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Household Social Needs, Emotional Functioning, and Stress in Low-Income Latinx Children and their Mothers

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Authors' contributions

Study concept/design; Acquisition, analysis, interpretation of data; Critical revision of the manuscript: all authors
Drafting of the manuscript: Keeton, Bell, Gottlieb, Drake, and Fernandez y Garcia
Statistical analysis: Keeton, Bell, Drake, Pantell, Hessler
Administrative, technical, or material support: Wing, Gottlieb
Study supervision: Keeton, Bell, Gottlieb

Ethics Approval

This study was based on a secondary analysis of deidentified data and was therefore deemed exempt from full review by the Committee for the Protection of Human Subjects at the University of California, Davis.

Code availability

Code for data cleaning and analysis associated with current submission are available from the corresponding author on reasonable request.

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Abstract

Latinx families may be particularly vulnerable to emotional dysfunction, due to higher rates of economic hardship and complex social influences in this population. Little is known about the impact of environmental stressors such as unmet social needs and maternal stress on the emotional health of Latinx children from low-income families. We conducted secondary analyses using survey and biomarker data from 432 Latinx children and mothers collected in a separate study. We used binomial and multinomial logistic regression to test if household social needs, or maternal perceived stress or hair cortisol concentration (HCC), predicted child measures of emotional functioning or child HCC, independent of relevant sociodemographic factors. Approximately 40% of children in the sample had symptoms consistent with emotional dysfunction, and over 37% of households reported five or more social needs. High perceived maternal stress predicted higher odds of child emotional dysfunction (OR = 2.15; 95% CI [1.14, 4.04]; p = 0.01), and high maternal HCC was positively associated with high child HCC (OR = 10.60; 95% CI [4.20, 26.74]; p < 0.01). Most individual household social needs, as well as the level of household social need, were not independently associated with child emotional dysfunction or child HCC. Our findings begin to define a framework for understanding emotional health, stress, and resilience when caring for Latinx children and mothers living with high levels of social need, and the need for integrated mental health and social needs screening and interventions in settings that serve this population.

Keywords

Child emotional health; maternal stress; social needs; hair cortisol; Latinx

Introduction

Poor child emotional health can influence child development, interfere with daily functioning, and impact well-being into adulthood (Ghandour et al., 2019; Ogundele, 2018). Over the last two decades, the prevalence of emotional disorders such as anxiety and depression in children in the U.S. has steadily increased (Bethell et al., 2022; Bitsko et al., 2018; Ghandour et al., 2019), though it still may be underestimated secondary to well-studied barriers to accessing mental health diagnosis and treatment services in disadvantaged communities (Alegria et al., 2010; Ghandour et al., 2019; Marrast et al., 2016). At almost $11 billion annually, the costs associated with child mental health conditions are higher than for any other child health disorder (Davis, 2014; Ghandour et al., 2019).

Child Emotional Dysfunction and Unmet Social Needs

Given the known associations between poverty and economic disadvantage and multiple child physical health outcomes, it is not surprising that low household income is associated with higher rates of child emotional dysfunction (Council on Community Pediatrics et al., 2016; Ghandour et al., 2019; Harris & Santos, 2020; Ogundele, 2018). Evidence suggests that associations between poverty and child health are mediated by poverty-related

social risk factors and social needs (Beck et al., 2016; Bethell et al., 2022; Fierman et al., 2016; Rodems & Shaefer, 2020). *Social risk factors* include specific adverse social conditions associated with poor health (Alderwick & Gottlieb, 2019; Bethell et al., 2022). While some ambiguity still exists in identifying the most salient social risk factors for child health, multiple health professional and policy organizations have delineated and recommended screening for common domains of risk that include food, housing, employment, transportation, financial strain, safety, and access to health care (Kreuter et al., 2021). The construct of *social needs* extends the concept of social risk to include individual preferences, emphasizing the patient's shared role in identifying and prioritizing social interventions based on their perception of their most pressing needs (Alderwick & Gottlieb, 2019; Kreuter et al., 2021). Studies have distinguished between the concepts of income poverty and unmet social needs, highlighting that families may experience persistent social needs even if they only endure short-term or transient episodes of income poverty, and that unmet social needs may contribute more to stress than income poverty (Neckerman et al., 2016; Rodems & Shaefer, 2020; Zilanawala & Pilkauskas, 2012).

Over 50% of Latinx households report having any social needs, as compared to 34% of White, non-Latinx households, regardless of income poverty level (Karpman et al., 2018), yet the relationship between unmet social needs and health outcomes in this population is understudied. Global economic hardship is associated with an increased risk for depression in Latinx parents (Ayon et al., 2010; Harris & Santos, 2020), and food insecurity is independently associated with serious psychological distress in Latinx adult populations (Becerra et al., 2015). Mothers that experience economic hardship are at higher risk for both depression (Arroyo-Borrell et al., 2017; Ayon et al., 2010; Harris & Santos, 2020; Zilanawala & Pilkauskas, 2012) and parenting stress (Duran et al., 2018; Luecken et al., 2013), and maternal depression and stress have each been independently linked to child emotional dysfunction (Arroyo-Borrell et al., 2017; Duran et al., 2018; Larson et al., 2008). Poor maternal mental health may negatively impact child emotional health by exposing the child to, or limiting the parent's ability to protect the child from, chronic stress in the environment (Shonkoff & Garner, 2012). A strong and compelling body of evidence demonstrates that structural determinants are the root causes of maternal health inequities experienced by Latinx and BIPOC populations in the U.S., and supports the movement away from interventions that unjustly hold individuals rather than systems responsible for health outcomes (Crear-Perry et al., 2020). This research suggests that advancing upstream solutions to reduce or mitigate social needs is critical to support maternal and child mental health.

