

ORIGINAL ARTICLE

Correlations between caregiver psychiatric symptoms and offspring psychopathology in a low-resource setting

Camila T. Matsuzaka,¹ Milton L. Wainberg,^{2,3} Andrea Norcini Pala,^{2,3} Elis V. Hoffmann,¹ Bruno M. Coimbra,¹ Rosaly F. Braga,¹ Cristiane S. Duarte,^{3,4} Annika C. Sweetland,^{2,3} Marcelo F. Mello¹

¹Departamento de Psiquiatria, Universidade Federal de São Paulo (UNIFESP), São Paulo, SP, Brazil. ²Division of Epidemiology, New York State Psychiatric Institute, New York, NY, USA. ³Department of Psychiatry, Columbia University College of Physician and Surgeons, New York, NY, USA. ⁴Division of Child Psychiatry, New York State Psychiatric Institute, New York, NY, USA.

Objective: Associations between parental/caregiver depression and adverse child outcomes are well established and have been described through one or more mechanisms: child psychopathology following exposure to a depressed caregiver, child psychopathology exacerbating a caregiver's depression, and caregiver and offspring depression sharing the same etiology. Data from low and middle-income countries is scarce. We examined correlations between common symptoms of mental disorders in caregivers and their offspring's psychopathology in a Brazilian sample.

Methods: In this cross-sectional study, adult caregivers were screened for depression during routine home visits by community health workers as part of the Brazilian Family Health Strategy. Caregivers with suspected depression were assessed using the Zung Self-Rating Depression Scale and the Self-Reporting Questionnaire (SRQ-20). Children's symptoms were evaluated using the Strengths and Difficulties Questionnaire (SDQ).

Results: The sample included 68 primary caregivers and 110 children aged 6 to 15 years. Higher caregiver scores on the SRQ-20 correlated significantly with psychiatric symptoms in offspring.

Conclusion: These results substantiate our hypothesis that child psychopathology correlates with caregivers' psychiatric symptoms. This paper adds to the growing literature on community mental health assessment and can help guide future strategies for reducing the burden of common mental disorders in caregivers and children alike in low and middle-income countries.

Keywords: Depressive disorder; primary health care; child; caregivers; Brazil

Introduction

Common mental disorders, defined as depressive, anxiety, and somatic disorders, are typically encountered in community and primary care settings.¹ Major depressive disorder (MDD) is the most important common mental disorder because of its burden, and is among the top 10 causes of years lived with disability worldwide.² To date, most studies of common mental disorders in parents/caregivers and offspring with emotional and behavioral problems have focused on parental depression. MDD is a complex familial disorder that often affects offspring via different mechanisms, including genetic contributions^{3,4} and shared social environment.⁵⁻⁷ Numerous studies have shown that school-aged children of depressed mothers have increased rates of internalizing⁸⁻¹¹ and externalizing behavior.^{10,12,13} Multiple studies, all from high-income countries, have examined the bidirectional effects of caregiver and childhood depression, suggesting that children's symptoms may also exacerbate caregiver depression.^{7,14-17} However, data from

low- and middle-income countries (LMIC) are scarce. One Chilean study documented that a large proportion of children of depressed mothers attending primary care clinics had psychopathological symptom scores in the clinical range, with a predominance of internalizing symptoms.¹⁸ Two small studies, one each from Brazil and Malaysia, examined how offspring psychopathology was associated with maternal stress,^{19,20} but none examined how child psychopathology may exacerbate caregivers' psychiatric disorders.

Within this context, we sought to examine how caregivers' psychopathology correlates with symptoms in their offspring. Both symptomatic and asymptomatic children were included. Considering reciprocal associations of child-caregiver psychopathology, we hypothesized that the psychopathology of caregivers and their children would be strongly correlated. To our knowledge, this is the first such study conducted in a LMIC.

Material and methods

Study design

This descriptive cross-sectional study recruited participants screened for inclusion in a randomized control trial (RCT) designed to compare the effectiveness of interpersonal

Correspondence: Camila Tanabe Matsuzaka, Programa de Atendimento e Pesquisa em Violência (PROVE), Universidade Federal de São Paulo (UNIFESP), Rua Borges Lagoa, 570, 10º andar, Vila Clementino, CEP 04038-000, São Paulo, SP, Brazil.
E-mail: camila.tm@gmail.com
Submitted Apr 25 2016, accepted Mar 08 2017, Epub Jul 06 2017.

counseling facilitated by community health workers versus enhanced treatment-as-usual within the Brazilian Family-Health Strategy (Estratégia de Saúde da Família), Unidade Básica de Saúde Iaçapé, in Sapopemba, a district of São Paulo, Brazil. The Research Ethics Committee of Universidade Federal de São Paulo (UNIFESP) and the Municipal Health Council of the city of São Paulo approved the study protocol. The trial was registered in the Brazilian Clinical Trials registry with accession number RBR-5qhmb5 ([http://www.ensaiosclinicos.gov.br/rg/RBR-5qhmb5/](http://www ensaiosclinicos.gov.br/rg/RBR-5qhmb5/)). The outcome data from the RCT are under analysis and not yet published. This cross-sectional study, in turn, was design to examine the correlation between caregiver and child psychopathology in a poor district of the city of São Paulo, Brazil, within a community-based health outreach program conducted as part of the Brazilian Family-Health Strategy, among a subset of individuals screened for inclusion in the RCT.

