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Logistic Regression to Assess Risk Factors in Offspring from Brazilian Families with Alcohol and Drug Problems

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Abstract

Background: The correlations between protective and risk factors in Brazilian families with substance misuse problems were investigated in this study.

Methods: A case-control study was conducted with a convenience sample; the participants were paired by sex and age. Three hundred five families with children and adolescents (4-18 years of age) were evaluated; 60% (n=183) were in the study group, and 40% (n=122) were in the control group. In the study group, 73% (n=133) of the families had fathers with drinking problems and 27% (n=50) had fathers with illicit poly-drug addiction.

Results: Parents with illicit drug dependence problems showed a greater number of clinical aspects to their children's psychological development than parents with alcohol addiction, as the proportion of this group was (CBCL: withdrawn (59%); somatic complaints (24.5%); social problems (29%); thought problems (12%); delinquent behavior (24,5%); externalizing (55%); and total problems (55%)). However, both substances are equally harmful and can trigger mental health risks in children, especially younger children. Regarding the risk of mental health problems, the findings indicate that 39% (n=115) of the children demonstrated externalizing problems and 33% (n=97) demonstrated internalizing problems.

Conclusion: There is a need for better and more readily available comprehensive preventive strategies that can address complex and correlated risk factors, the multiple needs of families with parents who misuse drugs, and the conditions in their communities (such as poverty, unemployment, poor education, criminality, and the lack of public services and policies).

Keywords

Offspring of addicted parents, High-risk families, Multiple needs, Logistic regression

Introduction

Over the past 40 years, efforts to prevent child maltreatment have moved through various stages: public and professional recognition of the problem, experimentation with a wide range of prevention programs addressing one or more factors believed to increase a child's risk for maltreatment, and the development of systemic and contextual reforms to better integrate and sustain these diverse interventions [1]. Throughout this process, basic and applied research has played a critical role in shaping prevention programming and assessing its impacts on children and families [2].

Several types of factors may increase a child's vulnerability to mental health problems: biological factors, genetic factors, psychosocial factors, stressful life events and exposure to physical or sexual abuse [3]. The negative impacts of various stressors have been shown to affect children's mental health; these stressors include witnessing marital violence, living with a mentally disturbed mother and suffering physical and sexual aggression at home [4,5].

The cumulative effect of multiple factors is more important in determining a child's emotional or behavioral problems than the presence of an isolated stressor, regardless of its magnitude.

Parental substance abuse is frequently associated with all types of maltreatment; almost 80% of the families who come to the attention of Child Protective Services in the USA have some type of substance abuse problem [6]. In a Brazilian pilot study [4], high rates of child mental health problems (22.4% in children aged 4-17 years) and severe physical punishment (10.1% in children aged 0-17 years) were found, confirming the need to explore the potential association between those risk factors and parental drug misuse more closely.

The relationship between parental substance abuse and child neglect is stronger than the relationship between parental substance abuse and other types of maltreatment [7]. McCoy and Keen [8] conducted a parental factors study in which 85% of the sample listed substance abuse as one of the top two causes of child mistreatment, with poverty as the other leading cause [8].

There is a large amount of data relating parents with alcohol

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problems to consequences for their children or family system. However, the psychosocial and emotional impairment of children with drug-dependent parents has rarely been investigated [9].

Based on the international literature on the impact of fathers' substance dependence, it was expected to encounter similar data in this sample. However, we expected that illegal drug dependence in fathers would be more likely to affect the development of their children and adolescents.

The main aim of this study is to evaluate the impact of addiction and its associated risk and protective factors on Brazilian children living with addiction in their households, including alcohol and illicit drug addiction. This study took place in a specialized service organization for children and adolescents of parents with substance dependence located in the outskirts of Sao Paulo, an area with high population density, widespread poverty, few services and other social vulnerabilities.

Methods

Setting

The study group was enrolled in a selective prevention program for children of parents with substance dependence from the Federal University of Sao Paulo, Brazil. The control group was recruited from the pediatric outpatient clinic of a public health care facility in the same district. The data were collected at both locations on the outskirts of the city of Sao Paulo, Brazil.

