

Prevalence of Behavioral Inhibition among Preschool Aged Children in Tehran, Iran

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Abstract- One of the identified risk factors for anxiety disorders in adolescence and adulthood is inhibited behaviors in childhood. The present study sought to examine the relationship between behavioral inhibition with some of the internal (personal) and external (family environment) factors in a sample of preschool children in kindergartens. In a cross sectional study in 2009, data was collected through a structured questionnaire completed by parents and teachers in day-care centers. A total of 1403 children were assessed. Analysis was performed through complex sample analysis. The results showed that 7.4% (CI95%= 6.1%-9.1%) of children according to parents' and 8.1% (CI95%= 6%- 10.7%) according to teachers' evaluation classified as behaviorally inhibited. The higher levels of behavioral inhibition were shown by girls, first children, single parent families and older children. Birth year before 2004, birth rank, living in a single parent family and maternal level of education were independent predictors for behavioral inhibition in logistic regression modeling. There is relatively high prevalence of inhibited behaviors among Iranian children. Further examination of diagnosed children with behavioral inhibition by experienced psychiatrists is needed. Also establishing consultation centers for behaviorally inhibited children and instructing their parents and teachers are recommended.

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Introduction

Behavioral inhibition, or shortly BI, is an exhibited behavioral response such as reticence, isolation, and halt of activity, reduced interaction tendency and clinging to caregiver after being exposed to an unfamiliar person or novel situation (1). This kind of behavior is accompanied by parallel sympathetic derived physical symptoms such as headaches, tension, restlessness, gastrointestinal distress and heart palpitations, and all showing distressful social, emotional and educational functions (2).

In some studies, a higher probability of early adolescence behavioral inhibition was found in children with later anxiety disorders such as overanxious disorder (OAD), multiple anxiety disorder and panic disorders (3). Specifically, tracking BI in the history of a person predicts the onset of social anxiety. It is shown that the rate of lifetime social anxiety in inhibited children is as

twice of non-inhibited control group. Moreover, BI significantly predicts new onset of social phobia among children (4). Some possible risk factors including female gender; exposure to maternal stress during pregnancy and preschool periods and at child age 4.5 years; early manifestation of behavioral inhibition, and elevated afternoon salivary cortisol levels, seem to cause higher behavioral inhibition in adolescents (5). As expected, not all children with BI show later anxiety disorders. One explanation for variability of BI outcomes can be the children's use of cognitive processes to regulate his/her negative reaction. But, several cognitive processes can interfere in the relationship of BI and its later consequences (6).

To date, there has been no available literature addressing the behavioral inhibition and its associated risk factors in Iranian children. Thus, for the first time, the present study sought to examine the relationship between behavioral inhibition (BI) and some of the

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internal (personal) and external (family environment) factors in a sample of preschool children kept in day care centers (kindergartens) in the capital city of Iran.

Materials and Methods

Study design

In order to estimate the prevalence of BI symptoms in Iranian preschool children a survey was done through designated questionnaires. The survey was to evaluate the symptoms of BI among the children attending kindergartens in Tehran by their school teachers and parents simultaneously. The study protocol had the approval of the Ethics Committee of Tehran University of Medical Sciences.

Study population

The subjects of our study were children aged 3 to 6 years old who were attending kindergarten at least for several hours per week during the past 6 months. 43 kindergartens were selected from all kindergartens in Tehran according to a multistage (stratified random cluster) sampling in which each region of the city considered as a stratum and each kindergarten as a cluster. Overall, with design effect 1.2 the sample size was estimated to be 1770 children. However, finally, 1403 children parents and teachers filled out the questionnaires completely which made an 80% participation rate.

Outcome and explanatory variables

We utilized preschool behavior questionnaire to provide an instrument for collecting data (12). An observer-rating inquiry was designated to assess if there were symptoms representing BI in children within the past 6 months. The questionnaires were distributed among both teachers and parents simultaneously. Reliability of the questionnaire was established using a pilot test by collecting data from 30 subjects. Of our inquiry, 14 items were designated to collect data on independent variables while 5 items were investigating BI symptoms. Further details on this matter have been published earlier (7-8).

