



Are Social Vulnerability and Family Social Support Associated with Children's Psychiatric Symptoms?

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Abstract

Social influence can shape early childhood at different levels. We explored the association between social vulnerability and lifetime caregiver alcohol use with children's psychiatric symptoms. Multivariable logistic regression assessed the association between child psychiatric symptoms and social vulnerability among 1275 preschool child-caregiver pairs with lifetime caregiver alcohol used as a control variable. Of the children, 15.78% (95% CI 15.17–16.42) had internalizing symptoms, 2.49% (95% CI 2.19–2.83) had externalizing symptoms, and 9.36% (95% CI 8.88–9.86) had internalizing/externalizing symptoms. High social vulnerability was positively correlated with internalizing (aRRR 1.54; 95% CI 1.41–1.68) and internalizing/externalizing symptoms (aRRR 1.77; 95% CI 1.58–2.00). Low family support was strongly associated with internalizing/externalizing symptoms (aRRR 2.60; 95% CI 2.20–3.10). Lifetime caregiver alcohol use was positively correlated with all three psychiatric symptoms (aRRR 1.33; 95% CI 1.18–1.51; aRRR 1.13; 95% CI 1.06–1.59; and aRRR 1.26; 95% CI 1.12–1.42). Their association with children's mental health outcomes calls for social policy changes at the macrosystem level.

Keywords Mental health · Psychiatric symptoms · Children · Low-to-middle countries · Alcohol use

Introduction

According to the World Health Organization (WHO), more than 80% of people who have psychiatric disorders live in low-and-middle-income countries (LMIC) [1]. It is also reported that mental health problems will affect at least

10–20% of youth in developing nations, an estimate that may be conservative due to underreporting of mental health problems due to stigma [1]. In Brazil, depressive and anxiety disorders are the fifth and sixth leading contributors, respectively, of years of life lived with disability [2]. It was also reported that 30% of Brazilian adolescents present

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common mental disorders, such as depression or anxiety, measured through a screening interview [2]. Many Brazilian children live in deprivation; however, major determinants of children's mental health, such as neighborhood conditions, family relationships, and caregiver alcohol use are not commonly studied together [3].

Early childhood constitutes a crucial developmental period and can be shaped by neighborhood stress at the macrosystem level, family social support at the mesosystem level, and parent–child relationships at the microsystem level. The environment in which people grow up and live in tends to impact their overall health [4]. Social vulnerability is generally described as external factors such as social networks and neighborhood conditions negatively impacting a community's resilience [5]. Neighborhood social vulnerability is characterized by violence, heightened rates of substance use, and strained neighbor relations, often exacerbated by a population's demographic differences [4]. These adverse social and environmental circumstances are linked to a greater risk for poor mental health, especially for children in vulnerable communities [5].

Familial relationships can influence an individual's well-being [6]. The quality of both social support and familial strain impacts people psychosocially, behaviorally, and psychologically [6]. Many demographic factors are considered when establishing a positive relationship between children's mental health and high family social support, which can be expressed in unique support dimensions such as religious practices and socioeconomic status [7]. Because care for most mental health disorders is heavily reliant on one's social network, typically being family, the management and recovery process can be negatively impacted when the affected people receive little to no support [8]. The presence of psychiatric symptoms may also reflect the caregiver's parenting practices; if caregivers criticize or show overcontrolling behaviors towards their children, the child may develop common internalizing symptoms seen in youth, such as anxiety or depression [9].

Neighborhood social environments impact children, so much so that alcohol use contributes to adverse childhood experiences [10]. Excessive alcohol use is increasing among urban populations in developing countries, and parental drinking is negatively correlated with children's well-being, especially their mental health, which can manifest through different behavioral and emotional symptoms such as depressive mood or anxiety [11, 12]. An assessment using the Child Behavior Checklist (CBCL) in South Africa found that children with maternal hazardous drinking had higher mean scores for psychological problems and lower cognitive scores [13]. South Africa ranks as an upper-middle-income country like Brazil. However, studies in high-income nations such as the United States and Norway also revealed that children of parents with substance use disorders and mothers

with at-risk drinking, respectively, are more likely to have offspring with behavioral and emotional problems [14–16]. While one study's sample of children under the age of eight showed no strong correlation between externalizing symptoms with maternal problem drinking [17], prior research provides evidence for externalizing symptoms among older children and adolescents.