Sample

Participants were recruited by community health workers during routine home visits between May 1, 2013, and April 30, 2015. All community health workers were employees of the Municipal Health Council of São Paulo, and received no monetary compensation to screen participants. Participation in the study was voluntary, and no financial compensation was offered. Written informed consent was obtained from adults, and written informed assent from children. All caregivers of children aged 6-15 who screened positive for depression were invited to participate in this study if they met the following criteria: 1) not currently in treatment with antidepressants or psychotherapy; and 2) no active suicidal ideation, current/previous episodes of mania or hypomania, current/previous psychotic symptoms, or alcohol or psychoactive substance use disorders. The sole inclusion criterion for children was age 6-15 years. Exclusion criteria for children were: 1) ongoing psychiatric treatment or psychotherapy; or 2) a previous diagnosis of psychosis, autism spectrum disorder, or intellectual disability. For caregivers with more than one child aged 6-15, all were included in the study.

Instruments

Research psychologists collected standard demographic information and administered a battery of instruments.

Zung Self-Rating Depression Scale²¹

This scale is a 20-item self-report screening questionnaire covering affective, psychological, and somatic symptoms associated with depression. Total scores range from 20 to 80; we used a cutoff point of ≥ 45 as the inclusion criterion, according to the validated Brazilian version.²² Although the scale can be self-administered, due to the low literacy level of the sample, the community health workers were trained to conduct the Zung screening orally. It was then re-administered by research psychologists.

Mini-International Neuropsychiatric Interview (MINI)²³

For individuals with Zung scores > 45 , a diagnosis of depression was confirmed by the research psychologist using the MINI,²³ a short semi-structured diagnostic interview compatible with DSM-IV and ICD-10 criteria. We used the Brazilian version translated and validated in Portuguese²⁴ to diagnose current major depressive episode (MDE), dysthymia, generalized anxiety disorder, panic disorder, agoraphobia, social phobia, and posttraumatic stress disorder.

Self-Reporting Questionnaire (SRQ-20)²⁵

The SRQ-20 was specifically developed by the World Health Organization to identify minor psychiatric morbidity in primary care settings and the community in developing countries. It comprises 20 dichotomous items covering common mental disorder symptoms: depression, anxiety, and somatization. We used a cutoff of ≥ 8 for positivity, according to the validated Brazilian version.²⁶

Clinical Global Impression Instrument (CGI)²⁷

The CGI provides an overall score of the clinician's view of the patient's symptoms, behavior, and functioning, using a seven-point scale for a single question. It ranges from 1 (normal) to 7 (extremely severe symptoms).

World Health Organization Quality of Life instrument – Abbreviated version²⁸ (WHOQOL-BREF)

The WHOQOL-BREF comprises 26 items, which measure the following quality of life domains: physical health, psychological health, social relationships, and the environment. Scores range from 0 to 100, with higher scores representing greater well-being. We used the validated Brazilian version.²⁹

WorldSAFE core questionnaire³⁰

An instrument used to investigate intrafamilial violence and associated factors, developed by the WorldSAFE steering committee of the World Studies of Abuse in the Family Environment (copyrighted in 1998). A section of the questionnaire was administered to adult women and sought to identify marital violence in the past (history) or current (in the last year). Only female caregivers in a current relationship answered this questionnaire. Disqualifying/humiliating, threatening, abandoning, or adulterous acts are considered forms of psychological violence, and the presence of at least one of the above was categorized as positive. Beating, punching, and kicking were considered severe forms of physical violence. Similarly, the presence of at least one of these incidents was categorized as positive. We used the translated Brazilian version developed by Bordin & Paula in 1999.

ABIPEME (Brazilian Association of Market Survey Institutes) survey³¹

An instrument used to determine socioeconomic status (SES) in Brazil, it considers level of education of the head of the household and a short inventory of household assets

(e.g. automobile, color TV, refrigerator, vacuum cleaner). Points range from zero to 34 and are classified from A (highest score and SES) to E (lowest score and SES).

Strengths and Difficulties Questionnaire (SDQ)³²

This is a screening questionnaire for behavioral problems in children, designed to be completed by the primary caregiver. It provides a total score from 0 to 40 to detect children with psychiatric symptoms. We used the Portuguese version of the SDQ for children aged 4-17 years and including impact supplements, which functions well in Brazil, all being scored in the standard manner.³² We considered a cutoff score of ≥ 14 for symptomatic children, as used in previous studies in Brazil.³³ We divided children into three groups: asymptomatic (SDQ < 14 and impact supplement score = 0); symptomatic without impact (SDQ ≥ 14 and impact supplement score = 0); and symptomatic with impact (SDQ ≥ 14 and impact supplement score ≥ 1).

