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ORIGINAL ARTICLE

Prevalence of behavior problems and associated factors in preschool children from the city of Salvador, state of Bahia, Brazil

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Objective: To identify the prevalence of internalizing and externalizing behavior problems among preschoolers from the city of Salvador, state of Bahia, Brazil, and their associations with maternal mental health and family characteristics.
Methods: This was a cross-sectional study of 349 children aged 49 to 72 months, randomly selected from 20,000 households representing the range of socioeconomic and environmental conditions in Salvador. In 1999, we assessed sociodemographic variables and family environment characteristics. In 2001, we used the Child Behavior Checklist to measure and describe the frequencies of behavior problems. We conducted bivariate and multivariate analysis to estimate associations between family and maternal factors and prevalence of behavior problems.
Results: The overall prevalence of behavior problems was 23.5%. The prevalence of internalizing problems was 9.7%, and that of externalizing problems, 25.2%. Behavior problems were associated with several maternal mental health variables, namely: presence of at least one psychiatric diagnosis (odds radio [OR] 3.01, 95%CI 1.75-5.18), anxiety disorder (OR 2.06, 95%CI 1.20-3.46), affective disorder (OR 2.10, 95%CI 1.21-3.65), and mental health disorders due to use of psychoactive substances (OR 2.31, 95%CI 1.18-4.55).
Conclusion: The observed prevalence of child behavior problems fell within the range reported in previous studies. Maternal mental health is an important risk factor for behavior problems in preschool-aged children.

Keywords: Child psychiatry; epidemiology; families; mood disorders, unipolar; women

Introduction

Behavior problems in children are difficult to characterize, and the definitions for some of these problems, such as attention deficit hyperactivity disorder, are imprecise.[1-3] Although conceptualization is challenging, most authors agree that behavior problems include deviation from social behavior[1-3] and manifestation of signs and symptoms that do not meet criteria for mental health disorders, but suggest a future risk to the child's development.[4]

According to Achenbach & Edelbrock, behavior problems can be grouped into two major categories: internalizing and externalizing behaviors.[5] The latter are more common among boys and include negative behavior directed outward, such as frequent defiance, destruction of property, hyperactivity, anger, and impulsivity. Internalizing behavior, on the other hand, is more common among girls and includes psychosomatic disorders, social withdrawal, anxiety, extreme wariness, and sadness.

Behavior problems are diagnosed when a child exhibits persistent and repetitive patterns that break social rules and impair social interaction with others.[2] Academic performance, feelings of inadequacy in daily situations, a tendency to develop physical symptoms, and excessive fear in ordinary situations also require investigation.[3]

A number of studies regarding the prevalence of childhood behavior problems have been conducted in several countries.[6-13] A review of child psychopathology studies published in 20 countries identified an estimated prevalence of behavior problems ranging from 1 to 51%.[12] The overall prevalence among preschool-aged children (age 1-6 years) was 10%, while another literature review reported a prevalence range of 9.5 to 14.2% for emotional/behavior problems among children under 5.[14] In Brazil, studies on the prevalence of these conditions within the preschool age group are insufficient.

The diagnosis of behavior problems in early childhood is imprecise and varies significantly depending on instrument cutoff points.[14-16] Therefore, any comparison of the prevalence of such problems is hindered by the use of varying methods and instruments.

One of the instruments most frequently utilized worldwide to diagnose behavior problems in children and youths is the Child Behavior Checklist (CBCL). An international study using the CBCL with children aged 17 to 60 months compared 19,850 children from 24 societies in developed and developing countries.[17]

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The authors reported the average prevalence of behavior problems to account for 33.3% of total problems within this age group.

Sociodemographic factors, such as low socioeconomic level, young maternal age, and low level of parental education, have been associated with a higher risk of developing internalizing, externalizing, and attention problems at age 5.[16,18,19] The proximal environment of a child – particularly the home environment, the main context of childhood development – also has a recognized influence on behavior problems. Family size and birth order, for instance, have been suggested as risk factors related to family background,[16] although the direction of associations is not completely clear. For instance, Lawson & Mace[20] demonstrated a dual effect of family context in terms of birth order. They reported that having an older sibling may have a positive impact on a child's mental health, while the presence of a younger sibling may have a negative impact. These findings suggest that there may be an unknown mechanism underlying the relationship between a child's mental health and his/her birth order.