It is known that there is a lack of available research and studies on mental health in vulnerable populations and communities in LMIC, impacting the growing disparity in the prioritization of providing systematic interventions in this area. Brazil is known to be one of the most inequitable countries globally, particularly with respect to marginalized racial and ethnic groups utilizing fewer healthcare services than their white counterparts due to systemic factors and poor access to resources [18, 19]. Research in the United States comparing the psychiatric symptoms of white, Black, and Hispanic/Latino adolescents suggests that Non-white racial and ethnic groups experience the highest levels of mental health disorders [20].

This study aims to determine if social vulnerability and lifetime caregiver alcohol use in Embu are associated with children's psychiatric symptoms. We hypothesize that high social vulnerability and lifetime caregiver alcohol use correlate positively with children's psychiatric symptoms.

Methods

Sampling

The Brazilian Preschool Mental Health Study is a school-based, cross-sectional survey conducted in Embu das Artes, São Paulo [24]. Embu das Artes, also known solely as Embu, is a municipality in the southwest of the metropolitan area of São Paulo, Brazil, with 240,000 inhabitants per the 2010 census [21]. It demonstrates population growth, similar to the state of São Paulo, growing more rapidly than over 80% of all Brazilian cities [21–23]. According to the São Paulo Index of Social Vulnerability (IPVS), approximately 36% of the city's population were classified as having high or very high social vulnerability and an additional 23.40% as average vulnerability [25]. However, 30.60% of the population had moderate to low social vulnerability and 10% of the population had very low vulnerability according to the IPVS. Thus, there is heterogeneity of adversity in this setting.

Brazilian law states that all 4 to 6-year-old children are to be offered universal preschooling. Because 80% of children in the São Paulo metropolitan area attend preschool on a regular basis, and because children in Brazil typically attend public preschools in the neighborhood in which they live, utilizing these schools as a source population provided an opportunity to sample most children within the age group in

the community. Schools were selected using probability-proportional-to-size sampling, with the probability being determined by the number of eligible 4 to 5-year-olds enrolled. This resulted in 30 out of 34 schools in Embu being selected for participation. Subsequently, a list of all eligible 4 to 5-year-olds in each of the selected schools' classrooms was created, from which we randomly selected eligible children and enrolled 1292 child-caregiver pairs, representing 22.30% of the source population.

Caregiver interviews were conducted in Brazilian Portuguese from May to December 2016 by a trained team of child and adolescent psychiatrists and psychologists from Universidade Federal de São Paulo (UNIFESP). The interviewed caregivers included biological and adoptive mothers and fathers, grandparents, and other extended family members, and they gave informed consent for participation. Due to missing responses in the outcome measures, we excluded 17 pairs for a total of 1275 child-caregiver pairs included in our analysis. Further details can be found in the Brazilian Preschool Mental Health Study [24].

Data Collection Instruments

Data were collected through in-person interviews, where interviewers entered data using a smartphone-assisted questionnaire to assess the child's overall socioemotional and behavioral development. Neighborhood conditions questions were based on the 1994–1995 Project on Human Development in Chicago Neighborhoods: Community Survey [26]. It comprises six subscales: (1) social, economic, and demographic structure, (2) organizational/political structure, (3) informal social control, (4) social disorder, (5) social cohesion, and (6) cultural structure [27]. Questions were translated to Brazilian Portuguese by two native Brazilian Portuguese psychiatrists fluent in English and then back translated by a native English speaker (Supplemental Fig. 1).

