

Resilience mediates the relationship between household dysfunction in childhood and postpartum depression in adolescent mothers in Peru

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1. Introduction

Postpartum depression is related to a variety of adverse health outcomes for mothers and children [1–3]. Of particular concern, when compared to older mothers, being an adolescent mother is associated with an assortment of risks that precede the pregnancy, such as adverse experiences in childhood, as well as risks that occur together with raising the child, such as experiencing postpartum depression [2–5]. Children of mothers with postpartum depression are more likely to have a constellation of adverse outcomes including lower infant birth weight, lower child growth, increased risk for childhood obesity, as well as adverse neurodevelopmental and behavioral outcomes [6,7] that may persist into childhood [8] and increase the risk for childhood mental health disorders [9]. Moreover, estimates in low and middle income countries suggest up to 25% of pregnant women experience symptoms of common mental health disorders including depression [6]. Thus, adolescent mothers in low and middle income countries are particularly vulnerable to pregnancy related complications, as maternal and reproductive health problems are a key cause of disease burden [10].

One consistent predictor of postpartum depression is adverse experiences in childhood [11]. Adolescent mothers living in post-conflict countries, such as Peru, are known to have a high burden of childhood adversity [12]. For pregnant women in Peru, prior exposure to adverse childhood experiences is associated with an increased risk of poor general health, intimate partner violence, and depressive symptoms occurring during pregnancy [13]. To date, the majority of research has examined associations of physical, sexual, or psychological abuse experienced in childhood or adulthood intimate partner violence with postpartum depression in Peru [6,13–15]. While evidence suggests that childhood abuse is one of the strongest predictors of psychopathology such as postpartum depression, other forms of adversities, such as overall household dysfunction, are also important predictors of postpartum depression [16]. Household dysfunction encompasses events that occurred for others in the child's household environment including

substance use in the household, incarceration of a household member, mental health disorders, and witnessing violence against their mother. Household dysfunction, along with other forms of adverse childhood events, contributes to poor health outcomes in adulthood [17], including increased likelihood of an unplanned pregnancy [18]. Yet, few studies have focused specifically on household dysfunction as related to postpartum depression [16].

Some investigators have examined resilience, or the strengths and resources that enable an individual to overcome the adverse effects of exposure to a risk factor [19]. Resilience refers to “the process of overcoming the negative effects of risk exposure, coping successfully with traumatic experiences, and avoiding the negative trajectories associated with risks [19].” Resilience is not to be confused with positive outcomes or a lack of vulnerability. While some researchers refer to resilience as an outcome, resilience models would operationalize the outcome as “positive adjustment” or a “stable trajectory of mental health despite exposures to risk factors” [20]. Instead resilience is a set of promotive factors, including assets (i.e., coping skills) or resources (e.g., community or organizations), that help an individual evade negative consequences of exposure [19]. Thus, the present manuscript conceptualizes as a set of promotive factors. In particular, we are interested in asset resilience, which we refer to here as resilience skills. Resilience skills have been conceptualized to include skills such as an individual's ability to adapt to change, to cope with stress, and to tolerate negative emotions [19,21]. Resilience are active coping strategies that participants engage in order to minimize the negative consequences of resilience. In this way resilience skills can function as a compensatory (i.e., resilience has a direct effect on outcome), protective (i.e., resilience reduces effect on outcome), or challenge (i.e., resilience and risk factor have curvilinear relationship) promotive factors against negative life events or risk exposure [19]. Indeed, a substantial body of work has looked at resilience skills that mediate the relationship between risk exposures (e.g., adverse childhood experiences) and mental health [22–25].

In the context of the present research, despite the consistent finding that household dysfunction and other adverse childhood experiences are a risk for postpartum depression [3], not all young adult mothers with a history of adverse childhood events develop postpartum depression. Prior research has reported that resource resilience in adulthood,

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such as having social support and a positive maternal-child bond, moderate the relationship between adverse childhood events and symptoms of mental health in pregnant or postpartum period women [11]. Of note, investigators have reported that resilience skills mediate the relationship between childhood neglect and postpartum mental health symptoms [22] including postpartum depression [26,27], and risk of suicide [28]. However, to date, no investigative team has examined the influence of resilience skills on the relation between childhood household dysfunction and postpartum depression within adolescent mothers in Peru. Understanding the role of resilience in postpartum depression may inform future research on interventions to foster resilience skills which aim to reduce the postpartum depression health burden in adolescent mothers and their children.