Inclusion and exclusion criteria

One child per family was randomly selected for inclusion in the study group. Children (4 to 18 years old) of alcohol or drug-dependent fathers who scored positive on the Family CAGE [10] and were accompanied by a caregiver at the selective prevention program were eligible to participate. Children of alcohol and drug combined user's father, children of addicted mothers and children who were not accompanied by a caregiver at the selective prevention program were excluded from the study. For the control group, one child per family was randomly selected. Children between the ages of 4 and 18 who lived with their parents and came from families with no substance dependence history were included in the control group. Children who were not accompanied by a caregiver at the pediatric outpatient clinic were excluded.

It is important to note that most of the drug-dependent family members at this service organization were male; there were too few children with substance-using mothers to be included in the sample.

Subjects

A case-control study was conducted with a convenience sample; the participants were paired by sex and age. One child per family was randomly selected to avoid biasing the sample, which ultimately included 305 children representing 305 families. The interview was conducted with the caregiver (all were female: mothers, grandmothers, aunts and stepmothers). The father had alcohol dependence in 44% (n=133) of the families, and the father had illicit-drug dependence in 16% (n=50) of the families; 40% (n=122) of the families had no parental substance dependence. Of the 305 families evaluated, 71% (n=214) were categorized as socioeconomic class D or E (see the measures section for the socioeconomic ratings).

Because some interviews were incomplete, there were eight missing participants who were missing data related to the Child Behavior Checklist protocol [11]. The total CBCL sample included 297 children and adolescents. Of this sample, 21% (n=62) had non-clinical scores, and 79% (n=235) had clinical scores (p<0.001). Of the 79% who received clinical scores, the findings indicated that 105 children were in the alcohol group, 48 children were in the illicit-drug group and 82 children were in the control group. Regarding substance use among the children, 98% (n=299) reported not having used any type of substance, and only 2% (n=4) had experimented with alcohol (all 4 were children of fathers with alcohol dependence).

Measures

A team of previously trained psychologists conducted the interviews. A 60-minute interview was conducted with the caregiver of the children following the sequence described below.

Family measures

The Brazilian economic classification criterion: *Associaçao Nacional de Empresas de Pesquisa* [12], a socioeconomic rating system, evaluates the purchasing power of urban families and individuals.

FIRA-G: The General Family Index of Regenerativity and Adaptation was developed by McCubbin, Thompson, and McCubbin [13] to provide a brief set of reliable and valid measures that can be used to test major dimensions of the Resiliency Model of Family Stress, Adjustment and Adaptation [13]. It was designed to obtain 7 indices of family functioning: Family Stressors; Family Strains; the Relative and Friend Support Index; Social Support Index; Family Coping-Coherence; Family Hardiness Index. The Family Distress Index. The Brazilian version of the FIRA-G scale showed to have a reliability of 0.65 to resilience family index. This scale was translated into Portuguese by two researchers with a strong command of English, and each version was pilot-tested. A committee of five bilingual healthcare professionals reviewed the questionnaire before it was re-piloted. The back-translated version of this final draft is available from authors of this study [9].

Psychosocial stress factors: Psychosocial Stress Factors were analyzed by investigating the psychosocial stresses faced by the groups. The assessment was based on the criteria established in the ICD-10 [14].

The family CAGE: The Family CAGE is a four-question screening instrument that is used to identify family problems related to alcohol consumption [10] the Portuguese version was created by Mansur and Monteiro (1983). The latter was adapted for use with illegal drugs for this study. The used cutoff corresponded to an affirmative answer.

Child measure

The Child Behavior Checklist (CBCL) [11,15] is the most commonly utilized instrument to identify mental health problems in children and adolescents worldwide. The CBCL 4-18 is a standardized parent-reported screening questionnaire with 118 items to identify emotional/behavioral problems in children and adolescents at a clinical or borderline level. The instrument identifies empirically based, cross-culturally reproducible syndromes that can be related to the DSM classifications [16].