Social Vulnerability Measure

The social vulnerability measure used was the 37-item neighborhood conditions questionnaire developed by Earls et al. [26] which has been used in numerous other studies (Supplemental Fig. 1) [28, 29]. We have utilized the term “social vulnerability” to define urban neighborhood conditions specifically referring to city structure, such as clean streets, graffiti, and abandoned lots, and social disorder and cohesion such as illegal activity, police brutality, and trust in neighbors, as perceived by respondents rather than its more common reference to natural environmental hazards [5]. High social vulnerability indicates an individual's perception of more social problems and negative features in the neighborhood whereas low social vulnerability is perceived as having fewer social problems.

To score neighborhood conditions, we dichotomized the original scores on the 5-point Likert scale of each item ranging from 0 to 4: scores 0 and 1 were categorized as “0” and 2, 3, and 4 were categorized as “1,” creating a variable to represent low and high neighborhood social vulnerabilities within each individual item, respectively. The sum of these dichotomous scores ascertained the levels of social vulnerability which ranged from a minimum score of 2 to a maximum of 28 with a mean of 13.07. The summed, overall level of social vulnerability was further dichotomized based on the median of 13 (Fig. 1). The final outcome of interest consisted of scores 13 and below being considered as the individual's perception of low neighborhood social vulnerability while scores greater than 13 were considered to be the individual's perception of high neighborhood social vulnerability.

Family Social Support

Family social support consisted of a 19-item questionnaire, each question using a 5-point Likert scale. This questionnaire was a Brazilian version of the Medical Outcomes Study that measured social support [30, 31]. In a validation study in Rio de Janeiro, Brazil, Cronbach's alpha for social support measures was > 0.83 in all domains [31]. Family social support questions assessed caregivers' perception on companionship, trustworthiness, confidence in expressing love and asking for help and advice from their loved ones, for example, whether participants have support persons to whom they can turn for help, from whom they can borrow money, etc. The sum of the raw scores of family social support ranged from a minimum of 19 to a maximum of 95 with a mean and median of 72.97 and 77, respectively. Using the median as the cutoff value, the family social support variable was recoded to be dichotomous: a sum of 77 and below indicated low levels of

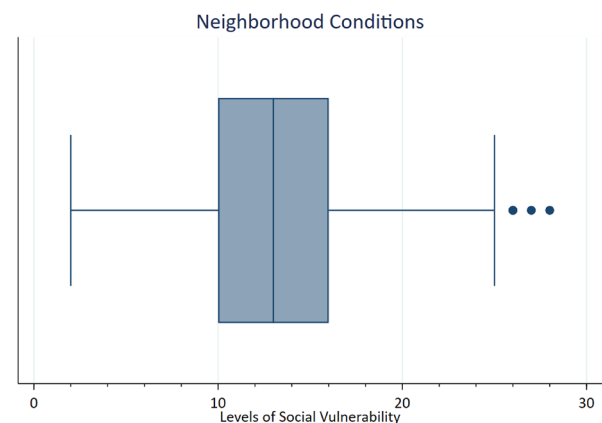


Fig. 1 Distribution of the levels of social vulnerability, illustrating the percentiles, in Embu das Artes, São Paulo, Brazil, 2017

family social support while any sum higher than 77 was considered high levels of family social support.

Variables

Independent Variables

The independent variables were levels of neighborhood social vulnerability (low and high). Covariables included in the multinomial logistic regression analysis relate to the child's demographics and the child's surrounding environment: child biological sex (female and male), race/ethnicity (white and Non-white, constituting Black, Asian, mixed, and other races/ethnicities), family religious affiliation/practice (yes and no), family social support (high and low), and lifetime caregiver alcohol use which is defined as consuming beer, wine, and spirits such as whiskey and vodka (no and yes). Socioeconomic status (high and low) was classified using the standardized Brazilian economic criterion, *Associação Brasileira de Empresas de Pesquisa* (ABEP). The criteria thresholds are determined through a point system based on the family's access to comfort items, household appliances, and public utility services, and the head of household's education level (Supplemental Fig. 2) [32]. The ABEP classifies families into socioeconomic categories, ranging from class A (highest) to class E (lowest), whose average monthly household incomes are R\$23,345 (USD\$6213) and R\$708 (USD\$188), respectively [33]. Classes A and B were grouped as high SES and classes C to E as low SES.