Despite this preliminary work, the research on maternal-child emotional health specific to unmet social needs in U.S. Latinx populations is sparse. The paucity of evidence may be due in part to barriers in participant recruitment and data collection unique to this group (Alegria et al., 2010; Hopwood et al., 2009). Much of the current data that exists on these topics is gathered from large survey-based population studies that fail to include sizeable numbers of Latinx families (Hopwood et al., 2009). Evidence on emotional disorders in Latinx populations is additionally limited because many studies fail to account for cultural influences on survey item endorsement and social desirability bias – participants' tendency to provide responses that they consider to be more favorable or acceptable (Hopwood et al.,

2009). The sensitive nature of social needs, particularly around the use of public benefits, also has raised concern for social needs underreporting (Meyer, 2015).

Biomarkers of Stress

The limitations of survey-based research related to emotional health and social needs in Latinx populations have spurred interest in physiologic measures of stress that can be used as proxies for emotional health. The rationale for using physiologic biomarkers of child emotional dysfunction is that chronic stress exposure activates certain inflammatory and hormonal processes at persistent and eventually harmful levels, and in some cases this chronic stress alters gene regulation or expression, or brain structure and function, which impacts emotional health (Bates et al., 2017; Ogundele, 2018; Shonkoff & Garner, 2012). Release of the glucocorticoid hormone, cortisol, produces diverse genomic, metabolic, and physiological changes in response to stress (Khoury et al., 2019) and is now widely used as a biomarker for stress in both adults and children (Bates et al., 2017; Khoury et al., 2019). Studies have found elevated cortisol levels to correlate with poverty (Evans & English, 2002; Luecken et al., 2013), anxiety or depression symptoms (Pervanidou et al., 2013), food insecurity (Ling et al., 2019), and reports of racial discrimination (Berger & Sarnyai, 2015), among other outcomes. Some studies also have explored concordance between cortisol levels of mothers and their children in response to stress, and the factors that may moderate this relationship (Braren et al., 2019; Bryson et al., 2020; Dauegaard et al., 2020; Doan et al., 2020; Hollenbach et al., 2019; Johnson et al., 2018; Ling et al., 2020; Ludmer Nofech-Mozes et al., 2020). However, little research on biomarkers of stress has focused on Latinx mothers and children.

Rates of child emotional dysfunction and stress in the U.S. are high. Reducing these rates will require recognizing the multifactorial etiology of these disorders and developing interventions across the many relevant domains of child and family well-being (Bethell et al., 2022). A small but growing body of literature suggests that unmet social needs contribute to child emotional dysfunction and stress. This work is particularly relevant to Latinx people, who make up over 18% of the U.S. population (Office of Minority Health, 2021) and experience a disproportionate share of both poor mental health outcomes (Macias Gil et al., 2020; Marrast et al., 2016; Paz & Massey, 2016) and social risk (Rodems & Shaefer, 2020), yet have been underrepresented in the existing literature on this topic.. A better understanding of associations between unmet social needs, stress biomarkers, and mental health outcomes in Latinx families can be used to inform meaningful clinical or policy interventions that address mental health disparities in this high risk and marginalized population.

The Current Study

The primary aim of the study was to use survey and biomarker data from Latinx mothers and their children to examine associations between household social needs, maternal perceived and physiologic stress, and child: a) emotional functioning or b) physiologic stress. We hypothesized that high level of household social needs, maternal perceived stress score, and maternal hair cortisol concentration (HCC) would independently and collectively predict increased child emotional dysfunction and child HCC. Our secondary aim was to explore

whether specific social needs were associated with child: 2a) emotional functioning or 2b) child HCC. To accomplish these aims, we leveraged data collected previously in a separate clinical trial (Gottlieb et al., 2020), and performed a secondary analysis of select survey and biomarker data from the enrollment phase of data collection.

Methods

Study Design, Setting, and Sample

This study is a secondary analysis of cross-sectional survey and biomarker data obtained from children and their caregivers during the enrollment phase of the Health Advocates Study II (HASII) clinical trial, conducted between July 2016 and June 2018 in the children's urgent care of a pediatric primary care center nested in a large county hospital in San Francisco, California. Patients aged 0 through 17 years old presenting for a visit with their caregiver were recruited for the trial by convenience sampling; the details of their enrollment and inclusion criteria were published previously (Gottlieb et al., 2020). The current study limited the sample to one child per family and to children whose mothers were the enrolled caregiver (n=549), self-reported "Hispanic or Latino" origin or descent (n=455), and for whom there was complete maternal hair cortisol data (n=432).

Protection of Human Subjects

HASII was approved by University of California, San Francisco Institutional Review Board (IRB), and only participants who consented according to the IRB-approved protocol were included in this study sample. These secondary analyses of deidentified data were deemed exempt from full review by the Committee for the Protection of Human Subjects at the University of California, Davis.

Study Measures and Variables

The child was the unit of analysis; measures collected about the child's mother were included in the analytic models of child health outcomes. At enrollment in HASII, a trained bilingual research assistant administered a survey (in English or Spanish) which caregivers completed about themselves and their children, including questions designed to capture their demographic characteristics, social situation and needs, physical and mental health status, and experiences with adverse events and stress. Caregivers were given the option to respond using written surveys (via electronic tablet), or in the case of literacy concerns, provide verbal responses to the research assistant. The research assistant also obtained a hair sample of approximately 3 cm measured from the scalp of each child and mother with sufficient hair length. More details related to the data collection and analysis protocol for the original clinical trial are available and published elsewhere (Gottlieb et al., 2020).

Outcome Variables—Two outcomes were examined: a) child emotional functioning and b) child HCC. We initially performed analyses with each outcome as a continuous variable, however, two issues emerged that made us question the appropriateness of the models. First, several models exhibited aspects of natural binning such that certain values occurred very frequently and values in between, rarely or never. Second, even if we ignored the binning issue, linearity of associations was also questionable in all models. We then converted each

outcome to a categorical variable and developed categories based on published reference ranges for emotional functioning and even percentile distributions for the hair cortisol (as explained below). The overall results did not differ substantially from the linear models, and thus are presented here for the better fitting categorical analyses.