The roles of individual characteristics – particularly prematurity, gender, temperament, IQ, and race/ethnicity – on behavior problems have probably been more widely studied.[16,18] There is strong evidence that maternal mental disorders increase the risk of a higher levels of behavior problems and/or development of psychopathology in the child.[7,16,21] A 2013 longitudinal Brazilian study highlighted the negative influence of maternal anxiety/depression, measured when children were 6 to 13 years old, on child/adolescent mental health problems at ages 12 to 19.[22]

Child mental health problems are fairly common and may influence development in different areas, such as cognition, socialization, and learning.[23-26] Numerous studies emphasize the severe long-term consequences of behavior problems as predictors of inadequate adjustment throughout the life course. These predictors cross into different domains, including delinquency, abuse of psychoactive substances, major depression, long-term unemployment, and difficulties in educating one's own children.[10,27-29]

The need to obtain more precise information about child mental health has been identified in countries such as Brazil, where children do not receive adequate treatment.[16,30] Within this context, the goal of the present study was to identify the prevalence of internalizing and externalizing behavior problems in preschool children in the city of Salvador, state of Bahia, Brazil, and the association between these problems and maternal mental health.

Methods

Study design and population

The study reported herein involved a cross-sectional design integrating a longitudinal study, started in 1997, which investigated risk factors for child diarrhea in a sample of 1,153 children living within the urban area of the city of Salvador, Brazil. The study itself was conducted in 2001, with 349 children of both genders, between 49 and 72 months of age. Detailed information on the study design and methods is available elsewhere.[31]

Sampling procedure

The longitudinal study started in 1997 into which the present investigation is nested was designed to assess child development and diarrhea in a sample of 1,153 children randomly selected, by stratification proportional to the number of residents, from areas of the city of Salvador with and without basic sanitation. Detailed information on sampling and early cohort follow-up (1997-1998) is presented in Strina et al.[31] To study child development within this population, we selected a subsample of 510 children who were aged $<$ 42 months as of 1999. Of these, 365 children were located and constituted the sample for the present study.

In 2001, we located and assessed 350 children aged 4-6 years of age; complete data for all the covariates of interest were available for 349 of these subjects. This sample size was deemed adequate for estimation of the prevalence of behavior problems, assuming $\alpha = 0.05$ and a statistical power of 80%.

The majority of losses (61.5%) occurred due to caregiver refusal to continue participation in the study; all remaining losses (38.5%) were due to a change of address during data collection. No statistically significant differences were found between the 349 participants of the original sample and the 190 participants lost to follow-up in relation to weight-for-height ($p = 0.65$), proportion of mothers with $<$ 4 years of formal education ($p = 0.72$), or quality of the environment external to the household ($p = 0.09$).

Instruments

Child Behavior Checklist (CBCL)

This instrument was developed and standardized by Achenbach & Edelbrock at the University of Vermont in 1966 and updated in 1991 and 2001.[32] The CBCL is one of the questionnaires most frequently used to assess behavior problems in a range of cultures, and is designed to be completed by parents or those who interact with the child at home.[17,33] In Brazil, it has been used in epidemiologic studies and to measure treatment effects.[16,34]

We used the 1991 version of the CBCL to investigate behavior problems in our sample. This version has 118 items organized into eight independent subscales: social withdrawal, somatic complaints, anxious/depressed, social problems, thought problems, attention problems, delinquent behavior, and aggressive behavior. Each of the 118 items is answered on the basis of the preceding 6 months, and scored on a scale ranging from 0 to 2, where 0 = not true (as far as you know), 1 = somewhat or sometimes true, and 3 = very true or often true. Total raw scores and T scores for behavior problems are calculated by adding the scores for each item. Two main categories are then created from the grouped items: internalizing and externalizing behavior problems. Gender-specific cutoffs

are used to dichotomize the groups into normal and clinic.[35] Normative CBCL data suggest that scores above 67 indicate symptomatic patients with a clinical expression of behavior problems.[36]

The Home Observation for Measurement of the Environment (HOME) Inventory

This instrument is widely used within different sociocultural situations to assess the quality of the home environment during the first 3 years of life and its impact on cognitive and emotional development changes.[37,38] The full scale takes approximately 60 minutes to complete. It must be applied in the child's home or in another environment in which the child spends most of his/her time, with the child fully awake and in the presence of his/her main caregiver. The version used in this study was developed for children ages 0 to 3 years and comprises 45 dichotomous items, with responses based on observations and answers obtained in an interview with the mother or substitute caregiver.