First Present Dependent Variable

The Child Behavior Checklist (CBCL) is a widely used 109-item questionnaire, each question using a 3-point Likert scale standardized parent-reported questionnaire focused on children's behavioral and emotional problems [34, 35]. This instrument is designed for children under the age of six, capturing internalizing behaviors such as anxiety, depression, and social withdrawal, and externalizing behaviors such as aggression, hyperactivity, and disobedience. Internalizing and externalizing symptoms were dichotomously coded as non-clinical (constituting both "normal" and "subclinical") and clinical. A new variable was then generated, splitting children into four mutually exclusive groups: non-clinical symptoms, only internalizing symptoms, only externalizing symptoms, or comorbid internalizing/externalizing symptoms. Although CBCL is more commonly used as a continuous variable, we chose this categorical method as other papers have already used a similar approach [36–40].

Statistical Analyses

Descriptive analyses (e.g., frequency counts, percentages) were performed for all independent variables performed (Table 1). We used multivariable logistic regression models to assess the association between caregiver alcohol use with internalizing and externalizing symptoms in children in the different levels of neighborhood social vulnerability while controlling for all independent variables. We conducted multinomial regression (Table 2) to assess the association between our dependent variables and the three symptom patterns (only internalizing symptoms, only externalizing symptoms, and internalizing/externalizing symptoms) using non-clinical symptoms as the reference group. To keep in accordance with the CBCL manual, which recommends the use of the continuous score, we ran a linear regression model treating internalizing and externalizing symptoms as continuous variables, presented in Supplemental Table 1 [41].

Effect estimates were reported as crude relative risk ratio (cRRR) and adjusted relative risk ratio (aRRR) with corresponding 95% confidence intervals (95% CI) and using p-values of 0.05 as the cut-off for statistical significance (Table 2). Sample standard survey weights were used appropriately in all analyses; we weighted each respondent by (1) a factor that accounted for their probability of being selected within their stratum (to obtain citywide estimates accounting for different sampling probabilities within strata) and (2) as necessary to account for potential bias introduced by non-response [24]. Weighted point estimates and confidence intervals were used to estimate population values for all descriptive variables. Analyses were performed using Stata version 15.1 [42].

Ethical Concerns and Protection of Human Subjects

The study protocol was approved by the Columbia University Institutional Review Board AAAP9754, and by UNIFESP Research Ethics Committee protocol number 981.943. All parents/legal guardians provided informed consent and children assented to participate.

Results

Out of 1275 children, 51.76% (95% CI 50.63–52.90) were male, 58.31% (95% CI 57.45–59.17) were Non-white, 74.07% (95% CI 72.65–75.44) were of low SES, and 86.75% (95% CI 86.07–87.40) were from religiously affiliated/practicing families. While 72.37% (95% CI 71.74–72.98) of all children had non-clinical internalizing or externalizing behaviors, 15.78% (95% CI 15.17–16.42) had only internalizing symptoms, 2.49% (95% CI 2.19–2.83) had only externalizing symptoms, and 9.36% (95% CI 8.88–9.86)

Table 1 Sociodemographic characteristics of 1275 preschool aged children (4 and 5 years old) and their caregivers and their perception of low and high neighborhood social vulnerabilities in Embu da Artes, São Paulo, Brazil, 2017