Statistical analyses

The prevalence of BI symptoms was calculated for both parent and teacher assessments. Statistical analysis was performed by complex sample survey analysis, and chi-square test used to test the relationship between the outcome and independent variables. Multiple logistic regressions was used to test main effect and

confounding effects (also for a linear trend in the prevalence) across explanatory categorical variables and to determine adjusted odds ratios. We used the SPSS statistical package (v18) and P-values and Odds Ratio with a confidence level of 95% were also calculated.

Results

48% of our studied subjects (n=674) were preschool girls and 51.7% (n=726) were the only child in their family. Other descriptive variables have been previously published by authors of this article (7-8).

Of our 1403 study subjects, 7.4% (CI95%= 6.1-8.7) and 8.1% (CI95%= 6.0-10.2) presented symptoms of behavioral inhibition based on extracted scores from parents and teachers evaluation, respectively. The prevalence of BI was 8.8% (CI95%= 7.0-10.6) among girls and 5.9% (CI95%= 4.4-7.4) among boys in parents assessment while in assessments made by kindergarten teachers, these rates were 10.7% (CI95%= 7.9-13.5) and 4.7% (CI95%= 3.0-6.4) among preschool girls and boys, respectively. In both groups of simultaneous evaluations made by parents and teachers, considering internal factors, BI was more prevalent among girls (OR=1.54 for parents and OR=2.41 for teachers assessments), children who were born before 2004 (OR=1.45 for parents and OR=2.76 for teachers assessments), children tend to watch violent TV programs (OR=2.14 for parents, OR=1.90 for teachers assessments) and diseased children (OR=2.67 for parents and OR=2.46 for teachers assessments) (Table 1).

With respect to parents' assessment of their child behavior, the difference between subgroups of several variables was not pronounced considering P-values. These variables include number of children within family, maternal age at birth, smoking during pregnancy, presence of chronic disease in any family members and maternal and paternal occupational status. However, statistically significant differences observed in variables such as rank of birth, single parent family, death of any family members and parents' level of education. Several similarities were seen while comparing above statements with teachers' assessment. In teachers' category, statistically significant differences were seen in rank of birth, single parent families, chronic disease within the family, and mothers' level of education (Table 1).

In parents evaluation of children behavior at home, birth age (before 2004), mothers educational degree less than bachelor of science, being the first child in family, single parent families and death of family members were

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independent explanatory variables according to multiple logistic regression analysis. However, the analysis of evaluation made by kindergarten teachers revealed that, birth age (before 2004), mothers educational degree less than bachelor of science, being the first child in family,

single parent families, history of child's disease, and child's tendency for violent television programs were independent explanatory variables for behavioral inhibition. Details have been shown in table 2.

Table1. Prevalence of behavioral inhibition among children based on scores acquired from their parents and teachers