Caregiver measures - The self-reporting questionnaire (SRQ-20) is a screening instrument developed by the WHO; it has 20 items that can be used in community and primary care settings, especially in developing countries, to identify symptoms that may be indicative of mental disorders [17]. The current version detects probable cases of anxiety and depression. The internal consistency of the Brazilian version was 0.81. [18]. Caregivers with a total score >7 were considered cases [19].

The Beck Depression Inventory (BDI) Beck, Ward, Mendelson, Mock & Erbaugh [20] is a well-established questionnaire that is used to screen for depression and has been validated for use in non-psychiatric patients.

The Beck Anxiety Inventory (BAI) Beck, Epstein, Brown, & Steer [21] is a 21-item self-report questionnaire measuring common symptoms of clinical anxiety. The BAI was developed to minimize the overlap with the Beck Depression Inventory. Both instruments are considered standard measurement tools and have been used in a wide variety of settings to assess mood disorders.

Statistical analysis

All FIRA-G scores were analyzed with descriptive measures (means, standard deviations, minimums, maximums and percentiles). An analysis of variance (ANOVA) was used to compare the mean

Table 1: Demographic characteristics of the families and children in the study (N=305).

Characteristic	Paternal dependence			Total N (%)	Statistic	P
	Alcohol n (%)	Drugs n (%)	Controls n (%)			
Marital status of the parents					$F_{2,257}=24,544$	**0.001**[**]
Single	4 (3)	4 (8)	2 (2)	10 (3)		
Married/steady partner	94 (71)	24 (48)	84 (69)	202 (66)		
Divorced/separated	31 (23)	21 (42)	32 (26)	84 (27.5)		
Widower	4 (3)	1 (2)	4 (3)	9 (3)		
Socioeconomic status					$F_{2,257}=13,282$	0,056
B	4 (3)	2 (4)	3 (2,5)	9 (3)		
C	32 (24)	7 (14)	43 (35)	82 (27)		
D	90 (68)	39 (78)	74 (61)	203 (66,5)		
E	7 (5)	2 (4)	2 (1,5)	11 (3,5)		
Age of the parents, mean ± SD					$F_{2,257}=13,695$	0,255
	39.06 ± 11.6	35.03 ± 9.8	37.02 ± 10.6			
Total	**133 (100)**	**50 (100)**	**122 (100)**	**305 (100)**		
Sex of the child						
Male	66 (50)	32 (64)	62 (51)	160 (52)		**0.203**
Female	67 (50)	18 (36)	60 (49)	145 (48)		**3,218**
Age of the child, average ± SD					$F_{2,257}=5,076$	**0.007**[**]
	10.38 ± 4.2	8.44 ± 3.4	10.30 ± 4.2			
Child's education level					$F_{2,257}=23,396$	**0.013**[*]
Illiterate	4 (3)	0 (0)	13 (11)	17 (6)		
Preschool	28 (21)	17 (34)	18 (15)	63 (21)		
< 9 years of schooling	66 (50)	29 (58)	54 (44)	149 (49)		
9 years of schooling	9 (7)	1 (2)	9 (7)	19 (6)		
High school (incomplete)	20 (15)	3 (6)	22 (18)	45 (15)		
High school (complete)	3 (2)	0 (0)	3 (2.5)	6 (2)		
Unknown	3 (2)	0 (0)	3 (2.5)	6 (2)		
Total	**133 (100)**	**50 (100)**	**122 (100)**	**305 (100)**		

[*]Chi-square test or [**]Fisher's exact test p-values;
F test (ANOVA) p-value for mean comparisons - [*]p<0,05. [**]p<0,01.

scores of the groups (alcohol, drugs and the control group). We applied the Duncan multiple comparison test to detect differences between the groups and Student's t-test to compare the means. Logistic regression was performed based on the CBCL .Logistic regression analyses were conducted and adjusted to examine which variables influenced the children's mental health. The Hosmer-Lemeshow goodness-of-fit test was used to evaluate the risk factors associated with the CBCL scale.

Ethical issues

All of the participants gave written informed consent, and their anonymity was guaranteed. The study design was approved by the Human Research Ethics Committee of the Federal University of Sao Paulo - School of Medicine (protocol no. 917/99).