Statistical analyses

Analyses were performed in SPSS and Mplus version 7.4.³⁴ Descriptive analyses included mean and standard deviations (SD) for continuous variables and frequencies for categorical or ordinal variables. P-values ≤ 0.05 were considered statistically significant.

Comparisons between the three groups of children (asymptomatic vs. symptomatic without impact vs. symptomatic with impact), stratified by the adult caregiver's clinical characteristics, were conducted using Mplus 7.4. For caregivers with more than one child included in the study, the caregiver score for ordinal variables was repeated. Differences in continuous variables were tested by comparing groups' means through the Wald chi-square test (Model Test function in Mplus). Bonferroni p-value correction ($p \leq 0.02$) was used for pairwise comparisons. Differences in categorical or ordinal dependent variables were tested using cross-tabulation and the chi-square test.

Linear regression was performed to test the association between caregivers' mental health outcomes (e.g., Zung score, SRQ-20 score) and children's characteristics, including SDQ score (i.e., symptomatic with impact, symptomatic without impact, and asymptomatic), age, and gender. Regression analyses were conducted using maximum likelihood with robust standard error (MLR) estimation to analyze continuous dependent variables (e.g., Zung score). Weighted least squares means and variance adjusted (WLSMV) was used to analyze ordinal variables (e.g., MINI diagnosis). As some caregivers participated in the study with more than one child, the analyses were performed controlling for intra-class (i.e., within-family) correlation.

Results

Of the 261 caregivers interviewed and screened for the RCT, 70 met the criteria for inclusion. Of these, 68 (97%) caregivers with 110 children agreed to participate. Demographic and clinical characteristics of the adult caregivers are described in Table 1. Mean age was

Table 1 Demographic and clinical characteristics of the caregivers

	Caregivers (n=68)
Age (years), mean (SD)	39.68 (10.82)
Gender (female)	66 (97.10)
Primary caregiver	
Mother	58 (85.29)
Father	2 (2.94)
Grandmother	5 (7.36)
Aunt	3 (4.41)
Race/ethnicity	
Black	5 (7.40)
White	29 (42.60)
Biracial/multiracial	31 (45.60)
Other	3 (4.40)
Marital status	
Married/cohabitating	45 (66.20)
Single	11 (22.40)
Separated/divorced	6 (8.90)
Widowed	5 (7.40)
Number of children	
1	38 (55.90)
2	22 (32.40)
≥ 3	8 (11.80)
Education	
Primary	35 (51.50)
Secondary	29 (42.60)
Higher	4 (5.90)
Religion	
Catholic	24 (35.30)
Protestant	27 (39.70)
Other	3 (4.40)
None	14 (20.60)
ABIPEME socioeconomic class	
A1/A2	0 (0.00)
B1/B2	22 (32.40)
C1/C2	36 (52.90)
D	6 (8.80)
E	4 (5.90)
Monthly household income (US\$),* mean (SD)	723.99 (552.82)
Zung, mean (SD)	52.79 (6.88)
SRQ-20, mean (SD)	13.12 (3.83)
CGI, mean (SD)	4.60 (0.74)
MINI, depressive disorder	61 (89.70)
MDE, current	57 (83.80)
MDE, recurrent	25 (36.80)
MDE, single episode	43 (63.20)
Dysthymia	5 (7.40)
MDE + dysthymia	1 (1.50)
MINI, comorbidity with depressive disorder	41 (37.30)
Generalized anxiety disorder	12 (10.90)
Panic disorder	8 (7.30)
Agoraphobia	17 (15.50)
Social phobia	9 (8.20)
Posttraumatic stress disorder	7 (6.40)

Data presented as n (%), unless otherwise specified.

ABIPEME = Brazilian Association of Market Survey Institutes categorization of Brazilian socioeconomic class; CGI = Clinical Global Impression instrument; MDE = major depressive episode; MINI = Mini-International Neuropsychiatric Interview; SD = standard deviation; SRQ-20 = Self-Reporting Questionnaire; Zung = Zung Self-Rating Depression Scale.

* Conversion factor: R\$ 1.00 = US\$ 3.50, August 2015.