Child emotional functioning was measured based on caregiver survey report using the parent-proxy version of the Pediatric Quality of Life Measurement Model (PedsQL™) (Varni et al., 2007b). The PedsQL™ 4.0 generic core scales measure the perception of health-related quality of life for children and adolescents in the areas of physical, emotional, social, and cognitive or school functioning, using developmentally appropriate language to adjust questions for different age groups (Varni et al., 2001). The PedsQL™ generic core scales have been demonstrated to be reliable and valid in a number of studies (Varni et al., 2007b; Varni et al., 2001), including those specifically focused on children with mental health conditions (Bastiaansen et al., 2004) and from Spanish-speaking families (Roizen et al., 2008; Seid & Varni, 2005). In those studies, internal consistency reliabilities exceeded the minimum reliability standard of 0.70 required for group comparisons; total scale scores approached or exceeded the recommended alpha criterion of 0.90; construct validity was demonstrated using a known groups approach (Varni et al., 2007b; Varni et al., 2001). Agreement between parent proxy-report and child self-report of the PedsQL™ generic core scales was also assessed and found to be good, especially among samples of healthy children (Varni et al., 2007a, 2007b). In the HASII study, mothers completed the parent-proxy version of the PedsQL™ generic core scales about their children, responding to the questions designed for their child's age group. In the emotional functioning core scale (PedsQL™-EF), parents are asked to assess whether particular symptoms (e.g., sadness, anger, worry) have been a problem for the child over the past month. Items are scored on a five-point Likert scale ranging from 0 (never a problem) to 4 (almost always a problem) and converted to a reverse 100-point scale (where 0=100 and 4=0) with higher scores indicating better functioning (Varni et al., 2001). We dichotomized responses as "high functioning" (score ≥ 64, coded as the reference group) vs. "low functioning" (score < 64), based on recommended PedsQL™-EF cutoff scores for risk of low child emotional functioning in a large, ethnically diverse (61% Latinx) population study of healthy children (Varni et al., 2003).

Child HCC was measured using an established liquid chromatography-mass spectrometry (LC-MS) protocol (Gao et al., 2016); the full assay protocol is available in a previous publication (Gottlieb et al., 2020). HCC results are given in units of picogram per milligram (pg/mg) (Noppe et al., 2014). The subsample with complete child HCC data (N=312) was used in all child HCC outcome analyses. While some studies have attempted to establish normal reference ranges for hair cortisol concentration in healthy children (de Kruijff et al., 2020; Noppe et al., 2014; Prado-Gasco et al., 2019), robust evidence in this area is still lacking, particularly in ethnically diverse samples. Although there has not been agreement on a specific reference range for HCC values, it is widely accepted in the literature that higher levels indicate prolonged activation of the hypothalamic-pituitary-adrenal (HPA) axis, a marker for a chronic physiologic stress response (Bates et al., 2017; Khoury et al., 2019). HCC values were divided into tertiles for analysis so that each contained a third of the sample, and categories were defined by the values reflected in each: "lowest tertile" (0.22 –

3.99 pg/mg; coded as the reference group), “middle tertile” (4.00 – 7.82 pg/mg) and “highest tertile” (7.84 – 1998.88 pg/mg).

Independent variables.—Three primary predictor variables were examined: 1) household social needs, 2) maternal perceived stress score, and 3) maternal HCC. Despite categorizing the outcome variables in our preliminary analyses, running the models with continuous predictors still demonstrated a lack of linearity of associations, even on the logit scale. We therefore converted all three predictor variables to categorical, using evenly divided categories, to achieve the best model fit.

Household social needs were measured in the original study by mothers’ survey responses of “yes” or “no” to current concerns about 18 possible issues for either themselves or members of their household (no=reference, yes). The social needs survey was created by the original study investigators and has been described in an earlier publication (Gottlieb et al., 2020). Survey items had been adapted from social risk screening questionnaires used in earlier studies (Gottlieb et al., 2014; Gottlieb et al., 2016), and used validated domain-specific measures when available (Brcic et al., 2011; Johnson et al., 2009; Keller et al., 2008; Kleinman et al., 2007). Despite previous research involving the use of these questionnaire items, currently there is no gold standard for social risk screening instruments, and very little psychometric evidence to evaluate their validity and reliability (Henrikson et al., 2019).

Household social needs variables were constructed in two ways: 1) categorical level of household needs (primary aim), and 2) indication of an individual household need (secondary aim). Household level of social needs was assigned based on a summative count of needs and then divided into four categorical groups for analysis. The first group included respondents who reported no needs, and the remainder of the sample was divided evenly across three additional groups: “none” (0 needs=ref), “1–2 needs”, “3–4 needs”, and “5 or more needs”. This approach using the number of needs reported has been used in other published studies (Bethell et al., 2022; Rodems & Shaefer, 2020). Options for individual social needs included: *financial* (problems paying utility or medical bills, denied other income support, no health insurance), *housing* (difficulty finding housing, or habitability concerns), *food* (running out of food before having money to buy more), *employment* (difficulty finding, or problems with, a job, disability interfering with work, difficulty obtaining unemployment benefits), *transportation* (difficulty affording transportation or disability paratransit), *legal* (deportation, child support, family law issues), and *other* (no primary care provider, difficulty finding childcare or after-school activities, bullying, or household mental health concerns).

