in Latin America, a region where depression rates are nearly twice the global average (Pan American Health Organization, 2018; World Health Organization, 2020). We found that 12 % of mothers in our sample were at risk of depression ( $CES-D \geq 16$ ), a rate lower than reported in previous studies in Uruguay, which have found prevalence rates of 29 % or higher (Casarotti, 2002; Lista, 2008; Ardoino et al., 2015). One likely explanation for this discrepancy lies in the measurement tool and threshold used. This study employed the full 20-item CES-D scale and a conservative cut-off score of 16 to indicate risk of depression, which is commonly used in clinical screening but may yield lower prevalence estimates compared to other instruments or more lenient thresholds. Differences in how depressive symptoms are operationalized across studies—such as the use of abbreviated scales, context-specific

adaptations, or broader screening criteria—can substantially influence reported rates. While the overall rate of mothers at risk for depression in our sample was 12 %, our regression models suggest that this risk is significantly higher among specific subgroups. For example, mothers in households receiving government assistance were eight percentage points more likely to meet the depression risk threshold, implying an estimated prevalence of approximately 20 % in that subgroup. This helps reconcile our overall findings with prior studies reporting higher depression rates in similarly vulnerable populations and underscores the disproportionate burden among mothers facing acute economic hardship.

Only 35 % of mothers in our sample had completed middle school, compared to 45 % nationally (INE, MSP, and UNICEF, 2018), highlighting the heightened socioeconomic disadvantage of the study population. Consistent with prior literature, we found that educational attainment—particularly completion of secondary school—was significantly protective against both depressive symptoms and the risk of depression (Lund et al., 2010; Peele and Wolf, 2020). While women in Uruguay have generally outpaced men in educational attainment, young women (ages 15–29) still comprise a significant share of those who disengage from formal education due to household responsibilities (Fernández Aguerre et al., 2021). These findings reinforce the need for expanded access to alternative education pathways, including informal and vocational programs, that can re-engage economically vulnerable mothers who left school early due to caregiving or work obligations.

More than half of the sample experienced a negative economic shock in the past year, and such shocks were robustly associated with elevated depressive symptoms. This pattern held not only in the full sample but also among households receiving government assistance and among both partnered and non-partnered mothers. These findings align with prior evidence across high- and low-income countries, showing that income volatility and financial stress are key contributors to maternal depression (Kuhn et al., 2009; Scheve et al., 2022). In the current global climate—where economic uncertainty and inflation have intensified due to post-pandemic recovery and geopolitical instability—the mental health consequences of financial shocks may become even more widespread. These findings underscore the urgency of reinforcing mental health and social protection systems, especially for women and caregivers in low-income households.

Interestingly, we found that receiving government assistance was consistently associated with higher depressive symptoms and increased risk of depression. One possible explanation is that receipt of assistance may reflect deeper structural vulnerabilities not fully captured by other indicators. In addition, recent studies suggest that welfare stigma can generate psychological distress, particularly in Latin American contexts. Nicolau (2022), for example, found that participation in a conditional cash transfer program was associated with heightened shame, social self-consciousness, and discomfort in public settings—factors that may contribute to the observed association between assistance and depressive symptoms.

Family structure also played a complex role. Among households where mothers and fathers did not live together, we observed a strong and surprising association between asset ownership and higher CES-D scores. In particular, levels of asset index matter differently for families where mother and father live together vs. families where mother and father do not live together. With a similar level of asset index, depressive symptoms, and risk of depression among mothers in families where mothers and fathers do not live together increased, while depressive symptoms and risk of depression among mothers in families where mothers and fathers live together decreased. This may reflect a strong benefit of having the support of another family member. On the other hand, when not having another family member, heightened pressure that single mothers face in striving to secure material stability while managing caregiving responsibilities in relative isolation. These findings align with prior work showing that single mothers experience elevated stress and poorer mental health outcomes due to limited

support, financial insecurity, and social exclusion (Agnafors et al., 2019; Bucheli and Vigorito, 2017; Guarín et al., 2023). In Uruguay, single motherhood is common, and many single mothers live in extended or composite households. Yet, these mothers reportedly receive 1.6 times less financial support than their counterparts, potentially compounding their stress and depression risk. These findings highlight the need for targeted financial and mental health support for single-parent households.

Overall, this study highlights how maternal mental health is shaped by the intersection of poverty, gender, caregiving demands, and state policy. It suggests that social programs—whether direct assistance or parenting support—must be sensitive not only to economic constraints but also to the psychosocial realities of mothers' daily lives. In particular, it calls for a reimagining of maternal well-being as a structural, rather than solely individual, outcome: one that requires cross-sector investments in education, mental health care, social protection, and gender equity.