Table 2 Demographic characteristics of children

	Total (n=110)	Asymptomatic* (n=42)	Symptomatic without impact [†] (n=20)	Symptomatic with impact [‡] (n=48)	Statistic	p-value
Age (years), mean (SD)	9.81 (2.70)	9.81 (2.73)	10.60 (2.54)	9.47 (2.70)	2.85	0.24 [§]
Gender						
Female	53 (48.20)	20 (47.60)	13 (65.00)	20 (41.70)	0.40	0.53
Male	57 (51.80)	22 (52.40)	7 (35.00)	28 (58.30)		
Education						
Not attending school	3 (2.70)	1 (2.40)	1 (5.00)	1 (2.10)	0.52	0.47
Grade 1-4	60 (54.50)	23 (54.80)	8 (40.00)	29 (60.40)		
Grade 5-9	47 (42.80)	18 (42.80)	11 (55.00)	18 (37.50)		
Number of siblings, mean (SD); median	1.06 (1.02); 1	1.33 (0.94); 1	0.80 (1.21); 0	0.92 (0.93); 1	5.33	0.07*

Data presented as n (%), unless otherwise specified.

SD = standard deviation.

* Asymptomatic = Strengths & Difficulties Questionnaire < 14.

[†] Symptomatic without impact = Strengths & Difficulties Questionnaire ≥ 14, impact supplement score = 0.

[‡] Symptomatic with impact = Strengths & Difficulties Questionnaire ≥ 14, impact supplement score ≥ 1.

[§] Wald's chi-square test.

39.68 ± 10.82 years, and most caregivers (97.10%) were female. Most were mothers (n=58; 85.29%), two were fathers, five were grandmothers, and three were aunts. The most prevalent ethnicity was biracial/multiracial (n=31, 45.60%), followed by white/European (n=29, 42.60%). Forty-five (66.20%) were married or cohabitating with a partner. On average, they had one or two children (88.30%), low educational attainment, were of Catholic (n=24, 35.30%) or Protestant (n=27, 39.70%) religion, and of socioeconomic class C (n=36, 52.90%), according to the ABIPEME Brazilian classification (lower-middle class to middle-middle class). The mean scores for all adult caregivers' questionnaires were: Zung, 52.79 ± 6.88; SRQ-20, 13.12 ± 3.83; and CGI, 4.60 ± 0.74. Sixty-one (89.70%) caregivers met criteria for depressive disorder, including current MDE or dysthymia. Seven caregivers screened positive for depression on the Zung scale, but were negative according to the MINI. These caregivers with subclinical depression were still included in the sample.

The mean age of children was 9.81 ± 2.70 years; 53 (48.20%) were female, 60 (54.50%) were attending 1st to 4th grade, and 47 (42.80%) were attending 5th to 9th grade. The children (n=110) were divided into three groups: asymptomatic (n=42); symptomatic without impact (n=20); and symptomatic with impact (n=48). As shown in Table 2, these groups did not differ significantly in terms of age, gender, education level, or number of siblings.

Table 3 describes differences among the three groups of children, stratified by the adult caregiver's clinical characteristics. The mean scores for all adult caregivers' questionnaires were: Zung, 53.67 ± 7.47; SRQ-20, 13.22 ± 3.89; CGI, 4.65 ± 0.76; and WHOQOL-BREF, 41.66 ± 11.66. According to the MINI, 92 (83.60%) children had a caregiver with a current MDE diagnosis and seven (6.40%) had a caregiver with dysthymia. In total, 97 (88.20%) children had a caregiver with a depressive disorder (current MDE or dysthymia). Forty-two (38.20%) children had caregivers with recurrent MDE and 50 (45.50%) had a caregiver with a single MDE. Forty-one of all 110 children (37.30%) had caregivers with depressive disorders and comorbidities such as dysthymia, generalized anxiety disorder, panic

disorder, agoraphobia, social phobia, or posttraumatic stress disorder. About two-thirds of the children (n=69; 62.73%) had female caregivers cohabitating with a current partner (spouse or partner). Among these, 42 children (60.90%) had a caregiver who reported current marital psychological violence and four (5.80%) had a caregiver who reported current severe marital physical violence. Most children (n=100; 90.91%) had a female caregiver who acknowledged a previous history of marital violence as defined by WorldSAFE. Of these, 83 (83.00%) had a caregiver with past history of marital psychological violence, and 38 (38.00%) had a caregiver who reported a past history of severe marital physical violence.

As described in Table 3, there was a significant difference (p = 0.01) in the distribution of caregivers with recurrent MDE according to the level of offspring psychopathology; the group of symptomatic children with impact had a higher frequency of caregivers with recurrent MDE, compared to both other groups (symptomatic children with impact, 54.20%; asymptomatic children, 26.20%; symptomatic children without impact, 25.00%). The three groups of children also had a different distribution in their caregivers' WHOQOL-BREF social relationships and environment domains (p = 0.02 and p = 0.05). Pairwise comparisons (Bonferroni correction) showed a significant difference between the asymptomatic vs. symptomatic groups, with impact on both domains (p = 0.01 and p = 0.02). No significant differences were observed between asymptomatic vs. symptomatic without impact (p = 0.06 and p = 0.47) or symptomatic with vs. without impact (p = 0.90 and p = 0.47). Female caregivers reporting current physical violence also had a different distribution (p = 0.02), with higher frequency in symptomatic children with impact compared to both other groups (symptomatic with impact, 11.50%; asymptomatic, 3.30%; symptomatic without impact, 0.00%).