	Total n = 1275			Low social vulnerability n = 667			High social vulnerability n = 608			p-value ^c
	n	%wt ^a	[95% CI] ^b	n	%wt ^a	[95% CI] ^b	n	%wt ^a	[95% CI] ^b	
Presence of child symptoms ^d										< 0.0001
No	920	72.37	[71.74, 72.98]	509	41.01	[40.35, 41.67]	411	31.36	[30.58, 32.15]	
Yes	355	27.63	[27.02, 28.26]	158	12.39	[11.97, 12.83]	197	15.24	[14.68, 15.82]	
Child biological sex										0.0595
Female	619	48.24	[47.10, 49.37]	321	25.23	[24.62, 25.84]	298	23.01	[22.02, 24.03]	
Male	656	51.76	[50.63, 52.90]	346	28.17	[27.51, 28.85]	310	23.59	[22.55, 24.66]	
Child race/ethnicity										0.1621
White	536	41.69	[40.83, 42.55]	282	22.76	[21.71, 23.84]	254	18.93	[18.21, 19.68]	
Non-White ^e	739	58.31	[57.45, 59.17]	385	30.64	[29.59, 31.72]	354	27.67	[26.98, 28.37]	
Family SES ^f										0.0125
High	338	25.93	[24.56, 27.35]	172	13.34	[12.69, 14.02]	166	12.59	[11.63, 13.61]	
Low	937	74.07	[72.65, 75.44]	495	40.06	[39.20, 40.92]	442	34.01	[33.14, 34.89]	
Family religious affiliation/practicing										< 0.0001
No	171	13.25	[12.60, 13.93]	102	8.25	[7.65, 8.89]	69	5.00	[4.55, 5.50]	
Yes	1104	86.75	[86.07, 87.40]	565	45.15	[44.36, 45.94]	539	41.60	[40.87, 42.33]	
Family social support										< 0.0001
High	613	47.88	[46.94, 48.82]	344	27.28	[26.51, 28.06]	269	20.60	[19.67, 21.57]	
Low	662	52.12	[51.18, 53.06]	323	26.12	[25.34, 26.92]	339	26.00	[25.35, 26.65]	
Caregiver alcohol use										< 0.0001
No	610	48.12	[47.19, 49.06]	304	24.25	[23.54, 24.96]	306	23.88	[23.11, 24.67]	
Yes	665	51.88	[50.94, 52.81]	363	29.15	[28.29, 30.04]	302	22.72	[22.01, 23.45]	

^a%wt: weighted proportions^bCI: confidence interval^cp-value: outputs in bold are significant (p < 0.05)^dSymptoms: internalizing and externalizing symptoms (described in the manuscript)^eNon-white: Mixed (n = 579), Black (n = 115), Asian (n = 35), Other (n = 11)^fSES: socioeconomic status according to the ABEP scale (described in the Methods section)

had internalizing/externalizing symptoms. In 92.21% (95% CI 91.19–93.24) of the pairs, the caregiver was reported to be a biological parent, where 80.73% were the biological mother (95% CI 80.14–81.31). Out of all respondents, 46.60% (95% CI 45.88–47.32) perceived to be exposed to high neighborhood social vulnerability. The percentage of respondents who answered ‘yes’ to lifetime alcohol use was 51.88% (Table 1).

Using a multinomial logistic regression model (Table 2), the perception of high neighborhood social vulnerability was positively correlated with internalizing symptoms (aRRR 1.54; 95% CI 1.41–1.68) and comorbid internalizing/externalizing symptoms (aRRR 1.77; 95% CI 1.58–2.00). Lifetime caregiver alcohol use was positively correlated with all three psychiatric symptom patterns: internalizing symptoms (aRRR 1.33; 95% CI 1.18–1.51), externalizing symptoms (aRRR 1.13; 95% CI 1.06–1.59), and comorbid internalizing/externalizing symptoms (aRRR 1.26; 95% CI

1.12–1.42). Low levels of family social support were positively correlated with internalizing symptoms (aRRR 1.90; 95% CI 1.74–2.08) and comorbid internalizing/externalizing symptoms (aRRR 2.60; 95% CI 2.20–3.07).