#### *Future research and conclusion*

These findings suggest several directions for future research. First, as the results highlight the importance of income and education levels as protective factors against the risk of depression, it is crucial for different sectors to invest in better educational attainment and employment opportunities for girls and women. Secondly, targeted financial and governmental assistance for single parents, especially those residing in extended family households, should be prioritized to alleviate the pressures arising from caregiving responsibilities and limited resources. Third, policies and practices should incorporate robust social safety nets targeting mental health through intervention programs. Evidence from other regions supports these approaches. For example, a study in Western Kenya by Haushofer and Shapiro (2016) showed that a large amount of unconditional cash transfers generally improves parents' psychological well-being and increases asset holding. A study from Côte d'Ivoire also connected unconditional cash transfers with reduced stress in mothers (Wolf et al., 2024). Notably, maternal psychological well-being is improved when the transfers are made to the mother instead of the father, suggesting a holistic benefit of financial support for women in economically vulnerable regions. Fourth, to our knowledge, this study is the first to focus on negative shocks and depression among vulnerable mothers in Uruguay. Research on mental health in Uruguay, especially among mothers in this population, is growing, but little is known about the relations between stressful life events and family well-being in relation to motherhood in Uruguay. Further research is needed to closely examine the specific types of negative shocks these families experienced, and how such events differentially associate with mental health symptomatology and clinical diagnoses within this population. Finally, this research suggests further investigation into the influences of maternal well-being, positive parent-child relationships, and family socioeconomic status on child outcomes.

The findings of this study should be carefully interpreted with some limitations. First, the research relies only on quantitative data, limiting the understanding of the associations of poverty on long-term family and child well-being. Research using a qualitative approach enables a more nuanced examination of the risk factors that shape these relationships and would complement, as well as corroborate, the findings presented above. While qualitative investigation was not possible for our study, we recommend it for future research in this domain. Secondly, the depression measures rely on self-report, which has a risk of response bias. We address this by implementing the CES-D: a scientifically validated questionnaire. While the CES-D scale has not been locally validated in Uruguay, its use is supported by extensive validation in Spanish-speaking and Latin American samples, which strengthens its relevance in this context (Ruiz-Grosso et al., 2012; González et al., 2017). Future research that validates this instrument in Uruguay is recommended.

Third, although this study contributes to the limited body of research

on maternal mental health within economically vulnerable communities in Uruguay, our focus on urban mothers limits the generalizability of the findings to rural contexts. Future investigations should expand to rural areas, ensuring more inclusive findings and more regionally or nationally representative samples. Finally, while this research has examined income levels and education as predictors for symptoms and risks of depression among the sample, other important factors, such as food insecurity, exposure to violence, social support, and networks, were not tested. Future research should pay attention to other potential predictors of depression among mothers in this context. Although we adjusted for a wide range of covariates, residual confounding may still be present. For example, unmeasured variables such as maternal trauma history, social support networks, intimate partner violence (IPV), or mental health stigma may influence both socioeconomic position and depressive symptoms. Additionally, given that participants were recruited from parenting programs and ECD centers, results may not generalize to mothers who are not engaged with such services. Future studies should explore community-wide representative samples to assess the broader applicability of these findings. Additionally, while interaction models allowed us to examine differential associations by government assistance status, these analyses were exploratory and may be underpowered to detect small effects. Caution is warranted in interpreting subgroup differences, and future studies with larger samples should further test these moderating relationships.

Together, our findings emphasize the consistent benefit of income and education in protecting mothers from elevated depressive symptoms and the risk of depression. The results suggest that policies and programs should promote financial and educational support for Uruguayan mothers, especially single mothers living in low-income extended or composite households. Greater attention to the design and delivery of parenting interventions is also warranted, ensuring that support mechanisms alleviate rather than unintentionally exacerbate stress. Additional emphasis on unconditional cash transfers, vocational training, and inclusive early childhood policies may play a critical role in improving maternal mental health and overall family well-being, particularly in the face of growing economic instability.

### Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used Grammarly to refine readability. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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### CRedit authorship contribution statement

**Anahita Kumar:** Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Investigation, Formal analysis. **Juanita Bloomfield:** Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Ana Balsa:** Supervision, Project administration, Funding acquisition, Data curation. **Hang Do:** Writing – review & editing, Writing – original draft. **Alejandro Cid:** Writing – review & editing, Supervision, Resources, Project administration, Funding acquisition, Data curation. **Guilherme Lichand:** Writing – review & editing, Supervision. **Sharon Wolf:** Writing – review & editing, Supervision, Methodology, Investigation, Formal analysis.

### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this manuscript.

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### Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jadr.2025.100978.

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