Variable	Sub Groups	Parents			Teachers		
		Prevalence (CI95%)	OR (CI95%)	P value	Prevalence (CI95%)	OR (CI95%)	P value
Gender	Girl	8.8% (7.0-10.6)	1.54 (1.11-2.13)	0.012	10.7% (7.9-13.5)	2.41 (1.44-4.03)	0.002
	Boy	5.9% (4.4-7.4)			4.7% (3.0-6.4)		
Birth Year	<1383	8.8% (6.9-10.7)	1.45 (1.04-2.04)	0.028	15.2% (11-19.4)	2.76 (1.99-3.83)	<0.001
	>1383	6.2% (4.7-7.7)			6.1% (4.7-7.5)		
Child Disease	Diseased	14.5% (7.0-22.0)	2.67 (1.08-4.71)	0.027	16.6% (10.1-23.1)	2.46 (1.30-4.29)	0.007
	Healthy	7% (5.8-8.2)			7.5% (5.5-9.5)		
Violent TV programs	Regular	11.5% (8.3-14.7)	2.14 (1.39-3.31)	0.002	11.4% (8.1-14.7)	1.90 (1.38-2.42)	0.001
	No favor	5.7% (4.4-7.0)			6.3% (4.6-8.0)		
Number of Children	One	9.5% (7.4-11.6)	--	0.284	10.2% (6.9-13.5)	--	0.053
	Two	5.0% (3.5-6.5)			5.4% (4.2-6.6)		
	Three	7.3% (3.9-10.7)			2.6% (1.3-3.9)		
Rank of Birth	1 st	9.4% (7.4-11.4)	2.52 (1.80-3.53)	<0.001	10.2% (7.3-13.1)	3.08 (1.70-5.58)	0.001
	Other	4.0% (3.0-5.0)			3.6% (2.4-4.8)		
Maternal age at birth	<18 or >35y	6.1% (3.8-8.4)	--	0.371	5.5% (3.1-7.9)	--	0.169
	18-35y	8.8% (6.1-11.5)			8.4% (6.2-10.6)		
Smoking during pregnancy	Yes	30.2% (4.3-56.1)	--	0.544	30.6% (3.7-57.5)	--	0.124
	No	7.4% (6.1-8.7)			7.8% (5.9-9.7)		
Single Parent	Yes	22.8% (15.7-29.9)	4.06 (2.45-6.72)	<0.001	24.3% (17.5-31.1)	4.18 (2.58-6.78)	<0.001
	No	6.8% (5.4-8.2)			7.1% (5.2-9.0)		
Family Death	Yes	10.3% (8-12.6)	1.61 (1.12-2.30)	0.012	8.0% (5.4-10.6)	--	0.900
	No	6.7% (5.2-8.2)			7.8% (5.5-10.1)		
Chronic disease in Family members	Yes	11.3% (5.4-17.2)	--	0.168	13.3% (7.2-19.4)	1.89 (1.01-3.52)	0.042
	No	7.2% (6-8.4)			7.5% (5.6-9.4)		
Maternal occupational status	Employee	6.3% (4.2-8.4)	--	0.292	8.5% (5.3-11.7)	--	0.769
	Free job	8.7% (5.3-12.1)			7.1% (3.3-10.9)		
	Housewife	8.1% (5.9-10.3)			7.6% (5.7-9.5)		
Maternal level of Education	Less than Bachelor	10% (7.9-12.1)	2.12 (1.48-3.05)	<0.001	14.3% (10.2-18.4)	2.06 (1.26-3.37)	0.006
	Bachelor or higher	4.9% (3.6-6.2)			7.5% (5.5-9.5)		
Paternal occupational status	Employee	7.2% (5.3-9.1)	--	0.131	8.2% (5.3-11.1)	--	0.722
	Free job	6.6% (4.8-8.4)			6.9% (4.6-9.2)		
	Worker	14.6% (6.9-22.3)			4.0% (0.5-7.5)		
Paternal level of Education	Workless	49.1% (6.6-91.6)	1.80 (1.36-2.38)	<0.001	45.4% (7.3-83.5)	--	0.051
	Less than Bachelor	9.4% (7.3-11.5)			7.0% (2.9-11.1)		
	Bachelor or higher	5.4% (4.1-6.7)			6.1% (5.1-7.1)		
Total		7.4% (6.1-8.7)	--	--	8.1% (6.0-10.2)	--	--

Table2. Predictors of inhibited behavior: Multivariate Logistic Model

	Parents	Teachers
	Adjusted OR (CI95%)	Adjusted OR (CI95%)
Birth year before 2004	6.53 (3.03-14.08)	9.96 (4.59-21.63)
Rank of birth: 1 st versus others	4.072 (2.545-6.517)	4.10 (2.03-8.28)
Single parent family	3.14 (1.19-8.26)	2.04 (1.20-3.44)
Maternal level of education less than Bachelor	1.93 (1.27-2.92)	2.14 (1.23-3.71)
Death of family member	1.724 (1.08-2.74)	NS
Diseased child	NS	2.53 (1.5-4.47)
Interest to violent TV programs	NS	1.5 (1.03-2.18)

Discussion

We could say that the inhibited behaviors are a common disorder among our studied population. Obviously our results are affected by the diagnostic method of inhibited behavior that we utilized in this study; our method of diagnosing behavioral inhibition as scores given to symptoms mentioned as responses to questionnaires was mainly a screening method other than definitive diagnosis; this only could be possible by experienced psychiatrists in well equipped laboratories. However, several experienced researchers in the field of behavioral psychology believe that it is estimated to see behavioral inhibition in 10-15% of children and this rate remains fairly stable from toddlerhood to early childhood (9-11), and our reported prevalence rate is not so different from them and considering confidence interval 95% there is no statistically significant difference between these rates.