Results

Demographic data for the families and children

Three hundred five families with children and adolescents were evaluated (4–18 years of age); 60% (n=183) were in the study group, and 40% (n=122) were in the control group. In the study group, 73% (n=133) of the families had fathers with drinking problems, and 27% (n=50) had fathers with illicit poly-drug addiction.

There were no significant differences between the families in terms of socioeconomic status. The mean age of the parents was 38 years old (×=15,7; sd =11.6). Of the 305 fathers, 43% (n=132) were Caucasian, 45% (n = 136) were multi-ethnic and 12% (n=37) were Black. Of the 305 mothers, 53% (n=161) were Caucasian, 39% (n=119) were multi-ethnic, and 8% (n=25) were Black. Most of the fathers had manual labor jobs, and most of the mothers worked as housecleaners or housekeepers. With regard to formal education, 52% (n = 158) of the fathers and 50.5% (n = 154) of the mothers had not completed elementary school.

The children's ages ranged from 4 to 18. Of the children, 124 were 4 to 8 years old, 86 were 9 to 12 years old and 95 were 13 to 18 years old. The mean age of the children with alcohol-dependent fathers was 10.38, whereas it was 8.44 for the children with fathers with illicit drug dependence and 10.30 for the children in the control group (p=0.007). Eight percent of the children were 17-18 years old; of these children, only 24% (N=6) had completed high school. Of the 31% who should have completed 9 years of schooling, only 14% had. With regard to the number of siblings, 16% (n=50) were the only child in the family, 56% (n=170) had one or two brothers and 28% (n=85) had more than three brothers. The demographic data for the sample are shown in Table 1.

Child behavior data (CBCL)

Seventy-nine percent of the children (n=235) had clinical scores, and 21% (n=62) had non-clinical scores (p=0.001). Among the children with clinical scores, the CBCL analysis revealed that the children of drug-dependent fathers were affected at higher rates than the children of alcohol-dependent fathers for 7 of 12 subscales: withdrawn (59%; n=29); somatic complaints (24.5%; n=12); social problems (29%; N=14); thought problems (12%; N=6); delinquent behavior (24.5%; N=12); externalizing (55%; n=27%); and total behavioral problems (55%; n=27). Among the children with clinical scores, the children of alcohol-dependent fathers were affected at higher rates on 4 of the 12 subscales: anxious/depressed (20%; n = 26); attention problems (20%; n=26); aggressive behavior (20%; n=26); and internalizing (47%; n=61) (Table 2).

Regarding the demand for treatment or support, 81% (n=248) reported that they had no need for help coping with emotional, physical, behavioral, or learning problems. However, 10.5% (n=14) of the children with alcoholic fathers had sought help for learning problems, and 10.5% (n=14) had sought help for emotional and physical problems (p=0.017).

Table 2: Child Behavior Checklist results, by substance (N=235).

| Child Behavior Checklist Clinical Conditions of the Children | Substance Used by Child's Father | | | | p** |
	Alcohol 130 (44%)	Drugs 49 (16%)	None 118 (40%)	Total N=297 (100%)	<0.001
Withdrawal	29 (22)	29 (59)	6 (5)	64 (21.5)	< 0.001
Somatic complaints	12 (9)	12 (24.5)	1 (1)	25 (8)	< 0.001
Anxiety/depression	26 (20)	3 (6)	8 (7)	37 (12.5)	= 0.001
Social problems	22 (17)	14 (29)	10 (8.5)	46 (15.5)	= 0.003
Thought problems	10 (8)	6 (12)	4 (3)	20 (7)	< 0.001
Attention problems	26 (20)	4 (8)	11 (9)	41 (14)	= 0.001
Delinquent rule-breaking behavior	11 (8.5)	12 (24.5)	6 (5)	29 (10)	< 0.001
Aggressive behavior	26 (20)	8 (16)	11 (9)	45 (15)	= 0.027
Sexual problems	63 (48.5)	11 (22)	53 (45)	127 (42)	< 0.001
Internalizing	61 (47)	11 (22)	25 (21)	97 (33)	< 0.001
Externalizing	55 (42)	27 (55)	33 (28)	115 (39)	= 0.001
Total behavioral problems	69 (53)	27 (55)	33 (28)	129 (43)	= 0.001