Thus, the present study investigated the relationship between childhood household dysfunction and postpartum depression in adolescent mothers in Peru. We hypothesized that there would be a positive relationship between household dysfunction in childhood and postpartum depression. Additionally, we evaluated the extent to which, if at all, resilience skills mediated observed associations [15]. As discussed above, there are several ways resilience skills may influence outcomes including compensatory (i.e., resilience has a direct effect on outcome), protective (i.e., resilience reduces effect on outcome), or challenge (i.e., resilience and risk factor have curvilinear relationship) promotive factors against negative life events or risk exposure [19]. In line with prior research which looks at the mediating effect of resilience skills on the relation between other types of childhood neglect and mental health status in adulthood [26,27], and consistent with the protective model of resilience, in which the resilience skills may diminish but does not remove the effect of the risk on the outcome in the population [19], we hypothesized that the relationship between household dysfunction in childhood and postpartum depression would be mediated by resilience skills.

2. Methods

2.1. Participants and procedure

The present study was conducted as a part of the Teen Pregnancy Outcomes Maternal and Infant Study (TPROMIS) carried out between November 2016 and September 2018. TPROMIS is an investigation of the risk and protective factors for trauma and mental health among adolescent mothers. Eligible participants ($N = 789$) were adolescent postpartum mothers, aged 14–18 years old, who gave birth at the Hospital San Bartolomé, Nacional Docente Madre Niño, in Lima, Peru. Following approval from the institutional review boards of the Harvard T. H. Chan School of Public Health in the Office of Human Research Administration, Boston, MA and San Bartolome, Lima, Peru, and completion of written informed consent, participants were interviewed using questionnaires. All interviews were completed in a private setting within a 2–3 days postpartum. Interviews were conducted by a midwife, fluent in Spanish, and trained in research methods. Participants were asked to provide information about sociodemographic characteristics, adverse experiences in childhood, symptoms of depression and anxiety, suicidal ideation, and resilience skills.

2.1.1. Postpartum depression

The Patient Health Questionnaire (PHQ-9) is a 9-item scale which screens for depression [29] by asking participants to rate the frequency to which they experience depressive symptoms with response options of (0) “not at all,” (1) “several days,” (2) “more than half the days” and (3) “nearly every day.” In the present study, participants responded to items prompting them to recall the frequency they experienced depressive symptoms in the prior 2-weeks, or 14-days. The summary score of PHQ-9 scores can be used as a severity measure and range from 0 to 27. However, a provisional diagnosis of depression can also be assessed via cut off scores. Depression can be defined as score of 10

or greater, which has been supported by several large studies including a meta-analysis of individual participant data [30,31]. This cut-off for the PHQ-9 has also been validated in Spanish-speaking and pregnant populations [32,33]. The PHQ-9 was also found to have good reliability among pregnant women in Peru [14]. Cronbach's alpha for depression was acceptable at 0.74.

2.1.2. Household dysfunction in childhood

The adverse childhood experiences questionnaire utilized in the present study was adapted from Childhood Physical and Sexual Abuse Questionnaire [17]. Participants were asked to consider from “the time while you were growing up to now” and identify whether they had experienced the following events: (1) substance abuse in the household (alcohol, or other illicit substances), (2) mental illness (depression or suicide attempt) in the household, (3) incarceration of a household member, and (4) witnessed violence against their mother or step-mother (pushed, grabbed, slapped, or object thrown, being kicked, being bitten, being hit with fist, or being hit with a hard object, being repeatedly hit over at least a few minutes, or being threatened with or hurt by a knife or gun) in the household. The presence of each type of household dysfunction was coded with a binary indicator. Participants were defined as exposed to a category if they responded “yes” to 1 or more of the questions in that category. Cronbach's alpha for household dysfunction was acceptable at 0.75.