We conducted a regression analysis to test for association between caregivers' clinical outcomes and children's characteristics; the results are shown in Table 4. Caregivers with symptomatic children with impact on

Table 3 Findings in the three children's groups, stratified by adult caregiver's clinical characteristics

Caregivers (n=68)	Total children (n=110)	Asymptomatic* (n=42)	Symptomatic without impact [†] (n=20)	Symptomatic with impact [‡] (n=48)	Statistic	p-value
Zung	53.67 (7.47)	53.48 (8.58)	54.30 (7.33)	53.58 (6.31)	0.12	0.94 [§]
SRQ-20	13.22 (3.89)	12.98 (4.12)	12.40 (3.87)	13.77 (3.57)	2.31	0.31 [§]
CGI	4.65 (0.76)	4.71 (0.67)	4.50 (1.16)	4.67 (0.59)	0.50	0.78 [§]
MINI, n (%)						
Depressive disorder	97 (88.20)	35 (83.30)	16 (80.00)	46 (95.80)	4.93	0.09
MDE, current	92 (83.60)	34 (81.00)	14 (70.00)	44 (91.70)	2.05	0.15
MDE, recurrent	42 (38.20)	11 (26.20)	5 (25.00)	26 (54.20)	9.23	0.01
MDE, single episode	50 (45.50)	23 (54.80)	9 (45.00)	18 (37.50)	2.69	0.26
Dysthymia	7 (6.40)	3 (7.10)	2 (10.00)	2 (4.20)	0.25	0.62
MDE + dysthymia	2 (1.80)	2 (4.80)	0 (0.00)	0 (0.00)	3.30	0.19
Comorbidity with depressive disorder	41 (37.30)	17 (40.50)	6 (30.00)	18 (37.50)	0.64	0.73
Generalized anxiety disorder	12 (10.90)	5 (11.90)	2 (10.00)	5 (10.40)	0.72	0.97
Panic disorder	8 (7.30)	4 (9.50)	0 (0.00)	4 (8.30)	0.10	0.75
Agoraphobia	17 (15.50)	6 (14.30)	3 (15.00)	8 (16.70)	0.20	0.66
Social phobia	9 (8.20)	3 (7.10)	1 (5.00)	5 (10.40)	0.52	0.47
Posttraumatic stress disorder	7 (6.40)	4 (9.50)	0 (0.00)	3 (6.20)	0.74	0.39
WHOQOL-BREF						
Total quality of life	41.66 (11.66)	43.81 (20.65)	44.37 (12.60)	38.66 (9.35)	5.10	0.07 [§]
Physical	46.17 (18.75)	44.81 (20.65)	52.32 (17.36)	44.79 (16.75)	2.00	0.37 [§]
Psychological	35.80 (15.10)	36.61 (14.93)	42.29 (16.94)	32.38 (13.16)	4.64	0.10 [§]
Social relationships	41.75 (18.73)	48.02 (19.18)	38.33 (18.33)	37.77 (16.72)	8.10	0.02[§]
Environment	44.46 (13.40)	48.07 (12.12)	44.53 (14.85)	41.28 (12.87)	6.01	0.05[§]
WorldSAFE core questionnaire, n (%)						
Marital violence section, n (children)	69	30	13	26		
Current psychological violence	42 (60.90)	17 (56.70)	5 (38.50)	20 (76.90)	2.79	0.10
Current physical violence	4 (5.80)	1 (3.30)	0 (0.00)	3 (11.50)	5.51	0.02
Marital violence section, n (children)	100	39	18	43		
History of psychological violence	83 (83.00)	33 (84.60)	12 (66.70)	38 (88.40)	0.25	0.62
History of physical violence	38 (38.00)	16 (41.00)	1 (5.60)	21 (48.80)	0.73	0.39

Data presented as mean (standard deviation), unless otherwise specified.

Bold type indicates statistical significance.

CGI = Clinical Global Impression instrument; MDE = major depressive episode; MINI = Mini-International Neuropsychiatric Interview; SRQ-20 = Self-Reporting Questionnaire; WHOQOL-BREF = World Health Organization Quality of Life instrument-Abbreviated version; Zung = Zung Self-Rating Depression Scale.

* Asymptomatic = Strengths & Difficulties Questionnaire < 14.

[†] Symptomatic without impact = Strengths & Difficulties Questionnaire ≥ 14, impact supplement score = 0.

[‡] Symptomatic with impact = Strengths & Difficulties Questionnaire ≥ 14, impact supplement score ≥ 1.

^{||} Only among female caregivers in a relationship.

[§] Wald chi-square test.

overall distress and impairment had higher SRQ-20 scores compared to the caregivers of asymptomatic children (Beta = 0.20; p = 0.04). Caregivers of more than one child had higher scores on the Zung Self-Rating Depression Scale (beta = 0.44; p = 0.00).