*chi-square test; **Fisher's exact test

Table 3: Summary of the adjusted logistic regression results for the three groups (N=235).

| Explanatory Variables | Child Behavior Checklist – (dependent variables - Subscales) | | | | | | | | | | |
	Withdrawal	Somatic complaints	Anxiety Depression	Social Problems	Thought Problems	Attention Problems	Delinquent Behavior	Aggressive Behavior	Sexual Problems	Internalizing	Externalizing
Age¹											
9 to 12 years					–					+	+
13 to 18 years			–				–	–	+		–
Sex² (male).											
Psychosocial Stress											
Hospitalization for psychiatric disorder											
Severe disease in the family							–				
Suicide in the family											
Attempted suicide in the family					+						
Problems with the police			+			+		+			
Death in the family							+		–	+	+
Physical aggression between family members	+						+				
Substance											
Alcohol	+	+	+						+		
Cocaine/Crack/Cannabis	+										
Caregiver psychiatric status			+					+			
Depression								+		+	
Anxiety											
FIRA-G											
Resilience											
Family Strain		+		+	+	+	+	+		+	+
Family Coping-Coherence								+			
Family Hardiness											
Family Distress											
Relative & Friend Support	–						+				
Social Support											

Significant at level 5% of significance
¹4-8 years old=reference category
²Female=reference category
+ = positive correlation
– = negative correlation

Logistic regression

The association between a clinical CBCL score for children and adolescents (alcohol, drug and control groups) and their parents' addiction, adjusted for psychosocial factors and family resilience, was assessed using logistic regression. This technique is used when the dependent variable is dichotomous, and it quantifies the effects of explanatory variables (the subscales of the CBCL). The variables related to the CBCL were the age and sex of the children; psychosocial stress factors, the caregiver's psychiatric status; the type of substance use; and family resilience.

The Hosmer-Lemeshow test found a good fit for 11 subscales (the exception was the Sexual Behavioral subscale, which did not have a good fit). The main results of the logistic regression model and each subscale of the CBCL were compared among the three groups (Table 3).

Depression and anxiety

The children of alcohol-dependent parents had three times the chance of developing depression and anxiety compared with the children in the control group (CI: [1.37; 6.77]; p=0.006). Caregivers' psychiatric problems increased the likelihood of anxiety and depression in their children 3.4 times compared with the children of caregivers with no psychiatric history (CI: [1.56; 7.38]; p=0.002). Legal problems within the family were associated with a three-fold increase in the likelihood of developing anxiety and depression compared with families without legal problems (CI: [1.31; 7.16]; p=0.010). The Hosmer-Lemeshow test (p=0.973).

Withdrawal

The children of alcohol-dependent parents had five times the chance of developing withdrawal compared with the control group (CI: [1.9; 12.32]; p=0.001), and the children of illicit drug-using parents were 23 times more likely than the control subjects (CI: [8.18; 64.24]; p<0.001). Having witnessed physical aggression between family members increased the likelihood of experiencing withdrawal 2.2 times (CI: [1.11; 4.23]; p=0.023). (Hosmer-Lemeshow test: p=0.110).

Somatic complaints

The children of alcohol-dependent parents had 7 times the chance of developing somatic complaints compared with the control group (CI: [0.85; 56.85]; p=0.070). For the children with drug-addicted parents, the likelihood was 27 times greater compared with the control group (CI: [3.29; 215.02]; p=0.002). Higher scores on the family strain index were associated with a greater chance of developing somatic complaints: the odds of experiencing somatic symptoms increased 7% for each 1-point increase on the index (CI: [1.02; 1.12]; p=0.003). (Hosmer-Lemeshow test: p=0.431).