2.1.3. Resilience

Resilience skills were assessed using the Connor-Davidson Resilience Scale 10-item (CD-RISC-10) [34], an abbreviated version of the 25-item CD-RISC [21]. Participants rate how often they identify with statements of resilience, such as “I am able to adapt to change”, apply to them from (0) “never” to (4) “almost always.” The CD-RISC assesses a respondents ability to: (1) adapt to change, (2) deal with whatever comes their way, (3) try to see the humorous side of problems, (4) bounce back after illness or hardship, (5) achieve goals despite obstacles, (6) believe that coping with stress can strengthen them, (7) stay focused under pressure, (8) not be easily discouraged by failure, (9) think of themselves as a strong person, and (10) handle unpleasant feelings. Resilience skills are calculated by summing participants' scores that range from 0 to 40. The Spanish language version of CD-RISC-10 has been previously validated [35]. Our team has recently documented the construct validity and reliability of the CDI-RISC-10 in the present study population (Levey, 2020, personal communication). Cronbach's alpha for resilience skills was good at 0.8.

2.1.4. Other covariates

Participant age was categorized as: 14–15, 16–17, and 18 years. Other sociodemographic variables were categorized as: educational attainment (≤ 6 years, 7–12 years, and > 12 years of completed schooling); participant ethnicity (Mestizo (or mixed race) vs. other); living situation (living with parents, living with partner, or other); access to basics such as foods (hard, not very hard); and planned pregnancy (yes, no).

2.2. Statistical analysis

We first examined the frequency distribution of demographic variables and childhood household dysfunction. Comparisons of categorical variables were made between those who experienced household dysfunction, and those who did not using Chi-squared tests. Then, student's *t*-tests evaluated mean differences. Logistic regression was used to calculate odds ratios (ORs) and 95% confidence intervals (95% CI) to assess the relation of exposure factors that were consistent with household dysfunction and postpartum depression. In addition, exploratory mediation analysis was conducted to assess if the relation between childhood household dysfunction and postpartum depression could be partially explained through the indirect effects of resilience skills). Mediation analysis tested whether the relation between childhood household

dysfunction and postpartum depression could be explained through the pathway of resilience skills, or both. Resilience is a hypothesized mediator of adverse experiences in childhood (i.e., household dysfunction) and mental disorders (i.e., postpartum depression) [22–25,36]. We conducted the mediation analysis in line with other epidemiological studies that have sought to understand mechanistic pathways [37]. The mediation analysis was accomplished by fitting two regression models, a log-linear regression for resilience skills (the mediator) and a log-linear regression model for postpartum depression, adjusting for confounders. The mediation analysis decomposes the total effect of household dysfunction on postpartum depression into two components: the OR of a natural direct effect (NDE) and an OR of a natural indirect effect (NIE). The NDE is interpreted as the effect of household dysfunction on postpartum depression if the mediator (resilience skills) was set to what it would have been without household dysfunction as a child [38]. The NIE is interpreted as the effect on postpartum depression when household dysfunction is present after setting resilience skills (mediator) to what it would have been with versus without household dysfunction as a child. All analyses were performed with Stata [39].

3. Results

Table 1 summarizes the sociodemographic and mental health characteristics of the study sample. Mean age of the participants was approximately 17 years ($M = 17.1$, $SD = 1.1$); nearly half of the participants living with the father of the infant (45.12%), and the

Table 1
Sociodemographic and mental health characteristics of the study population ($N = 789$).