Discussion

As originally hypothesized, caregiver SRQ-20 score correlated significantly with "symptomatic with impact" status (SDQ score ≥ 14 and impact supplement score ≥ 1) in children. This result is in line with previous studies conducted in high-resource countries showing that, overall, the severity of a mother's depression is associated with her children's psychopathology.^{10,11,18,35} According to Fritsch et al.,¹⁸ it is possible that the association between the severity of the mother's illness and children's symptoms is part of a vicious circle or bidirectional – mothers become more severely depressed because they have children with mental disorders, and children's symptoms worsen in the presence of a mother's depression.

The results of our analysis substantiate prior findings on correlations of caregiver and offspring psychopathology. Nevertheless, our results do not address causal processes. The next step is to design studies that can assess potentially population-specific causal pathways.

We also found that children with a greater number of siblings had caregivers who were more severely depressed (Zung), suggesting higher distress and an exacerbation of caregivers' symptoms. Previously, a few studies have shown sibling similarity for depression and anxiety disorders,^{36,37} but future research should assess number of siblings and shared influences.

Community assessments of parental depression and its impact on offspring in LMICs are underreported, with little prior research.¹⁸⁻²⁰ Studies from high-income countries have pointed to a higher risk of psychiatric disorders in children of low-income depressed mothers,^{14,35} although we did not find a correlation with household income in our sample.

We observed that caregivers with symptomatic children with impact were more likely to have recurrent MDEs.

Table 4 Regression analysis between adult caregivers' clinical characteristics and children's group and demographics

Caregivers (n=68)	Asymptomatic* vs. Symptomatic without impact†	Asymptomatic* vs. Symptomatic with impact‡	Gender	Age	Number of siblings	Education level	Family income
Zung (continuous)							
Beta	-0.01	0.04	0.23	0.17	0.44	0.04	-0.17
p-value	0.94	0.69	0.24	0.16	< 0.001	0.74	0.17
SRQ-20 (continuous)							
Beta	-0.02	0.20	0.01	0.12	0.09	-0.03	-0.16
p-value	0.07	0.04	0.89	0.28	0.63	0.75	0.19
CGI (continuous)							
Beta	-0.18	0.15	-0.05	0.13	0.27	-0.03	-0.06
p-value	0.22	0.22	0.57	0.46	0.28	0.18	0.75

CGI = Clinical Global Impression instrument; SRQ-20 = Self-Reporting Questionnaire; Zung = Zung Self-Rating Depression Scale.

* Asymptomatic = Strengths & Difficulties Questionnaire < 14.

† Symptomatic without impact = Strengths & Difficulties Questionnaire ≥ 14, impact supplement score = 0.

‡ Symptomatic with impact = Strengths & Difficulties Questionnaire ≥ 14, impact supplement score ≥ 1.

Findings from longitudinal studies support the notion that children of mothers with more chronic depression have worse outcomes.³⁸ We also found that caregivers with symptomatic children with impact had worse quality of life in the social relationships and environment domains of WHOQOL-BREF; additionally, they were more likely to report current physical violence from partners.

We must acknowledge the limitations of the present study. First, inclusion criteria were based on depression symptoms from the Zung screening scale. As a result, seven caregivers did not meet criteria for depressive disorders by MINI; three of these had a diagnosis of generalized anxiety disorder and four had subclinical symptoms based on the MINI. The main reason for our broader inclusion criteria is that anxiety and somatization are very common in primary care, and frequently comorbid.³⁹ The SRQ-20 was used to evaluate depression, anxiety, and somatization, given the substantial syndromic overlap in primary care and significance of common mental disorders,⁴⁰ and showed significant correlation with child's symptoms. Second, this small sample may have been biased by recruitment criteria that initially focused on including dyads of symptomatic participants, both adults and children. Thus, we cannot generalize the high prevalence of symptoms found in our study population. Third, we could not investigate specific diagnoses and differences in externalizing and internalizing symptoms further in our sample of children, due to a substantial amount of missing data in the asymptomatic group; this, again, is attributable to our initial interest in including only symptomatic children. Finally, to assess child psychopathology, we relied on the SDQ, which is based on caregiver reports; we did not obtain any information from the children themselves, nor from a clinician.

Strengths of the study include our sample demographics, since most previous studies examined homogeneous, middle- and upper-middle income, predominantly white families.¹² Moreover, none of the adults or children included in our study were currently in treatment, as they

were recruited for a future intervention study. In addition, our adult participants were not seeking treatment, but rather were actively screened by community health workers.

These results substantiate our bidirectional hypothesis that children's psychopathology impacts caregivers' psychiatric symptoms and vice-versa, and can help guide future strategies for actions and prevention efforts aimed at reducing the burden of common mental disorders in both caregivers and children. To the best of our knowledge, this is the first study to evaluate the correlation between caregiver psychiatric symptoms and child psychopathology in a LMIC. Our data add to the growing literature on community assessments conducted within LMICs.