HOME subscales for this age group correspond to six components or factors: 1) emotional and verbal maternal responsivity; 2) absence of punishment and restriction; 3) organization and regularity of the environment; 4) provision of appropriate play and learning material; 5) extent of maternal involvement with the child; and 6) opportunities for variety in daily stimulation. The total score ranged from 0 to 45 points, and the scores obtained for each subscale enable an assessment of the child's environment. Higher scores denote better environments, and frequencies and percentiles derived from these scores are used to calculate the environmental risk for the child's development. We created a dichotomous variable to represent the mother-child interaction using factors 1, 2, and 5. Scores for this new indicator ranged from 6 to 25 points. The variable was dichotomized using the 25th percentile as a cutoff point.

Composite International Development Interview (CIDI)

The CIDI was developed by the World Health Organization to assess mental health disorders in line with ICD-10 and DSM-IV. It has been validated for use in Brazil and includes 17 diagnostic areas for mental health disorders.[39] The researchers who used the instrument were trained by the CIDI Training Center at Universidade Federal de São Paulo - Escola Paulista de Medicina (UNIFESP-EPM). To represent maternal mental health, we used the most frequent disorders in our sample: disorders resulting from the abuse of psychoactive substances, anxiety disorders, and affective disorders. We also created a variable that represented the presence of at least one psychiatric diagnosis when the mother was diagnosed with at least one of the above-mentioned disorders.

Sociodemographic characteristics

In 2001, a pre-coded sociodemographic questionnaire was completed by the caregiver of each child as a means of assessing the family's socioeconomic conditions. Information was collected about the child (sex, age, preschool or day care center attendance), mother (age and educational attainment), and family (family income, paternal presence, number of children under 5 in the home, and housing density expressed as number of persons per room).

Data collection and processing

The data analyzed herein were collected between August and December 2001, except the HOME Inventory, which was applied in 1999. All children were assessed in their homes by a team consisting of two psychologists and four supervised students. Following codification, the data were entered into Epi Info 6, using the double-entry method, by separate researchers. The resulting databases were cleaned, corrected, converted, and imported into SPSS version 11.0 for further analysis.

Statistical analysis

Descriptive analyses were initially conducted to characterize the sample through frequencies (for categorical variables) and means and standard deviations (for continuous variable). We determined the non-adjusted prevalence of internalizing and externalizing problems and the total prevalence of behavior problems, and obtained a discriminated profile for eight behavior problem scales: withdrawal, somatic complaints, anxious/depressed, social problems, thought problems, attention problems, delinquent behavior, and aggressive behavior.

We then used logistic regression to calculate odds ratios (ORs) and their respective 95% confidence intervals (95%CI) to determine the association between variables related to the child (sex, age, preschool/day care center attendance), to the family (family income, paternal presence, number of children under 5 in the home, housing density), and to the mother (educational attainment, age, mental health, and psychosocial stimulation – mother-child interaction) and the prevalence of internalizing problems, externalizing problems, and total behavior problems among the preschoolers.

Finally, we included in the multivariate model only those variables that had demonstrated an association with $p > 0.20$ in the previous step, to assess the influence of maternal mental health on prevalence of behavior problems.

Ethical considerations

The Ethics Committee of the Hospital Universitário Professor Edgard Santos, Universidade Federal da Bahia, approved this study. The parents and guardians of all participants signed an informed consent form, which explained the aims of the study and provided assurances regarding the confidentiality of the information obtained.