Characteristics	All participants ($N = 789$)	
	n	%
Age (years)		
≤ 15	91	11.7
16–17	309	39.7
18	379	48.7
Education (years)		
≤ 6	27	3.5
7–12	730	93.7
> 12	22	2.8
Mestizo ethnicity	537	68.1
Live with		
Parents	212	27.3
Father of your baby	351	45.1
Other	215	27.6
Difficulty paying for basics		
Very hard/hard/somewhat hard	539	73.2
Not very hard	197	26.8
Planned Pregnancy	130	16.5
C-section delivery	191	24.2
Childhood history of substance use in household		
Alcohol	121	15.3
Other illicit substances	47	6
Both alcohol and other illicit substances	30	3.8
Childhood history of incarceration of a household member	52	6.6
Childhood history of mental illness in household		
Depression or other mental illness	36	4.6
Suicide attempt	41	5.2
Both mental illness and suicide attempt	14	1.8
Childhood history of witnessing violence against their mother		
Pushed, grabbed, slapped, object thrown at	143	18.1
Kicked, bitten, hit with fist, hit with hard object	96	12.2
Hit repeatedly over at least a few minutes	89	11.3
Threatened with, or hurt by, knife or gun	9	1.1
Depressive disorders (PHQ-9 ≥ 10)	81	10.3
	Mean	SD
Age (years)	17.06	1.12
Resilience (CD-RISC)	34.5	5.3

Abbreviations: PHQ-9, The Patient Health Questionnaire 9-item, CD-RISC, Connor-Davidson Resilience Scale 10-item.

overwhelming majority of participants completed at least seven years of education (93.71%). Roughly 73% of the participants reported difficulty paying for basics such as food items. The prevalence of postpartum depression was 10%. About 20% of the participants reported a childhood history of substance use in the household, 6% reported a childhood history of incarceration of a household member, about 10% reported a childhood history of mental illness in the household, and about 16% reported a childhood history of witnessing violence committed against their mother.

The association between the history of childhood household dysfunction and postpartum depression is presented in Table 2. Compared with those who did not report childhood dysfunction, those who reported experiencing any childhood household dysfunction had increased odds of postpartum depression (aOR = 3.0; 95% CI: 1.88–4.82). After adjusting for potential confounders including age, race, and difficulty paying for basics, those who had childhood experience with substance abuse in the household (aOR = 2.79; 95% CI 1.63–4.7), incarceration of a household member (aOR = 2.94; 95% CI 1.37–5.91), mental illness in the household (aOR = 3.18; 95% CI 1.59–6.02), or witnessing violence committed against their mother (aOR = 1.91; 95% CI 1.09–3.26) had increased odds of postpartum depression compared with those who reported no household dysfunction in childhood. Given prior findings which focus on the robust influence of childhood physical and sexual abuse on adult health outcomes [16], we further adjusted for childhood physical or sexual abuse. The magnitude of associations remained virtually identical for any childhood household dysfunction (aOR = 3.16, 95% CI 1.96–5.14), substance abuse in the household (aOR = 2.91, 95% CI 1.69–4.93), incarceration of a household member (aOR = 2.63, 95% CI 1.21–5.36), mental illness in the household (aOR = 3.17, 95% CI 1.58–6.04), and witnessing violence committed against their mother (aOR = 2.05, 95% CI 1.15–3.55). Additionally, we looked at the cumulative risk of reporting childhood household dysfunction. Those who reported one type of dysfunction (aOR = 3.04, 95% CI 1.70, 5.35), two types of dysfunction (aOR = 1.65, 95% CI 0.56, 3.90), and three or more types of dysfunction (aOR = 6.10, 95% CI 2.67, 13.3) all had a higher risk of postpartum depression than those who reported no childhood household dysfunction. Logistic regression assessing the cumulative effect of reported childhood dysfunctions found a positive relationship between number of childhood household dysfunctions reported and postpartum depression ($B = 0.53$, $p < 0.001$).

Since resilience skills may be on the causal pathway between household dysfunction in childhood and postpartum depression, we explored the extent to which resilience skills (as measured using CD-RISC) are a mediator of the association of childhood household dysfunction with sleep postpartum depression (Fig. 1). From these analyses, we found that resilience skills accounted for 44% of the indirect effect of the relation between substance use in household and postpartum depression (Fig. 1). Similarly, resilience skills accounted for 64% of the indirect effect of between the incarceration of a household member and postpartum depression, 54% of the indirect effect of between mental illness in the household and postpartum depression, and 54% of the indirect effect of between witnessing violence committed against their mother in household and postpartum depression (Fig. 1).