In our study, the average prevalence of behavioral inhibition was lower based on the parent's assessment of their child behavior compared with teachers of daycare centers (7.4% [CI95%=6.1-8.7] versus 8.1% [CI95%=6.0-10.2]) but with respect to CI95% there is no statistically significant difference between these rates; in other words, our results indicate that the detection of inhibited behaviors are not affected by observer.

We found prominent gender difference in the prevalence of behavioral inhibition. There is no available literature on the epidemiology of BI in our country, but several studies have addressed this subject in other parts of the world. For example, Dr Essex and her colleagues (12) suggest that behavioral inhibition as an independent risk factor for further types of anxiety, especially social anxiety disorder, is more common among girls and interestingly early BI in girls has more tendency to remain longer and affects the inhibited child chronically. Like Essex we found a higher prevalence rate among preschool girls. As consistent with previous works on this subject, female gender has an established role in the emergence and occurrence of BI (13-14). Thus, girls should be at the focus of attention when discussing issues like anxiety in children and its related disorders.

In both groups of reported children behavior, behavioral inhibition was more common among older children (in this study who were born before 2004); and with respect to table 2 and adjusted ORs this is the strongest risk factor for inhibited behaviors (6.53 for

parents and 9.96 for teachers). This finding suggests that the symptoms presenting BI and other form of anxiety tend to emerge at later ages during childhood. Thus, special care should be given to diagnosing inhibited behaviors among children in the later stages of preschool period.

History of chronic disease was another significant risk factor in our study which had statistically significant association with behavioral inhibition in both teachers' and parents' assessments. A chronic disease could possibly increase the fear in a child from surroundings and by diminishing the self confidence in a child make him/her prone to inhibited behavior while confronting new experiences. Also, greater attention from parents in home and also teachers in day care centers could make children more limited with new things. Another associative factor was child's interest for violent TV programs; this could possibly due to deterrent effects of such programs on a child while trying to handle new stressful experiences. Behavioral inhibition was more prevalent among single parent families; in this setting there would be greater supervision on a child where may not be necessary; difficult life condition in single parent families could be another possible cause for more common inhibited behaviors.

Among external factors in our study, some associated with BI only according to parents' evaluation; these factors include: death of family members (OR=1.61), fathers' educational degree less than Bachelor of Science vs. higher degrees (OR=1.80). However, in teachers' report, the only specific external factor associated with increased prevalence was the existence of chronic disease in family members (OR=1.89). Mesman & Koot in conclusion of their longitudinal study with 8 year follow-up on 420 preschool children suggested that teachers better notice children's internalizing problems and related issues such as depression and anxiety (15-16). They also believe that only teachers and not parents could notice preschool signals of later depression but not anxiety.

The representativeness of our data may be limited and may not be reflective of the broader preschool population because there were some constraints in the process of data collection; we faced rather large number of families and teachers that did not wish to participate in the project and children who do not attend kindergartens are not included in this study. The use of special study population -kindergarteners- was another key limitation of this study.

Behavioral inhibition is a common subtype of

anxiety among preschool children which could precede later serious adulthood anxiety problems. The diagnosis and prevention of this disorder or risk factor help reducing the burden of anxiety related morbidity in adolescence and adulthood. Special attention should be paid to girls, older kindergarteners, children who tend to watch aggressive programs on TV, and children with preexisting comorbidity. We recommend that further examination of diagnosed children with BI is done by experienced psychiatrists in the setting of cohort studies to investigate progression into more serious psychological problems later in adolescence and adulthood and for definitive diagnosis and establishing earlier effective treatments as well. It is desired to establish consultation centers for children affected by BI and also instructing parents and teachers in kindergartens for noticing symptoms of inhibited behaviors.

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