Results

As shown in Table 1, most of the children were male (54.7%), aged 5 to 6 years (67.6%), and attended

Table 1 Sociodemographic characteristics and prevalence of behavior problems as measured by the Child Behavior Checklist (n=349)

Variable	n (%)	
Child variables		
Sex		
Male	191 (54.7)	
Female	158 (45.3)	
Age (years)		
⩽ 4	113 (32.4)	
5 or 6	236 (67.6)	
Attends preschool/day care center		
Yes	279 (79.9)	
No	70 (20.1)	
Child behavior problems	Normal	Clinical
Internalizing problems	315 (90.3)	34 (9.7)
Externalizing problems	261 (74.8)	88 (25.2)
Total behavior problems	267 (76.5)	82 (23.5)
Withdrawal	305 (87.4)	44 (12.6)
Somatic complaints	334 (95.7)	15 (4.3)
Anxiety/depression	320 (91.7)	29 (8.3)
Social problems	321 (92.0)	28 (8.0)
Thought problems	310 (88.8)	39 (11.2)
Attention problems	314 (90.0)	35 (10.0)
Delinquent behavior	263 (75.4)	86 (24.6)
Aggressive behavior	258 (73.9)	91 (26.2)
Family variables		
Father absent		
No	293 (84.0)	
Yes	56 (16.0)	
Family income (× minimum wage)		
⩽ 1	130 (37.3)	
⩾ 2	219 (62.7)	
Number of children under 5 in the home		
⩽ 1	225 (64.5)	
⩾ 2	124 (35.5)	
Number of persons per room		
⩽ 1	123 (35.2)	
> 1	226 (64.8)	
Psychosocial stimulation – mother-child interaction*		
High	258 (73.9)	
Low	91 (26.1)	
Maternal variables		
Schooling		
Illiterate to pre-primary level	92 (26.4)	
Primary level	106 (30.3)	
At least secondary level	151 (43.3)	
Age (years)		
⩽ 21	21 (6.0)	
> 22	328 (94.0)	
Maternal mental health	Yes	No
At least one psychiatric diagnosis	162 (46.4)	187 (53.6)
Anxiety disorder	119 (34.1)	230 (65.9)
Affective disorder	94 (26.9)	255 (73.1)
Mental health disorders due to psychoactive substance use	48 (13.7)	301 (86.3)

* Psychosocial stimulation – mother-child interaction: a variable created according to factors 1 (maternal emotional and verbal responsivity), 2 (absence of punishment and restrictions), and 5 (maternal involvement with the child) from the HOME Observation for Measurement of the Environment Inventory.

preschool (79.9%). We found a 23.5% overall prevalence of behavior problems, and specific prevalence figures of 9.7% for internalizing and 25.2% for externalizing problems. A range of 4.3 to 26.2% was observed in the prevalence of behavior problems according to the CBCL subscales, with the greatest prevalence found for delinquent and aggressive behavior.

As also shown in Table 1, most families had an income of two or more times the minimum wage (62.7%) and were living in homes with more than one person per room (64.8%). The father was absent from 16% of families, while 35.5% had more than one child under 5 in the home and 26.1% had a low level of mother-child interaction, assessed by the HOME Inventory. Most mothers had at

Table 2 Prevalence and odds ratios of behavior problems in relation to associated risk factors