Maternal perceived stress was measured with the Perceived Stress Scale-4 (PSS-4), a shortened version of the full instrument (Baik et al., 2017) that measures the degree to which adults perceive stress in their control over or ability to handle events in their lives over the past month (Warttig et al., 2013). The four items are scored on a five-point Likert scale ranging from 0 (never) to 4 (very often), where summative higher scores reflect higher perceived stress (Warttig et al., 2013). The PSS-4 tool is shown to be reliable and valid in studies of English-speaking (Warttig et al., 2013) and Spanish-speaking (Vallejo et al., 2018) participants. In these studies, internal consistency reliabilities for the instrument exceeded

the minimum reliability standard of 0.70 for both English and Spanish, and alphas were adequate for both language groups (Vallejo et al., 2018; Warttig et al., 2013). Due to a lack of established cutoff scores, responses on the 20-point PSS-4 scale were divided evenly into tertiles – each containing a third of responses – and each tertile category was defined by the scores reflected in that group: “lowest tertile” (score: 0–4; coded as the reference group), “middle tertile” (score: 5–7), and “highest tertile” (score: 8 and higher).

Maternal physiologic stress was measured with HCC as described above for child HCC, and also divided categorically into tertiles and defined by the values in each: “lowest tertile” (0.22 – 3.99 pg/mg; coded as the reference group), “middle tertile” (4.00 – 7.82 pg/mg) and “highest tertile” (7.84 – 1998.88 pg/mg).

Covariates.—Sociodemographic and other physical and mental health characteristics theoretically associated with perceived and physiologic stress (Bates et al., 2017; Shonkoff & Garner, 2012), emotional health (Ogundele, 2018), or social needs (Kreuter et al., 2021) were included as covariates. In all models, sociodemographic covariates included mother’s age (18–24 years=reference, 25–34 years, 35–44 years, 45 years and older), child’s age divided by preschool, school age, and teen (0–5 years=reference, 6–12 years, 13–17 years), child’s gender (male=reference, female), preferred language of the mother (English=reference, Spanish), mother’s highest level of education (less than high school=reference, high school or general educational development [GED], some college or technical school, college/graduate degree) and annual household income (less than $20,000=reference, $20,000–50,000, more than $50,000, don’t know/decline to state).

Child health characteristics included health status, reported by the mother’s responses on a 5-point scale ranging from poor to excellent to the statement, “In general, would you say your child’s health is” (recoded into three groups as poor/fair=reference, good, very good/excellent); and child’s physical functioning, rated on the PedsQL™ physical functioning 100-point scale and dichotomized as “high functioning” (score ≥ 64, coded as the reference group) vs. “low functioning” (score < 64) according to evidence-based cutoffs for this tool (Varni et al., 2003). Maternal health characteristics included symptoms of depression, measured as a summative score on the Patient Health Questionnaire-8 (PHQ-8) instrument and dichotomized according to evidence-based cutoffs (Kroenke et al., 2010) (score 0–5: “mild”=reference, score >5: “moderate/severe”); and physical health rating on the two-item Patient-Reported Outcomes Measurement Information System (PROMIS®) global physical health scale (Hays et al., 2017), measured by responses on a 5-point scale ranging from poor to excellent to the question, “In general, how would you rate your physical health?” (recoded into three groups as poor/fair=reference, good, very good/excellent).

Data Analysis—All data were analyzed with Stata, version 16 statistical software (College Station, TX, USA). Descriptive statistics summarized the overall sociodemographic and health characteristics of the study sample and the dependent and independent variables.

We used multiple binomial logistic regression in our analyses of the first outcome to model child emotional functioning (high functioning=reference group) as a function of household social needs, maternal perceived stress, maternal HCC, and the sociodemographic and

health covariates. In the first set of models, each social need was analyzed separately as an independent variable, controlling for maternal perceived stress, maternal HCC, and all covariates. In the second model, we used categorical level of social needs as the independent variable. Results from the binomial models are odds ratios (OR) comparing the independent variable categories to the reference group.

In our analyses of the second outcome, we used multinomial logistic regression to model child HCC (measured as lowest=reference group, middle, and highest HCC tertiles) as a function of household social needs, maternal perceived stress, maternal HCC, and the sociodemographic and health covariates. We ran the multinomial logistic regressions first using individual, and second using categorical level, to represent social needs. Due to the known potential associations between age or sex and HCC (Gray et al., 2018), we initially tested for effect modification by age or gender in each model, but did not find any meaningful significant interactions to support stratification by either variable in our final models. Results from the multinomial models are odds ratios (OR).

Results

Descriptive Findings

Sociodemographic and health characteristics.—Table 1 summarizes frequencies for sociodemographic and health characteristics for the study sample. Most mothers were between the ages of 25 and 44 years, and over half the children were less than 6 years old. The sample of children was relatively evenly divided between males and females. Approximately 86% of mothers in the sample reported Spanish as their preferred language, 57% reported less than a high school diploma as the highest level of education completed, and 53% of the sample reported an annual household income of less than $20,000. Most mothers in the sample rated their child's overall health as good or very good/excellent and reported their children had high physical functioning. Over one-third of mothers rated their own physical health as poor or fair, and almost half scored in the moderate to severe range for depression risk.

Household social needs.—About 90% of mothers reported at least one current social need in their household, and well over one-third reported having more than five social needs. Descriptive statistics for reported social needs are presented in Table 2. Problems paying bills (39%), housing instability (38%), and food insecurity (36%) were the most reported social needs. Almost one-third of participant households reported job, habitability, transportation, or legal needs, or difficulty finding after-school activities for their children.

Maternal stress.—The median score on the PSS-4 was 6 (range: 0, 15; mean: 5.49, SD: 3.21). Median maternal HCC for the full sample was 5.47 pg/mg (range: 0.22, 1998.88; mean: 35.24, SD: 142.83). After verifying with our laboratory that the unusually high HCC values in the sample were not due to measurement or processing error, we also tested the models after removing very large observations – participants whose HCC was greater than 3SD outside of the mean (Aguinis et al., 2013). Overall significance of findings was unchanged when these observations were removed so results presented here include the full sample.