Acknowledgements

The authors gratefully acknowledge the enormous contributions made to this project by the patients, the families, and the staff from Brazilian Family-Health Strategy (UBS laçapé) and Universidade Federal de São Paulo. This study was supported by Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP; grant 2012/17485-4).

CTM has received a scholarship from Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) and Instituto Lemann. MLW receives support from NIMH (D43 TW009675 and T32 MH096724). ANP receives support from NIMH (T32-MH19139 Behavioral Sciences Research in HIV Infection; Principal Investigator: Theodorus Sandfort, PhD). EVH has received a scholarship from Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) and Instituto Lemann. These scholarships provided travel expenses for CTM and EVH to spend a year in the T32 Global Mental Health Post-Doctoral Fellowship (T32MH096724; Wainberg ML & Oquendo MA) at the Columbia University Department of Psychiatry/New York State Psychiatric Institute. ACS receives support from NIMH (K01MH104514).

Disclosure

The authors report no conflicts of interest.

References

- 1 Goldberg D. A bio-social model for common mental disorders. *Acta Psychiatr Scand Suppl.* 1994;385:66-70.
- 2 Global Burden of Disease Study 2013 Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet.* 2015;386:743-800.
- 3 Fernandez-Pujals AM, Adams MJ, Thomson P, McKechnie AG, Blackwood DH, Smith BH, et al. Epidemiology and heritability of major depressive disorder, stratified by age of onset, sex, and illness course in generation scotland: scottish family health study (GS:SFHS). *PLoS One.* 2015;10:e0142197.
- 4 Flint J, Kendler KS. The genetics of major depression. *Neuron.* 2014;81:484-503.
- 5 Gunlicks ML, Weissman MM. Change in child psychopathology with improvement in parental depression: a systematic review. *J Am Acad Child Adolesc Psychiatry.* 2008;47:379-89.
- 6 Beardslee WR, Gladstone TR, O'Connor EE. Transmission and prevention of mood disorders among children of affectively ill parents: a review. *J Am Acad Child Adolesc Psychiatry.* 2011;50:1098-109.
- 7 McAdams TA, Rijdsdijk FV, Neiderhiser JM, Narusyte J, Shaw DS, Natsuaki MN, et al. The relationship between parental depressive symptoms and offspring psychopathology: evidence from a children-of-twins study and an adoption study. *Psychol Med.* 2015;45:2583-94.
- 8 Barker ED, Copeland W, Maughan B, Jaffee SR, Uher R. Relative impact of maternal depression and associated risk factors on offspring psychopathology. *Br J Psychiatry.* 2012;200:124-9.
- 9 Mendes AV, Loureiro SR, Crippa JA, de Meneses Gaya C, Garcia-Esteve L, Martin-Santos R. Mothers with depression, school-age children with depression? A systematic review. *Perspect Psychiatr Care.* 2012;48:138-48.
- 10 Foster CJ, Garber J, Durlak JA. Current and past maternal depression, maternal interaction behaviors, and children's externalizing and internalizing symptoms. *J Abnorm Child Psychol.* 2008;36:527-37.
- 11 Pilowsky DJ, Wickramaratne PJ, Rush AJ, Hughes CW, Garber J, Malloy E, et al. Children of currently depressed mothers: a STAR*D ancillary study. *J Clin Psychiatry.* 2006;67:126-36.
- 12 Goodman SH, Rouse MH, Connell AM, Broth MR, Hall CM, Heyward D. Maternal depression and child psychopathology: a meta-analytic review. *Clin Child Fam Psychol Rev.* 2011;14:1-27.
- 13 Elgar FJ, McGrath PJ, Waschbusch DA, Stewart SH, Curtis LJ. Mutual influences on maternal depression and child adjustment problems. *Clin Psychol Rev.* 2004;24:441-59.
- 14 Gross HE, Shaw DS, Moilanen KL. Reciprocal associations between boys' externalizing problems and mothers' depressive symptoms. *J Abnorm Child Psychol.* 2008;36:693-709.
- 15 Gross HE, Shaw DS, Moilanen KL, Dishion TJ, Wilson MN. Reciprocal models of child behavior and depressive symptoms in mothers and fathers in a sample of children at risk for early conduct problems. *J Fam Psychol.* 2008;22:742-51.
- 16 Tamplin A, Goodyer IM, Herbert J. Family functioning and parent general health in families of adolescents with major depressive disorder. *J Affect Disord.* 1998;48:1-13.
- 17 Wilkinson PO, Harris C, Kelvin R, Dubicka B, Goodyer IM. Associations between adolescent depression and parental mental health, before and after treatment of adolescent depression. *Eur Child Adolesc Psychiatry.* 2013;22:3-11.