Social contact

Children within the 13 to 18 age range were 67% less likely to develop social contact problems compared with those between 4 and 12 years of age (CI: [0.15; 0.77]; p=0.010). The children of illicit drug users were 2.4 times more likely to have social contact issues compared with the alcohol group and the control group (CI: [1.15; 5.18]; p=0.020). Higher scores on the family strain index were associated with greater chances of developing social contact problems: the likelihood of having social contact issues increased 6% for each 1-point increase on the index (CI: [1.03; 1.10]; p=0.001). (Hosmer-Lemeshow test: p=0.073).

Thought problems

An attempted suicide in the family increased the likelihood of developing thought problems 7 times (CI: [1.53; 33.73]; p=0.012). The odds of having thought problems increased 7% with each 1-point increase on the family strain index (CI: [1.02; 1.12]; p=0.005). (Hosmer-Lemeshow test: p=0.389).

Attention problems

Legal problems within the family increased the likelihood of having attention problems three times (CI: [1.49; 6.95]; p=0.003). Higher values on the family strain index were associated with a greater likelihood of attention problems: the chances of having attention problems increased 6% for each 1-point increase on the index (CI: [1.03; 1.10]; p=0.001). (Hosmer-Lemeshow test: p=0.052).

Delinquent behavior

Children between the ages of 13 and 18 were 85% less likely to develop delinquent behavior than children between 4 and 12 years of age (CI: [0.04; 0.60]; p=0.007). The children of illicit drug users were 5.6 times more likely to exhibit delinquent behavior than the children in the alcohol group and the control group (CI: [1.97; 15.88]; p=0.001). The death of a family member increased the likelihood of exhibiting delinquent behavior 5.4 times (CI: [1.95; 14.81]; p=0.001). Another factor that enhanced the likelihood of delinquent behavior was physical aggression within the family (3.6 times greater; CI: [1.33; 9.53]; p=0.012). Each 1-point increase on the family strain index and the relative/friend support index increased the likelihood of delinquent behavior by 9% (CI: [1.04; 1.15]; p=0.001) and 12% (CI: [1.02; 1.24]; p=0.020), respectively. On the other hand, severe disease in the family decreased the chances of delinquent behavior by 82% (CI: [0.05; 0.69]; p=0.013). (Hosmer-Lemeshow test: p=0.830).

Aggressive behavior

Children between 13 and 18 years of age were 61% less likely to develop aggressive behavior than children between 4 and 12 years of ages (CI: [0.17; 0.89]; p=0.025). Illegal problems within the family increased the likelihood of aggressive behavior 2.4 times (CI: [1.02; 5.4]; p=0.044). Greater severity of depression in the caregiver and higher scores on the family strain and family coping-coherence indices were associated with greater chances of aggressive behavior. The chances of exhibiting aggressive behavior increased 122% (CI: [1.07; 4.63]; p=0.033), 5% (CI: [1.01; 1.09]; p=0.010) and 55% (CI: [1.14; 2.1]; p=0.005), respectively, for every 1-point increase on these indices. (Hosmer-Lemeshow test: p=0.482).

Internalizing

Children between 9 and 12 years of age were 95% more likely to demonstrate internalizing problems than children of other ages (CI: [1.06; 3.57]; p=0.014). The children of alcohol-dependent parents were 2.4 times more likely to have internalizing problems than the children of drug users and the children in the control group (CI: [1.42; 4.17]; p=0.001). A death in the family increased the chances of developing internalizing problems 2 times (CI: [1.17; 3.69]; p=0.013). Furthermore, the greater the severity of depression in the caregiver and the higher the family strain index, the more likely internalizing problems were. Every 1-point increase on the depression severity scale (CI: [1.09; 3.63]; p=0.030) and the family strain index (CI: [1.01; 1.08]; p=0.013) increased the likelihood of internalizing problems by 99% and 5%, respectively. (Hosmer-Lemeshow test: p=0.268).

Externalizing

Children between 13 and 18 years of age had a 65% lower chance of developing externalizing problems (CI: [0.20; 0.63]; p=0.000). The children of illicit drug users were 2.2 times more likely to have externalizing issues than other groups (CI: [1.13; 4.28]; p=0.020). It was also observed that death in the family increased the likelihood of externalizing problems two-fold (CI: [1.30; 4.03]; p=0.004). For every 1-point increase on the family strain index, the odds of externalizing problems increased 7% (CI: [1.04; 1.10]; p<0.001). (Hosmer-Lemeshow test; p=0.734) (Table 3).