Regression Models

Outcome a): child emotional functioning.—In the full sample, 41% of children scored at risk for emotional dysfunction on the PedsQL™-EF. In all fully adjusted binomial regression models (Table 3), the middle and highest tertiles of maternal perceived stress each positively predicted child emotional dysfunction compared to lowest tertile of maternal perceived stress (middle: OR range 1.92 – 2.73; highest: OR range 1.97 – 3.43; $p < 0.05$; not all results shown in table). Neither the maternal HCC nor the level of social needs was significantly associated with child emotional dysfunction in any of the models. For our secondary aim, almost none of the individual social needs were independently linked with child emotional dysfunction, except for finding after-school activities or opportunities (OR = 2.09; 95% CI [1.24, 3.52]; $p < 0.01$).

Outcome b): child HCC.—Our analyses for this outcome included only the 312 children with complete HCC data. Chi-square analyses of the differences in sociodemographic and health characteristics between children with and without child HCC revealed that the group with child HCC data included significantly more mothers who were over 34 years old (50% vs. 35%; $p = 0.02$), more children who were female (57% vs. 35%; $p < 0.01$), fewer children ages 0 to 5 years (49% vs. 80%; $p < 0.01$), and more children with low physical functioning (18% vs. 8%; $p < 0.01$), as compared to the group missing HCC data (results not shown in tables). Median child HCC was 18.69 (range: 0.71, 11,965.91; mean: 382.82, SD: 1313.84). We again found no statistical differences in findings between models with and without the largest HCC values and thus included all participants in the subsample.

In all fully adjusted multinomial models, neither household level of social needs nor maternal perceived stress score tertiles predicted middle or highest tertile of child HCC compared to lowest tertile of child HCC (Table 4; results not all shown in table). Being in the highest tertile of maternal HCC significantly predicted both middle (OR: 1.86 – 2.51; $p < 0.05$) and highest tertiles of child HCC (OR: 9.80 – 11.00; $p < 0.01$) in comparison to lowest tertile of child HCC across all models (results not all shown in table). For our secondary aim, individual social needs were not independently associated with middle or highest tertile of child HCC in any of the adjusted models.

Discussion

To our knowledge, this is the first study in the U.S. to examine household social needs and maternal stress as predictors of child emotional dysfunction and child HCC in a sample of low-income and majority Spanish-preferring Latinx families. Over 40% of the children in the sample had emotional dysfunction, a staggering finding given the evidence that low income and Latinx youth are less likely to be diagnosed with and receive treatment for emotional disorders than those from higher income or non-Latinx households (Alegria et al., 2010; Ghandour et al., 2019; Marrast et al., 2016). Similar to previous findings in non-Latinx (Bryson et al., 2020; Dauegaard et al., 2020; Doan et al., 2020; Schloß et al., 2019) and Latinx (Hollenbach et al., 2019) populations, maternal HCC was strongly associated with child HCC. This finding may indicate heritability of HCC and/or shared environmental risk factors.

The level of social needs in this sample was also striking. Approximately 90% of mothers reported having at least one social need, and over one-third reported having at least five needs. This far exceeds numbers for Latinx households reported in national survey research (Karpmanet al., 2018). Our study is unique in that we asked about a large number of possible social needs, whereas much of the existing evidence in this area focuses on only a few domains of economic hardship (Bethell et al., 2022; Neckerman et al., 2016; Rodems & Shaefer, 2020; Zilanawala & Pilkauskas, 2012). Accordingly, we acknowledge that our broader assessment may explain the higher summative levels identified in our study, though there were other indicators that this is indeed a high needs sample. For instance, problems paying bills and housing instability were the most frequent concerns for our participants, consistent with a previous report that these are the most common social needs in Latinx families with children (Schmeer, 2012). Difficulty finding after-school activities for children was also a common concern and was the only individual need that significantly predicted higher odds of child emotional dysfunction.

While we did not have information about participants' immigration status, it is plausible that immigration influenced the study's urban, predominantly Spanish-preferring population. Threats of impending changes to policies affecting or affected by immigration status that occurred during the HASII study's enrollment period, such as those expected to the "public charge rule," negatively impacted enrollment in public assistance programs, including immigrant communities' enrollment in Medicaid (Bustamante et al., 2022; Miller et al., 2022; Wang et al., 2022). It is possible that fear associated with the public charge rule or other programs – e.g. programs that require documentation of immigration status or that depend on English fluency – may partially explain the high rates of social needs in our sample. Despite the recent reversal of the public charge rule, evidence suggests that its impact on immigrant communities' trust in public programs will persist (Bustamante et al., 2022), further underscoring the lasting harm of discriminatory policymaking.

Counter to our original hypotheses, level of social needs did not independently predict greater risk of parent-reported child emotional dysfunction. One theory that explains this lack of association is that a mother's awareness of household social needs does not necessarily correlate with her child's experience. For example, parents may struggle with financial concerns such as paying bills or food insecurity without their child's knowledge, or families in households with food insecurity may prioritize feeding their children first (or instead) so that the child never goes hungry. Conversely, difficulty finding afterschool care or activities is a need that may be much more apparent to a child, which could explain why it was associated with greater emotional dysfunction in our sample. Alternatively, the child's emotional response to high household social needs may somehow be mitigated by other supportive factors known to exist in Latinx populations. The HASII study did not include measures of resilience for us to explore this concept further, but previous studies have documented characteristics of resilience in Latinx families facing different forms of social adversity (Linton et al., 2016; Perreira et al., 2019). "Familismo" is the concept of strong family ties and values that is central to most Latinx cultures (Ayon et al., 2010; Lawton et al., 2014), and is thought to serve as a buffer against many risk factors that can contribute to physical or mental health problems in this population (Ayon et al., 2010; Filion et al., 2018; Potochnick & Perreira, 2010; Ruiz et al., 2018). For example, in multiple studies of Latinx

families, strength of the parent-youth relationship has been shown to be a buffer between parental stress and child emotional problems (Ayon et al., 2010; Frasquilho et al., 2016; Lorenzo-Blanco et al., 2017; Palermo et al., 2018; Perreira et al., 2019). It is also important to consider that the high overall level of needs and emotional dysfunction in our sample may have limited our ability to detect statistically significant associations between these two variables.