	Internalizing problems		Externalizing problems		Total problems	
	n (%)	OR (95%CI)	n (%)	OR (95%CI)	n (%)	OR (95%CI)
Child characteristics						
Male sex	22 (11.5)	1.58 (0.76-3.31)	43 (22.5)	0.73 (0.45-1.18)	49 (25.7)	1.31 (0.79-2.16)
Older age (5-6 years)	25 (10.6)	1.37 (0.61-3.04)	56 (23.7)	0.79 (0.47-1.31)	55 (23.1)	0.97 (0.57-1.64)
Attends preschool/day care center	26 (9.32)	0.80 (0.34-1.84)	71 (25.5)	1.06 (0.58-1.96)	68 (24.4)	1.29 (0.68-2.46)
Family characteristics						
Father absent	11 (19.6)	**2.87 (1.31-6.29)**	18 (32.1)	1.51 (0.81-2.81)	19 (33.9)	**1.87 (1.01-3.48)**
Family income $\leqslant 1 \times$ minimum wage	15 (11.5)	1.37 (0.67-2.81)	41 (31.5)	**1.69 (1.03-2.75)**	35 (26.9)	1.35 (0.81-2.23)
Two or more children under 5 in the home	16 (12.9)	1.70 (0.84-3.47)	37 (29.8)	1.45 (0.88-2.38)	36 (29.0)	1.59 (0.96-2.64)
More than one person per room	24 (10.6)	1.34 (0.62-2.91)	65 (28.8)	**1.76 (1.03-3.00)**	56 (24.8)	1.23 (0.73-2.08)
Low psychosocial stimulation*	11 (12.1)	1.41 (0.66-3.01)	26 (28.6)	1.27 (0.74-2.16)	30 (33.0)	**1.95 (1.14-3.32)**
Maternal characteristics						
Up to elementary level of schooling	19 (9.6)	1.04 (0.51-2.12)	49 (24.8)	1.06 (0.65-1.72)	49 (24.8)	0.85 (0.51-1.41)
Up to 21 years of age	3 (14.3)	1.60 (0.45-5.73)	9 (42.9)	2.36 (0.96-5.82)	10 (47.6)	**3.23 (1.32-7.91)**
At least one psychiatric diagnosis	21 (13.0)	1.99 (0.96-4.12)	53 (32.7)	**2.11 (1.29-3.46)**	54 (33.3)	**2.84 (1.70-4.77)**
Anxiety disorder	14 (11.8)	1.40 (0.68-2.88)	37 (31.1)	1.58 (0.96-2.60)	37 (31.1)	**1.86 (1.12-3.08)**
Affective disorder	13 (13.8)	1.79 (0.86-3.73)	29 (30.9)	1.48 (0.88-2.51)	30 (31.9)	**1.83 (1.08-3.11)**
Mental health disorders due to psychoactive substance use	7 (14.6)	1.73 (0.71-4.23)	15 (31.3)	1.42 (0.73-2.76)	18 (37.5)	**2.22 (1.16-4.24)**

95%CI = 95% confidence interval; OR = odds ratio.
Results in bold indicate statistically significant associations.
* Psychosocial stimulation - mother-child interaction: a variable created according to factors 1 (maternal emotional and verbal responsivity), 2 (absence of punishment and restrictions), and 5 (maternal involvement with the child) from the HOME Observation for Measurement of the Environment Inventory.

least primary level schooling (56.7%). Nearly half (46.4%) had at least one psychiatric diagnosis, with a 34.1% prevalence of anxiety disorders, 26.9% prevalence of affective disorders, and 13.7% prevalence of mental disorders due to use of psychoactive substances.

The bivariate analyses described in Table 2 revealed a distinct pattern of association between problem behavior and the risk factors of interest. At the individual level of child characteristics, no significant association was found between the studied variables and behavior problems, except for paternal absence, which was associated (OR 2.87, 95%CI 1.31-6.29) with internalizing problems. On the other hand, a greater likelihood of externalizing problems was found when the family earned only one minimum wage (OR 1.69, 95%CI 1.03-2.75), lived in a home with more than one person per room (OR 1.76, 95% CI 1.03-3.00), and when the mother had at least one psychiatric diagnosis (OR 2.11, 95%CI 1.29-3.46). Finally, all behavior problems were associated with paternal absence (OR 1.87, 95%CI 1.01-3.48), young maternal age (OR 3.23, 95%CI 1.32-7.91), low levels of mother-child interaction (OR 1.95, 95%CI 1.14-3.32), presence of at least one maternal psychiatric diagnosis (OR 2.84, 95%CI 1.70-4.77), and maternal anxiety disorder (OR 1.86, 95%CI 1.12-3.08), affective disorder (OR 1.83, 95%CI 1.08-3.11), or mental disorder due to use of psychoactive substances (OR 2.22, 95%CI 1.16-4.24).

On multivariate analysis (Table 3), prevalence of any of the maternal mental health disorders assessed was associated with prevalence of behavior problems, adjusted for paternal absence, number of children under 5 in the home, maternal age, family income, number of persons per room, and level of mother-child interaction. The same multivariate model was used to test the association between maternal mental disorder and prevalence of internalizing or externalizing problems in the child, and showed that presence of at least one psychiatric diagnosis or anxiety disorder was associated with externalizing behavior (OR 2.24, 95%CI 1.35-3.74 and OR 1.70, 95%CI 1.02-2.85, respectively). However, total behavior problems were associated not only with presence of at least one maternal psychiatric diagnosis (OR 3.02, 95%CI 1.75-5.20), but also with presence of anxiety disorder (OR 2.10, 95%CI 1.20-3.58), affective disorder (OR 2.10, 95%CI 1.22-3.58), or mental disorder due to use of psychoactive substances (OR 2.40, 95%CI 1.21-4.76).