4. Discussion

The present study extends the literature by documenting increases in the odds for postpartum depression among adolescent mothers with a history of childhood household dysfunction. This finding was also true for the subtypes of childhood household dysfunction including substance use in the household, mental illness in the household, incarceration of a household member, and witnessing violence against their mother, which were all associated with higher odds of postpartum depression. Additionally, the number of childhood household dysfunctions reported was associated with increased risk for postpartum depression. Our findings are largely consistent with prior studies

Table 2
Association between childhood household dysfunction and postpartum depression (N = 789).*

Household dysfunction	No depression		Depression		Unadjusted OR (CI 95%)	Adjusted OR (CI 95%)
	N	%	N	%		
Number of household dysfunctions reported						
No dysfunction	500	63.37	36	4.56	Reference	Reference
Any dysfunction	208	26.36	45	5.7	3.00 (1.89, 4.82)	3.00 (1.88, 4.82)
Number of household dysfunction						
1	125	15.84	26	3.29	2.96 (1.71, 5.10)	3.04 (1.70, 5.35)
2	54	6.84	7	0.89	1.85 (0.72, 4.14)	1.65 (0.56, 3.90)
≥ 3	29	3.68	12	1.52	5.9 (2.70, 12.4)	6.10 (2.67, 13.3)
*p-value for trend					B = 0.53, p < 0.001	B = 0.53, p < 0.001
Type of household dysfunction						
Substance use	111	13.94	27	3.42	2.69 (1.61, 4.42)	2.79 (1.63, 4.7)
Mental illness	47	5.96	16	1.03	3.46 (1.81, 6.34)	3.18 (1.59, 6.02)
Incarceration	40	5.07	12	1.52	2.94 (1.42, 5.72)	2.94 (1.37, 5.91)
Violence against mother	125	15.84	23	2.92	1.85 (1.08, 3.08)	1.91 (1.09, 3.26)

Note: Analysis adjusted for maternal age (years), race (Mestizo vs. Other), difficulty paying for basics, * = Logistic regression.

documenting associations between household dysfunction and adverse health outcomes [16,40].

While other studies have looked at the influence of resilience skills on household dysfunction and other forms of adverse experiences in childhood [22,26–28], to our knowledge, this is the first study investigating resilience skills as a mediator of the relationship between childhood household dysfunction and postpartum depression in adolescent women in Peru. We found that the relationship between childhood household dysfunction and postpartum depression in adolescent mothers in Peru was partially mediated by resilience skills. The mediating effect of resilience is reminiscent of the Albee hypothesis, which postulated an equation in which “psychopathology risk” could be estimated by an “individual’s stress level” + “their particular organic factors” divided by “their coping skills” + “their self-esteem and social support” [41]. A more recent version of this is the mind body medicine equation, which estimates “vulnerability to stress-related non-communicable diseases” by dividing an individual’s stress level (“genetic vulnerability” + “adverse childhood experiences”) by their resilience

factors (“genetic endowment” + “positive psychology” + “healthy lifestyle”) [42].

The influence of resilience skills on the relationship between childhood household dysfunction and postpartum depression may have some preventative and clinical implications. Prior research has shown potential for postpartum home interventions, which target household dysfunction directly by increasing the quality of home environments [43]. Our findings suggest that influencing household dysfunction may also decrease postpartum depression in adolescent mothers. Thus, home based interventions that both aim to prevent childhood household dysfunction and provide strategies for developing resilience skills to cope with household dysfunction may also provide multiple avenues of prevention for and treatment of the intergenerational effects of postpartum depression [3,7]. Future work should investigate the clinical utility of developing resilience skills, like coping with adverse events or tolerating negative emotions, alongside other maternal health interventions as a way to diminish the injurious effects of household dysfunction on postpartum depression for adolescent mothers.