Level of social needs did not independently predict greater risk of being in the highest tertile of child HCC, again in contrast to our hypothesis that social needs would be positively associated with child stress. Our secondary exploration of individual needs also revealed no significant associations between specific social needs and child HCC. This is consistent with a recent study of non-Latinx infants and toddlers that found neither cumulative adversity nor multiple individual adversity indicators were significantly associated with HCC (Bryson et al., 2019). These findings contribute to an already conflicting research base on the associations between social needs and HCC in Latinx children. For example, one recent study showed higher child HCC was associated with greater food insecurity (Ling et al., 2019) while another showed no association between these variables (Distel et al., 2019). In addition to the theories related to child emotional experience discussed above, another theory that could explain the lack of association with child HCC is that prolonged stress exposure can result in a blunted cortisol response, although this has only been shown in studies examining HCC in non-Latinx populations (Dowd et al., 2009; Koumantarou Malisiova et al., 2020; Ouellette et al., 2015; Raffington et al., 2018; Solarikova et al., 2020). According to this theory, a family's chronic stress from the inability to meet household social needs results in a dampening of the child's ability to mount a physiologic stress response. There is still much to learn about how biomarkers can contribute to our understanding of stress and emotional functioning, particularly in ethnically diverse pediatric populations (Stalder et al., 2017).

Mothers in this relatively large local Latinx sample seeking healthcare primarily preferred Spanish, and had low education and very low incomes, which is consistent with the demographic of Latinx populations living in poverty in the U.S. (Fontenot, 2018). Language is often used as a measure of acculturation (Torres et al., 2012), indicating that our sample may have included a large percentage of immigrants with lower levels of acculturation. Our findings contradict previous evidence related to the "Hispanic health paradox", which proposes that less acculturated Latinx immigrants experience genetic, lifestyle, or cultural protective factors over their U.S. born or more acculturated Latinx counterparts that contribute to better health outcomes (Perreira et al., 2019; Ruiz et al., 2018; Teruya & Bazargan-Hejazi, 2013). The significant level of reported child emotional dysfunction and high HCC in mothers and children in our less acculturated sample could provide support for another body of literature that refutes the paradox theory, although we lack a substantial comparison group to test these assumptions. The paradox theory has been criticized for relying on methodology that favors healthier research participants and likely under-reports morbidity and mortality in immigrant populations (Ceballos & Palloni, 2010; Teruya & Bazargan-Hejazi, 2013); more research on this topic is warranted.

Limitations

Our study findings should be interpreted with the consideration of five key limitations. First, our outcomes should be considered with acknowledgement of their limitations to generalizability. Convenience sampling was used in the original trial and sampling probabilities for all participants are unknown. Our study sample was restricted to low-income families seeking pediatric healthcare services in a single county hospital setting, as well as to families who were chosen for and consented to participate in a clinical trial and had time to complete study activities. Second, the cross-sectional study design of this baseline data analysis means we cannot infer the directionality of any statistical associations. Third, our findings should be considered in the context of limited research on social screening instrument validity. The screening questions used in the original study were developed de novo prior to the development of multi-domain social screening tools now being used more commonly in practice settings, though none of these has been tested using gold standard psychometric and pragmatic validity testing procedures (Henrikson et al., 2019). Further, our assessment of child emotional functioning relied on parent proxy-report only and did not include self-report or observational data that could have reduced the potential for response bias. Fourth, in this study, 30% of children were missing hair samples because they were either not obtained or samples were insufficient for analysis. This may have resulted in an over-estimation of some of the associations we report, though many of the measured demographic and health characteristics between those included and excluded from this sub-analysis were similar. Finally, data may also be subject to unmeasured influence by other variables that are associated with child emotional functioning and stress (e.g. immigration status, acculturation stress, parenting style) but were not collected as part of the HASII study.

Conclusion

This study contributes to a growing body of evidence linking maternal stress and social needs to child emotional dysfunction and stress. It is one of only a small number of published studies examining the physiologic impact of stress and social needs specifically in Latinx populations and adds new evidence on the use of HCC as a measure of stress in Latinx children and mothers. Our study findings have multiple implications for health policy, clinical practice, and research. We found that household social needs in low-income Latinx families with children are high, particularly related to financial and housing insecurity, calling attention to the need for policies that expand access to public assistance programs and remove barriers related to immigration status. Our findings provide further evidence that stress in Latinx mothers increases the risk for poor child emotional health (Arroyo-Borrell et al., 2017; Larson et al., 2008). Interventions that promote equitable access to conditions for optimal health – e.g., increased access to health insurance, mental health services, and respectful and culturally appropriate care (Crear-Perry et al., 2020) – are therefore critical to supporting Latinx mothers. The evaluation of maternal perceived stress may also be an important component of early identification and intervention related to child emotional health. Integrated caregiver and child behavioral health services in healthcare settings that serve low-income Latinx families may improve early diagnosis and intervention for youth at risk for stress and emotional dysfunction. Future research should explore the utility of

HCC as a measure of stress in Latinx populations, as well as resilience and other supportive factors that may mitigate the impact of stress and social needs on emotional health in these vulnerable families.