Table 3 Adjusted odds ratios for behavior problems related to maternal mental health problems

Maternal mental health	Internalizing problems	Externalizing problems	Total problems
At least one psychiatric diagnosis	2.13 (1.00-4.52)	**2.24 (1.35-3.74)**	**3.02 (1.75-5.20)**
Anxiety disorder	1.68 (0.79-3.58)	**1.70 (1.02-2.85)**	**2.10 (1.23-3.58)**
Affective disorder	1.87 (0.88-3.99)	1.66 (0.96-2.87)	**2.11 (1.21-3.68)**
Mental health disorders due to psychoactive substance use	1.94 (0.76-4.94)	1.39 (0.70-2.78)	**2.40 (1.21-4.76)**

Data presented as adjusted odds ratio (95% confidence interval). Analyses adjusted for absence of father, maternal age, income, number of persons per room, and mother-child interaction.
Results in bold indicate statistically significant associations.

Discussion

This study shows that the presence of maternal mental disorders increases the likelihood of behavior problems among preschoolers, even after adjustment for important social and interaction factors. There is evidence that maternal mental health problems have a deleterious effect on child behavior, which may have significant repercussions on the acquisition of cognitive and social skills over both the short and long term.[3,23-26,34] This finding is in line with other studies, which have demonstrated that maternal mental health is an important predictor of behavior problems in children.[7,16,21]

The prevalence of behavior problems found in this study (23.5%) falls within the range reported in other investigations conducted in developing countries (12 to 29%).[9] Regarding the prevalence found in Brazilian studies, the prevalence of our sample was lower than those described by Vitolo et al.[13] in Taubaté (35.2%) and by Feitosa et al.[40] in Salvador. However, these two studies were carried out on children at a different stage of development (age 6 to 12 years).

International studies suggest a trend toward increased prevalence of behavior problems with advancing age. For instance, prevalence ranges from 3.6 to 24% in children aged 1 to 6 years, with an average of 10.2%, and from 1.4 to 30.7% in children aged 6 to 12 years, with an average of 13.2%.[12]

On bivariate analysis, low family income, absence of a father figure, young maternal age, problematic mother-child interaction, and high housing density increased the likelihood of child behavior problems in our sample.

Low socioeconomic status is one of the most frequently studied risk factors for behavior problems.[41] Such a context increases exposure to biological and psychosocial risks, which affect development through structural and functional changes to the brain and to the child's behavior.[21] In the present study, children living in families with a household income of only one minimum wage were 1.7 times more likely to exhibit externalizing problems.

According to Bradley & Corwyn, there is substantial evidence that children with low socioeconomic status manifest symptoms of psychiatric disorders and maladjusted social functioning more frequently than children who live in better circumstances.[41] However, it is likely that the relationship between socioeconomic status and behavior problems is mediated by aspects related to family dynamics and to the interactions experienced by the child; therefore, further studies are needed to examine this relationship.[8,11,13]

Poor environments with little psychosocial stimulation threaten the development of a child's full potential, particularly during the first years of life.[21,42] We observed that children presenting problems in mother-child interaction were almost 1.9 times more likely to display behavior problems. Unlike distal risk factors, such as maternal schooling, this proximal risk factor can be modified through interventions, although few studies have been conducted in developing countries regarding the effect of psychosocial stimulation on child development.[21,39]

One of the limitations of this study was its sample size, which may not provide sufficient statistical power for estimation of the associations between the different risk factors and prevalence of behavior problems. Another limitation is that data collection took place in 2001, using a now-outdated version of the instrument employed to measure child behavior problems. However, given the lack of studies on this topic, we consider our findings relevant to the field of child mental health in Brazil.

In conclusion, our findings suggest that maternal mental health problems have a deleterious effect on child behavior and that these effects may be avoided through the development of programs seeking to reduce the risk of behavior disorders in preschoolers, emphasizing the need for comprehensive care of the whole family, with particular attention to maternal mental health.

Disclosure

The authors report no conflicts of interest.

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