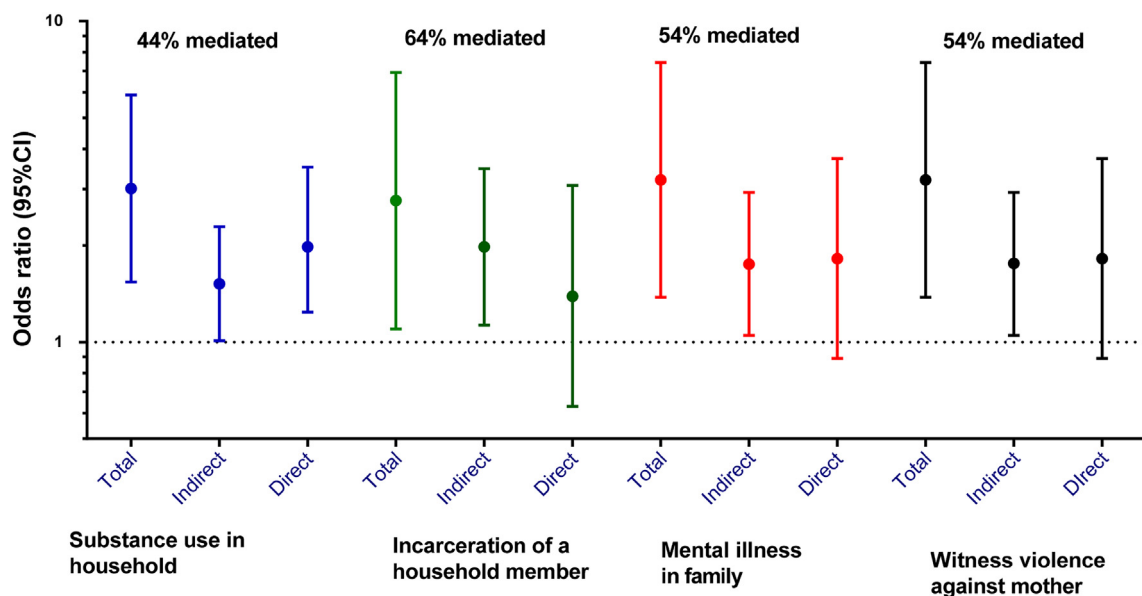


Fig. 1. Total, indirect and direct effect of resilience onto relation between childhood household dysfunction and postpartum depression. Model adjusted for age, education, ethnicity, living situation, difficulty accessing basics, and planned pregnancy (N = 789).

A few limitations should be considered when interpreting these study findings. First, care should be taken in interpreting the relationship between childhood household dysfunction and postpartum depression as the data were collected in a cross-sectional interview. Second, our results may not be generalizable to all adolescent mothers in Peru. As the participants were recruited from just one of the main hospitals in Lima, and with only 35% of Peruvian adolescents living in Lima [44], the experiences of these young women may not represent the experiences of teen mothers throughout the country. Additionally, up to 65% of adolescents in Lima live in low-income human settlements where they are unlikely to have access to health care [44]. In these environments, the experience of family tension, poverty, challenging transitions, racism, and violence may be even more amplified [45]. Thus, it is important to consider the effect of resilience skills based on the relevant challenges faced by adolescent mothers dependent on each particular social environmental context. Finally, there are limitations to self-report measures of resilience. Resilience theorists argue that the best measures of resilience are context, population, risk, and outcome dependent [19]. While our selected measure includes many resilience skills (e.g., coping with adverse events), there may be other skills specific to being an adolescent mother in Peru not measured by the scale used here. It is important to note that resilience is not a static trait, but a contextual set of skills which are dependent on variables such as environment, population, and outcome measured [19].

5. Conclusions

In summary, childhood household dysfunction is positively related to postpartum depression in adolescent mothers in Peru. We found that resilience skills partially mediated this relation between childhood household dysfunction and postpartum depression. This is the first study, to our knowledge, to assess resilience skills as a mediator of the relation between childhood household dysfunction and postpartum depression in adolescent mothers in Peru. Future research should investigate the potential clinical implications of teaching resilience skills as a strategy to reduce the harmful effects of household dysfunction on postpartum depression in adolescent mothers in low- and middle-income countries.

Disclosure of potential conflict

All authors have no potential conflict, perceived or otherwise to report.

Sources of funding and acknowledgments

This research was supported by funding from the National Institute of Health's National Center on Minority Health and Health Disparities (T37MD001449) and National Institute of Mental Health (1t32MH116140-01, 5T32MH116140-02).

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