Discussion

Evidence shows that a combination of risk factors can cause a wide range of vulnerabilities in young people [22]. The findings from this study revealed that substance abuse by fathers is more harmful when it involves illicit drug use, and these harms are associated with other factors, such as the age of the child and the psychiatric status of the female caregiver. The presence of family stressors, physical aggression, death, severe disease and legal problems within the family context could all potentially act as risk factors for mental health problems in children and adolescents, whether they present signs of drug abuse or not.

When the children of alcohol-dependent and drug-dependent fathers were compared with the children in the control group, the impact of parental addiction became evident. However, fathers with illicit drug dependence showed greater number of clinical aspects related to the psychological development of their children than fathers with alcohol addiction. Of the 12 CBCL subscales applied in this study, a greater proportion of children of drug-dependent fathers had clinical scores on 7 of the scales: withdrawn (59%); somatic complaints (24.5%); social problems (29%); thought problems (12%); delinquent behavior (24.5%); externalizing (55%); and total problems (55%). The children of alcohol-dependent parents, however, were more vulnerable to developing depression and anxiety (20%), attention problems (20%), internalizing aspects (47%) and aggressive problems (20%).

Regarding substance use among children, 98% (n = 299) reported that they had not used any type of substance, and only 2% (n = 4) had experimented with alcohol (all 4 were the children of fathers with alcohol dependence, according to the caregiver's perception). This result must be considered in light of the fact that it is a behavior easily denied by the parents or potentially not even shared by their children. However, the findings of a national study [23] have shown that the mean age of drinking onset for Brazilian adolescents has decreased to approximately 13.9 years old.

According to the WHO [24], between the ages of 12 and 18 years, the use of psychoactive substances can result in the emergence of mental and behavioral disorders. Nevertheless, it is important to note that the mean age bracket was 8–10 years. Thus, based on the ages of the children in this study, it is hard to predict from this evidence whether these children will use substances or not.

According to Fleitlich-Bilyk & Goodman [5], the prevalence of psychiatric disorders among Brazilian children and adolescents between 7 to 14 years old was 12.7% [5]. However, the findings revealed that these disorders can occur at earlier ages. The younger children in both groups were at higher risk of developing social, delinquent, aggressive and externalizing problems. Based on these findings, it is well established that the salience of specific risk and protective factors varies according to the child's stage of development [22].

Following the type of substance in the family and the child's age, the most frequent psychosocial stressor was family strain. This factor was associated with high vulnerability to somatic complaints, social contact, thought and attention problems, delinquent and aggressive behavior and internalizing. The socioeconomic status of the families in this sample might lead to more stressful situations, which could be directly related to family tension, as a previous study on child maltreatment has shown [25].

It is vital to consider the characteristics of the community from which this sample was drawn because the socioeconomic indicators revealed very low living standards [26]. Two hundred fourteen (71%) of the 305 families evaluated were living in poverty (class D or E). Socioeconomic status is not in itself a determining factor: a low-income family does not necessarily have dependence-related or violence-related problems. However, according to Velleman et al. [27], socioeconomic factors can create a more vulnerable environment for family members [27]. Consequently, the community

context and neighborhood resources have long been considered key factors in determining a child's relative risk of maltreatment and poor developmental outcomes. Neighborhood conditions can significantly influence child maltreatment rates, juvenile delinquency [28], early child behavior problems [29], and later deviance [30]. The *Jardim Angela* community, where the study was conducted, is a conglomerate of slums located in the southern region of Sao Paulo. According to Hinkly and Laranjeira [31], this area had the highest density of alcohol outlets reported in the literature in 2002 [31]. In the late 90 s, the United Nations (UN) ranked this area as the most violent neighborhood in the world, with 120 homicides per 100 thousand inhabitants.