A negative correlation was seen between female sex and internalizing symptoms (aRRR 0.77; 95% CI 0.70–0.85). Externalizing symptoms were also positively correlated with male sex (aRRR 1.69; 95% CI 1.43–2.00). Negative correlations between externalizing symptoms, children coming from high SES (aRRR 0.57; 95% CI 0.44–0.74), religiously affiliated/practicing families (aRRR 0.57; 95% CI 0.42–0.78) and externalizing symptoms were observed. Comorbid internalizing/externalizing symptoms were also positively correlated to male sex (aRRR 1.41; 95% CI 1.25–1.58) and being Non-white (aRRR 1.83; 95% CI 1.54–2.17).

When running the linear regression model in accordance with the CBCL manual treating internalizing and externalizing symptoms as continuous variables, the results were in the

Table 2 Multinomial regression model among covariates and the exposure of all symptoms^a in 1275 children in Embu da Artes, São Paulo, Brazil, 2017

	cRRR ^b	[95% CI] ^c	aRRR ^d	[95% CI] ^c	P> t ^e
<i>No symptoms (reference)</i>					
Only internalizing symptoms					
High neighborhood social vulnerability	1.58	[1.46, 1.72]	1.54	[1.41, 1.68]	< 0.001
Caregiver alcohol use	1.26	[1.12, 1.43]	1.33	[1.18, 1.51]	< 0.001
Male children	0.78	[0.71, 0.85]	0.77	[0.70, 0.85]	< 0.001
Non-white race/ethnicity ^f	1.05	[0.93, 1.18]	1.02	[0.90, 1.16]	0.737
Low family socioeconomic status ^g	1.00	[0.88, 1.12]	0.94	[0.83, 1.06]	0.295
Family religious affiliated/practicing	1.15	[0.97, 1.37]	1.19	[1.00, 1.41]	0.045
Low family social support	1.91	[1.74, 2.10]	1.90	[1.74, 2.08]	< 0.001
Only externalizing symptoms					
High neighborhood social vulnerability	1.09	[0.82, 1.45]	1.14	[0.87, 1.49]	0.335
Caregiver alcohol use	1.34	[1.08, 1.67]	1.30	[1.06, 1.59]	0.012
Male children	1.67	[1.43, 1.96]	1.69	[1.43, 2.00]	< 0.001
Non-white race/ethnicity ^f	1.22	[1.02, 1.46]	1.21	[1.00, 1.47]	0.046
Low family socioeconomic status ^g	0.58	[0.45, 0.75]	0.57	[0.44, 0.74]	< 0.001
Family religious affiliated/practicing	0.58	[0.43, 0.80]	0.57	[0.42, 0.78]	0.001
Low family social support	1.03	[0.86, 1.25]	1.07	[0.88, 1.30]	0.496
Co-occurring symptoms					
High neighborhood social vulnerability	1.83	[1.61, 2.09]	1.77	[1.58, 2.00]	< 0.001
Caregiver alcohol use	1.24	[1.09, 1.40]	1.26	[1.12, 1.42]	< 0.001
Male children	1.38	[1.22, 1.57]	1.41	[1.25, 1.58]	< 0.001
Non-white race/ethnicity ^f	1.89	[1.60, 2.22]	1.83	[1.54, 2.17]	< 0.001
Low family socioeconomic status ^g	1.24	[1.07, 1.44]	1.11	[0.96, 1.29]	0.164
Family religious affiliated/practicing	0.85	[0.72, 1.01]	0.88	[0.72, 1.06]	0.177
Low family social support	2.74	[2.34, 3.20]	2.60	[2.20, 3.07]	< 0.001

^aSymptoms: variable that includes all symptoms (1) no symptoms, (2) only internalizing symptoms, (3) only externalizing symptoms, and (4) co-occurring internalizing and externalizing symptoms

^bCI: confidence interval

^ccRRR crude relative risk ratio

^daRRR adjusted relative risk ratio

^ep-value: outputs in bold are significant (p < 0.05)

^fNon-white: Mixed (n = 579), Black (n = 115), Asian (n = 35), Other (n = 11)