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Conflicts of interest/competing interests

The authors have no conflicts of interest to declare that are relevant to the content of this article. The funders had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; or decision to submit the manuscript for publication.

Availability of data and material

This paper uses data from a previous RCT. After publication, deidentified participant data is available by request to researchers whose proposed use of the data has been approved. Requests can be made to holly.wing@ucsf.edu, and approval is at the discretion of the primary RCT research team, with signed data use agreement.

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Highlights

- Analysis of stress and household social needs in over 400 pairs of Latinx children and mothers.
- Unique measures, including 18 different social needs, and hair cortisol concentration as a measure of physiologic stress.
- Latinx households with low incomes show a high level of social need, with over one-third reporting having at least five needs.
- High maternal hair cortisol concentration is associated with greater risk for high child hair cortisol.
- Implications for the integration of mental health and social needs screening and intervention in the care of Latinx families.

Table 1.

Sociodemographic and Health Characteristics (N=432)

Covariates	n (%)
Maternal Age in Years	
18–24	55 (12.73)
25–34	179 (41.44)
35–44	167 (38.66)
45 or older	31 (7.18)
Age of Child in Years	
0–5	252 (58.33)
6–12	126 (29.17)
13–17	54 (12.50)
Gender of Child	
Female	221 (51.16)
Maternal Preferred Language	
English	60 (13.89)
Spanish	372 (86.11)
Highest Education Level Completed	
Less than High School	247 (57.18)
High school/GED	121 (28.01)
Technical school/Some College	40 (9.26)
College Graduate/Graduate school	24 (5.56)
Annual Household Income	
Less than $20,000	231 (53.47)
$20,000–50,000	142 (32.87)
More than $50,000	10 (2.31)
Don’t know/decline to state	49 (11.34)
Overall Rating of Child Health	
Poor/Fair	48 (11.11)
Good	191 (44.21)
Very Good/Excellent	193 (44.68)
Child PQL Physical Functioning Score	
High Functioning	364 (84.26)
Low Functioning (<64)	68 (15.74)
Maternal PHQ-8 Depression Risk Score	
Mild	223 (51.62)
Moderate/Severe (>5)	209 (48.38)
Maternal PROMIS Physical Health Rating	
Poor/fair	161 (37.27)
Good	219 (50.69)
Very Good/Excellent	52 (12.04)

Dependent and Independent Variables	n (%)
Child PedsQL-EF Score	
High Functioning	256 (59.26)
Low Functioning (<64)	176 (40.74)
Child Hair Cortisol Concentration[a]	
Lowest Tertile=ref	104 (33.33)
Middle Tertile	104 (33.33)
Highest Tertile (≥37.39 pg/mg)	104 (33.33)
Maternal PSS-4 Score	
Lowest Tertile	165 (38.19)
Middle Tertile	131 (30.32)
Highest Tertile (≥8)	136 (31.48)
Maternal Hair Cortisol Concentration	
Lowest Tertile=ref	144 (33.33)
Middle Tertile	144 (33.33)
Highest Tertile (≥ 7.41 pg/mg)	144 (33.33)

[a]Due to missing child hair cortisol data, for this variable N=312

Table 2.

Current Household Social Needs (N=432)[a]

	n (%)
Financial	
Problems paying bills, like electric, gas, water, or phone bills	169 (39.12)
Receiving medical or pharmacy bills you cannot afford	74 (17.13)
Getting cut off from or denied from programs that provide income support, like Cal Fresh (food stamps), CalWorks, etc	63 (14.58)
Having no health insurance	105 (24.31)
Housing	
Unstable housing including eviction, foreclosure, homelessness or staying with friends/family	168 (38.89)
Housing problems, like mold, insects rats or mice	128 (29.63)
Food	
Running out of food before having enough money or food stamps to buy more	156 (36.11)
Employment	
Difficulty finding a job	136 (31.48)
Problems with a current or former job, like unpaid wages, workers comp, discrimination or harassment	32 (7.41)
A disability interfering with the ability to work	48 (11.11)
Difficulty obtaining unemployment insurance	41 (9.49)
Transportation	
Difficulty affording transportation or ADA paratransit	136 (31.48)
Legal	
Other legal issues not mentioned above, including deportation concerns, child support or family law issues or violence	128 (29.63)
Other	
Having no primary care provider for your child or other household member (n = 367)[b]	61 (16.62)
Difficulty finding after-school activities or opportunities for you or your child	122 (28.24)
Difficulty finding childcare (n = 367)[b]	92 (25.07)
Bullying	48 (11.11)
Concerns about your or another adults' mental or behavioral health in your household	61 (14.12)
Household Level of Social Needs	
None	42 (9.72)
1–2	114 (26.39)
3–4	113 (26.16)
5 or more	163 (37.73)

[a]Reported needs are not mutually exclusive (participants reported up to 18 needs).

[b]This item was added after intial study initiation.

Table 3.

Logistic Regression of Low Child Emotional Functioning on Household Social Needs, Maternal Perceived Stress, and Maternal Hair Cortisol (N=432)