- 18 Fritsch RM, Montt ME, Solis JG, Pilowsky D, Rojas MG. [Psychopathology and social functioning among offspring of depressed women]. *Rev Med Chil.* 2007;135:602-12.
- 19 Ferriolli SH, Marturano EM, Puntel LP. [Family context and child mental health problems in the Family Health Program]. *Rev Saude Publica.* 2007;41:251-9.
- 20 Tan S, Rey J. Depression in the young, parental depression and parenting stress. *Australas Psychiatry.* 2005;13:76-9.
- 21 Zung WW. A self-rating depression scale. *Arch Gen Psychiatry.* 1965;12:63-70.
- 22 Chagas MH, Tumas V, Loureiro SR, Hallak JE, Trzesniak C, de Sousa JP, et al. Validity of a Brazilian version of the Zung Self-Rating Depression Scale for screening of depression in patients with Parkinson's disease. *Parkinsonism Relat Disord.* 2010;16:42-5.
- 23 Sheehan DV, Lecrubier Y, Sheehan KH, Amorim P, Janavs J, Weiller E, et al. The Mini-International Neuropsychiatric Interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *J Clin Psychiatry.* 1998;59:22-33; quiz 34-57.
- 24 de Azevedo Marques JM, Zuairi AW. Validity and applicability of the Mini International Neuropsychiatric Interview administered by family medicine residents in primary health care in Brazil. *Gen Hosp Psychiatry.* 2008;30:303-10.
- 25 Harding TW, de Arango MV, Baltazar J, Climent CE, Ibrahim HH, Ladrado-Ignacio L, et al. Mental disorders in primary health care: a study of their frequency and diagnosis in four developing countries. *Psychol Med.* 1980;10:231-41.
- 26 Iacoponi E, Mari JJ. Reliability and factor structure of the Portuguese version of Self-Reporting Questionnaire. *Int J Soc Psychiatry.* 1989; 35:213-22.
- 27 Guy W. Clinical global impressions. In: *ECDEU Assessment Manual Psychopharmacology, revised (DHEW Publ No ADM 76-338)*. Rockville: National Institute of Mental Health; 1976. p. 218-22.
- 28 Berlim MT, Pavanello DP, Caldieraro MA, Fleck MP. Reliability and validity of the WHOQOL BREF in a sample of Brazilian outpatients with major depression. *Qual Life Res.* 2005;14:561-4.
- 29 Fleck MP, Louzada S, Xavier M, Chachamovich E, Vieira G, Santos L, et al. [Application of the Portuguese version of the abbreviated instrument of quality life WHOQOL-bref]. *Rev Saude Publica.* 2000;34:178-83.
- 30 Sadowski LS, Hunter WM, Bangdiwala SI, Munoz SR. The world studies of abuse in the family environment (WorldSAFE): a model of a multi-national study of family violence. *Inj Control Saf Promot.* 2004;11:81-90.
- 31 Jannuzzi PdM. Indicadores sociais no Brasil: conceitos, fontes de dados e aplicações. Campinas: Atomo & Alínea; 2009.
- 32 Goodman R, Ford T, Simmons H, Gatward R, Meltzer H. Using the Strengths and Difficulties Questionnaire (SDQ) to screen for child psychiatric disorders in a community sample. *Int Rev Psychiatry.* 2003;15:166-72.
- 33 Cavalcante-Nóbrega LP, Mello AF, Maciel MR, Cividanes GC, Fossaluza V, Mari JJ, et al. Quality of life of mothers whose children work on the streets of São Paulo, Brazil. *Cad Saude Publica.* 2015; 31:827-36.
- 34 Muthén LK, Muthén BO. *Mplus user's guide*. 7th ed. Los Angeles ; Muthén & Muthén; 1998-2012.
- 35 Riley AW, Coiro MJ, Broitman M, Colantuoni E, Hurley KM, Bandeen-Roche K, et al. Mental health of children of low-income depressed mothers: influences of parenting, family environment, and raters. *Psychiatr Serv.* 2009;60:329-36.
- 36 Olino TM, Lewinsohn PM, Klein DN. Sibling similarity for MDD: evidence for shared familial factors. *J Affect Disord.* 2006;94:211-8.
- 37 Rende R, Warner V, Wickramarante P, Weissman MM. Sibling aggregation for psychiatric disorders in offspring at high and low risk for depression: 10-year follow-up. *Psychol Med.* 1999;29:1291-8.
- 38 Brennan PA, Hammen C, Andersen MJ, Bor W, Najman JM, Williams GM. Chronicity, severity, and timing of maternal depressive symptoms: relationships with child outcomes at age 5. *Dev Psychol.* 2000;36:759-66.
- 39 Kroenke K, Spitzer RL, Williams JB, Monahan PO, Lowe B. Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. *Ann Intern Med.* 2007;146:317-25.
- 40 Lowe B, Spitzer RL, Williams JB, Mussell M, Schellberg D, Kroenke K. Depression, anxiety and somatization in primary care: syndrome overlap and functional impairment. *Gen Hosp Psychiatry.* 2008;30:191-9.