^gSES: socioeconomic status according to the ABEP scale (described in the Methods section)

same direction as in the main analysis (Supplemental Table 1). The perception of high neighborhood social vulnerability was positively correlated with internalizing symptoms (r 2.01, 95% CI 1.75–2.26). Lifetime caregiver alcohol use was positively correlated with externalizing symptoms (r 1.59, 95% CI 1.35–1.83). Low levels of family social support were strongly correlated with both internalizing (r 2.55, 95% CI 2.35–2.75) and externalizing symptoms (r 2.40, 95% CI 2.22–2.59).

Discussion

In this cross-sectional survey conducted to understand psychiatric symptoms in a population of Brazilian children, the main findings were: (1) the perception of high neighborhood social vulnerability was positively correlated with

internalizing only and comorbid internalizing/externalizing symptoms, (2) lifetime caregiver alcohol use was positively correlated across all three symptom patterns, and (3) family social support was over two times more strongly positively correlated with comorbid internalizing/externalizing symptoms.

Exposure to high neighborhood social vulnerability especially in urban areas is frequently negatively correlated with the socioemotional development of an individual [43]. Thus, we suggest the usefulness of a new application of this concept in the areas of neighborhood aesthetics and safety conditions as well as other community outcomes (e.g., disaster management). An exciting area for future research will be to explore whether this notion of “social vulnerability” is predictive of psychological outcomes in other settings and contexts. Therefore, our scoring measure is unprecedented

and develops a new pathway of exploration as this definition of the concept deserves to be further evaluated appropriately.

Current alcohol use can negatively impact parenting; depending on the social context, it is usually stigmatized that a young child's parent drinking sets a bad example for them [12]. While the studies consistently suggest that parental alcohol use heightens children's internalizing and/or externalizing symptoms, results across all three symptom patterns (internalizing, externalizing, and comorbid internalizing/externalizing symptoms) as investigated in our study are sparse [34, 44–47]. These outcomes corroborate the meso-system level impact that is parental alcohol dependency on offspring mental health and development.

Internalizing symptoms alone were reported by parents about seven times more frequently compared to externalizing symptoms alone, revealing that most behaviors are not outwardly expressed or immediately recognized [48]. This is not typical in literature because younger children are in a more crucial development period and usually more attached to their parents [9]. Moreover, there are numerous studies that compare psychiatric symptoms between boys and girls, and their results correspond with ours: males more commonly showed externalizing symptoms such as overaggressive behavior and females presented more internalizing symptoms such as depressive mood and anxiety [20, 49, 50]. Comorbid internalizing/externalizing symptoms in our study were also more often present in boys. New research will undoubtedly be needed to incorporate these multiple factors in developing future interventions.

In our study, we observed a pattern relating to the presence of psychiatric symptoms and race/ethnicity: externalizing and comorbid internalizing/externalizing symptoms were positively correlated with being Non-white. Fortunately, Brazil's mental health system reform is transitioning from psychiatric hospitals to community-based care, which could result in the increased availability of services in both diverse and ethnically segregated neighborhoods [51]. Thus, while community-based care has the potential to reduce racial and ethnic differences in psychiatric symptoms, much work on the macrosystem level is needed to achieve this goal, such as addressing the lack of mental health professionals by increasing the mental health budget in Brazil to meet the current demand for treatment of children with mental disorders [52]. Our results regarding the importance of family social support to a child's well-being further underscore the need for neighborhood-based care. As described in our findings, children coming from families with low levels of social support were about two times more likely to present comorbid internalizing/externalizing symptoms compared to showing internalizing or externalizing symptoms alone.

A considerable strength of this study was the precision yielded by a large and diverse sample and little missing data. Additionally, our sampling scheme allowed us to achieve

representation of the population of children aged 4 and 5 years old in Embu das Artes public schools, enhancing the generalizability of our findings. Next, all interviews were conducted face-to-face by a trained team from an accredited university who could offer thorough explanations if questions arose. By using an extensive questionnaire, they were able to target all levels of social influence: individual-level, family-level, and community-level. Finally, the study produced results regarding all three symptom patterns, which is uncommon in literature [46].