	Model 1[a]			Model 2[b]		
	OR	**(95% CI)**	***p***	**OR**	**(95% CI)**	***p***
Household Social Needs (no=ref)						
Problems paying bills	1.21	(0.74, 1.96)	0.43	---	---	---
Medical or pharmacy bills you can't afford	0.84	(0.45, 1.56)	0.59	---	---	---
Getting cut off from or denied income support	1.10	(0.56, 2.17)	0.76	---	---	---
Having no health insurance	0.96	(0.55, 1.67)	0.90	---	---	---
Unstable housing	0.80	(0.49, 1.30)	0.38	---	---	---
Housing problems (e.g., habitability)	1.29	(0.77, 2.16)	0.31	---	---	---
Running out of food	1.54	(0.94, 2.51)	0.08	---	---	---
Difficulty finding a job	1.08	(0.65, 1.79)	0.75	---	---	---
Problems with a current or former job	1.83	(0.76, 4.39)	0.17	---	---	---
Disability interfering with work	0.78	(0.35, 1.71)	0.54	---	---	---
Difficulty obtaining unemployment	1.95	(0.90, 4.24)	0.09	---	---	---
Difficulty affording transportation	1.29	(0.77, 2.17)	0.31	---	---	---
Other legal issues	1.21	(0.73, 2.02)	0.45	---	---	---
No PCP for household member (n = 367)[c]	1.48	(0.75, 2.91)	0.25	---	---	---
Difficulty finding after-school activities	2.09	(1.24, 3.52)	<0.01*	---	---	---
Difficulty finding childcare (n = 367)[c]	1.56	(0.85, 2.86)	0.14	---	---	---
Bullying	0.70	(0.32, 1.50)	0.36	---	---	---
Concerns about household adult mental health	1.04	(0.52, 2.08)	0.90	---	---	---
Household Level of Social Need						
None=ref	---	---	---	---	---	---
1–2 needs	---	---	---	0.95	(0.37, 2.39)	0.92
3–4 needs	---	---	---	0.90	(0.35, 2.28)	0.83
5 or more needs	---	---	---	1.49	(0.59, 3.72)	0.39
Maternal PSS-4 Score						
Lowest Tertile=ref	---	---	---	---	---	---
Middle Tertile	---	---	---	1.98	(1.07, 3.64)	0.02*
Highest Tertile	---	---	---	2.15	(1.14, 4.04)	0.01*
Maternal Hair Cortisol						
Lowest Tertile=ref	---	---	---	---	---	---
Middle Tertile	---	---	---	0.77	(0.42, 1.38)	0.38
Highest Tertile	---	---	---	0.96	(0.54, 1.69)	0.90

ref=reference group; All models included maternal PSS, maternal HCC and all covariates (results not all shown);

* Denotes significant findings at p<0.05

[a]Model 1 included individual needs as the social need variable; results reported are for 18 separate models of the outcome on each social need. Maternal PSS predicted emotional dysfunction across all above models (moderate: OR range 1.92–2.73; high: OR range 1.97–3.43; $p < 0.05$; not all shown). Maternal HCC not significant in any model.

[b]Model 2 included level of need as the social need variable.

[c]This item added after original study began; analyses for this item includes participants with complete data only.

Table 4.

Multinomial Logistic Regression of Highest Tertile of Child Hair Cortisol on Household Social Needs, Maternal Perceived Stress, and Maternal Hair Cortisol (N=312)

	Model 1[a]			Model 2[b]		
	OR	**(95% CI)**	***p***	**OR**	**(95% CI)**	***p***
Household Social Needs (no=ref)						
Problems paying bills	1.06	(0.49, 2.31)	0.86	---	---	---
Medical or pharmacy bills you can't afford	0.94	(0.36, 2.42)	0.90	---	---	---
Getting cut off from or denied income support	0.51	(0.16, 1.58)	0.24	---	---	---
Having no health insurance	0.69	(0.28, 1.67)	0.41	---	---	---
Unstable housing	1.42	(0.67, 3.02)	0.35	---	---	---
Housing problems (e.g., habitability)	0.95	(0.42, 2.16)	0.91	---	---	---
Running out of food	0.53	(0.24, 1.16)	0.11	---	---	---
Difficulty finding a job	1.42	(0.65, 3.09)	0.37	---	---	---
Problems with a current or former job	0.76	(0.19, 3.05)	0.70	---	---	---
Disability interfering with work	1.51	(0.47, 4.86)	0.48	---	---	---
Difficulty obtaining unemployment	0.69	(0.21, 2.31)	0.55	---	---	---
Difficulty affording transportation	0.87	(0.37, 2.01)	0.74	---	---	---
Other legal issues	0.65	(0.29, 1.44)	0.29	---	---	---
No PCP for household member (n = 254)[c]	0.42	(0.12, 1.38)	0.15	---	---	---
Difficulty finding after-school activities	1.27	(0.57, 2.81)	0.54	---	---	---
Difficulty finding childcare (n = 254)[c]	1.32	(0.52, 3.34)	0.55	---	---	---
Bullying	0.90	(0.25, 3.20)	0.87	---	---	---
Concerns about household adult mental health	0.95	(0.34, 2.66)	0.92	---	---	---
Household Level of Social Need						
None=ref	---	---	---	---	---	---
1–2 needs	---	---	---	0.52	(0.13, 2.07)	0.35
3–4 needs	---	---	---	1.08	(0.26, 4.39)	0.91
5 or more needs	---	---	---	0.44	(0.10, 1.78)	0.25
Maternal PSS-4 Score						
Lowest Tertile=ref	---	---	---	---	---	---
Middle Tertile	---	---	---	0.66	(0.25, 1.72)	0.40
Highest Tertile	---	---	---	0.60	(0.22, 1.67)	0.33
Maternal Hair Cortisol						
Lowest Tertile=ref	---	---	---	---	---	---
Middle Tertile	---	---	---	1.52	(0.60, 3.83)	0.36
Highest Tertile	---	---	---	10.60	(4.20, 26.74)	<0.01*

ref=reference group; All models included maternal PSS, maternal HCC and all covariates (results not all shown);

*Denotes significant findings at p<0.05

[a]Model 1 included individual needs as the social need variable; results are for 18 separate models of the outcome on each need and shown for highest tertile of child HCC (compared to low). High maternal HCC predicted high child HCC across all models (OR range 9.80–11.00; $p < 0.01$; not all shown). Maternal PSS not significant in any model.

[b]Model 2 included level of need as the social need variable; results shown for highest tertile of child HCC (compared to low).

[c]This item added after original study began; analyses for this item includes participants with complete data only.