Another relevant risk factor was the psychiatric health of the female caregiver. It was the fifth highest risk factor associated with aggressive and sexual behavior, depression/anxiety and internalizing problems in children. When combined with the father's alcohol and drug dependence, this factor can be more harmful. Children in this subset are less likely to experience the protective effects of having one parent who can provide appropriate nurturance and discipline [32]. For example, the children of alcohol-dependent fathers were more vulnerable to mood disorders [33].

Other risk factors, such as physical aggression, death, severe disease and legal problems, were frequent social stressors in this sample. These factors can also have negative effects when analyzed separately. However, depending on the combination, these factors can either be risk factors or protective factors [34]. The children who witnessed severe disease in the family had an 82% lower chance of exhibiting delinquent behaviors compared with the children who did not experience it. Legal problems were correlated with depression/anxiety and attention problems.

Another psychosocial stressor we observed was aggression between family members, which was a risk factor directly correlated with delinquent behavior and withdrawal in children. The association between domestic violence and addiction problems is well known [35]. According to Zanoti-Jeronymo et al. [36], children who have witnessed aggression between family members are more likely to develop substance abuse in adulthood than children who have been physically abused. Moreover, addicted parents are more likely to display verbally and physically abusive behavior toward each other and to use aggressive disciplinary practices with their children [37]. The findings of a previous study [9] showed that physical aggression between family members was more common among families with drug-dependent fathers (46%; n=23) than families with alcohol-dependent fathers (29%; n=38). Analyzing the behavior of the children in the study group (with alcohol and drug-dependent fathers), it was observed that 15% (n=45) were more likely to develop aggressive behavior. Of this group, the children with alcohol-dependent fathers were more vulnerable (20%; n=26) than the children of drug-dependent fathers (16%; n=8). Both groups combined were more vulnerable than the control group (16 %; n=8).

The present study has some limitations. This study focused on a high-risk population that had relatively homogeneous socioeconomic status (low-income) in a Latin American country. Thus, we were able to identify the family-level factors that are related to specific types of child mental health problems in a population that has rarely been studied systematically. Our study results are most likely generalizable to other disadvantaged communities located in the outskirts of highly populated cities in developing countries. As such, they have important implications for designing effective interventions to prevent the development of mental health problems among children in these populations.

Since the study considered children enrolled in the prevention service, the diagnosis of substance misuse was made during the process of enrolling the families of the participants, and for the dependence criteria, it was taken into account one drug of choice only (licit or illicit drug). However, this interview process did not assurance the possibility to have fathers using more than on type of substance.

Furthermore, the questionnaire was administered to the caregivers of the children in the study, which could introduce bias related to the perceptions of caregivers and their understanding of the questions. Therefore, interventions that support parents emotionally may help them to perceive their children's needs and behavior more accurately.

Conclusion

Although the findings of the present study showed that both alcohol dependence and illicit drug dependence of fathers are very harmful to the development of their children because they considerably increase the likelihood that they will experience emotional and behavioral problems, the results of the logistic regression analyses indicated that illicit drug dependence had a greater impact on children's mental health than alcohol addiction. This study provided evidence to confirm the hypothesis that substance dependence has an impact on child and adolescent development, and furthermore, it showed that fathers with illegal drug problems are more likely to affect the development of their children and adolescents. This result might indicate a need for prevention measures that are tailored to the type of psychoactive substance present in family environment.

Younger children are more vulnerable to risk factors throughout their development. In this study, the children between the ages of 4 and 12 were exposed to the greatest risk of developing social contact problems, delinquent and aggressive behaviors and externalizing problems. The recurrent risk factors within this sample were family strain, caregivers with a psychiatric history, death, severe disease and legal problems in the family. The combination of these factors cries out for better, more comprehensive, readily available prevention strategies that can address complex correlated risk factors, the multiple needs of Brazilian families with parents who misuse drugs, and the characteristics of their communities (such as poverty, unemployment, poor education, criminality, and the lack of public services and policies).

Therefore, efforts should be made to further investigate protective factors among high-risk groups. The present findings suggest that future investigations should not limit their focus to risk factors. A holistic approach that focuses on community, families, and parenting skills could provide a considerable benefit.

Acknowledgments

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