One limitation of this study was the potential for social desirability bias because the responses were logged during in-person interviews. Because the respondents were primary caregivers to preschool children this may have impacted respondents' alcohol-related answers; however, the general screening measure in which we utilized for this study was not a sensitive item due to the variable being so broad, encompassing a large range from casual drinkers to people with substance use disorders, and therefore believing that the misclassification is likely minimal. It is worth noting that our study's measure of "alcohol use" was limited to a single screening question. It is not possible to discern whether a positive response to "ever consumed alcohol" is correlated with current, frequent drinking among our sample. The time frame of "ever consumed alcohol" in the screening item may have led to an overestimation of respondents' drinking behavior in their recent months or years of caregiving. However, the percentage of caregivers that responded 'yes' is consistent with the 3rd National Survey on Drug Use by the Brazilian Population published by the Institute for Health Metrics and Evaluation, where 66.40% of Brazilians age ranging from 12 to 65 had a lifetime alcohol use and 43.10% had used alcohol in the past year [53]. According to the National Survey, the prevalence of alcohol addiction in the previous 12 months for individuals over 18 years of age varied from 1.10 to 2.20% (the differences were not statistically significant). That we, nonetheless, observed a consistent and significant positive correlation between "alcohol use" and psychiatric symptoms in children underscores the importance of this variable to child well-being. Furthermore, the questionnaire could have been strengthened by incorporating a measure of the length of time respondents lived in their respective neighborhoods to reflect their perception of social vulnerability more concretely. Regardless, the importance of this variable is evidently highlighted: there is a clear association with psychiatric symptoms despite likely variation in the actual length of respondents' perception of their exposure to precarious neighborhood conditions. Lastly, the cross-sectional design of this study is a limitation to make causal inferences due to the lack of temporality.

Overall, this study provides important information regarding psychiatric symptom patterns. Identifying correlated factors such as perception of neighborhood social vulnerability,

caregiver alcohol use, and family social support might guide the implementation of neighborhood-level interventions to improve children's behavioral and socioemotional development. Examples include improvements in built environment such as creating more green spaces and community centers, and developing better housing [54, 55]. Their respective correlation with children mental health outcomes also calls for the development of macrosystem level social policy changes.

Summary

The environment in which people grow up and live in tends to impact their overall health. There is a lack of available research on mental health in vulnerable populations and communities in LMIC, impacting the growing disparity in the prioritization of providing systematic interventions in this area. We explored the correlation between neighborhood social vulnerability and lifetime caregiver alcohol use with children's psychiatric symptoms. The Brazilian Preschool Mental Health Study is a school-based, cross-sectional survey conducted in Embu das Artes, São Paulo where we randomly selected eligible children and enrolled 1292 child-caregiver pairs. Data were collected through in-person interviews to assess the child's overall socioemotional and behavioral development. The overall findings were: (1) the perception of high neighborhood social vulnerability was positively correlated with internalizing only and comorbid internalizing/externalizing symptoms, (2) lifetime caregiver alcohol use was positively correlated across all symptom patterns, and (3) family social support was over two times more strongly positively correlated with comorbid internalizing/externalizing symptoms. Overall, this study provides important information regarding psychiatric symptom patterns. Identifying correlated factors such as perception of neighborhood social vulnerability, caregiver alcohol use, and family social support might guide the implementation of neighborhood-level interventions to improve children's behavioral and socioemotional development. Their respective correlation with children mental health outcomes also calls for the development of macrosystem level social policy changes.

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Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Ethics Approval The study protocol was approved by the Columbia University Institutional Review Board AAAP9754, and by UNIFESP Research Ethics Committee protocol number 981.943. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institution and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Consent to Participate Informed consent was obtained from all individual participants included in the study.

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