Original Article

Normative data and psychometric properties of the parent and teacher versions of the strengths and difficulties questionnaire (SDQ) in an Iranian community sample

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Abstract

BACKGROUND: Strengths and difficulties questionnaire (SDQ) is a widely used instrument for screening mental problems in children and adolescents. The main aim of this study was to evaluate the validity and psychometric properties of this questionnaire in comparison with the children behavior checklist (CBCL) and psychiatric interview.

METHODS: The study was done in two stages. At stage one, 600 children aged between 6 and 12 were evaluated using the parent and teacher versions of SDQ and CBCL. At stage two, 25 children with the scores above the cut point reported by the developer of SDQ and 27 children with the score below this point were selected to be interviewed by a child and adolescent psychiatrist according to Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV) classification and by another clinician using the K-SADS-PL (Schedule for Affective Disorders and Schizophrenia for School-Age Children- Present and Lifetime Version) as a semi structured interview.

RESULTS: The mean scores of SDQ subscales found in this study were comparable to what found in other studies in other countries. The cut-off points of SDQ were almost similar to that of other researches. The internal consistency and concurrent validity of this questionnaire was good.

CONCLUSIONS: The current study showed that both parent and teacher versions of SDQ in Persian language can be used as a valid tool in screening the mental problems in children and adolescents.

KEYWORDS: SDQ, CBCL, mental problems, children, K-SADS.

The strengths and difficulties questionnaire (SDQ) is a brief questionnaire used to screen the psychiatric disorders among children and adolescents. It also detects the probable distress or social impairment of the child, which would be caused by the symptoms. This scale prevents from over estimating the detection of childhood psychiatric disorders.[1] The SDQ picks up both positive and negative behavioral aspects of the child using five subscales: prosocial behavior, hyperactivity, emotional symptoms, conduct problems and peer problems.[2] It has two versions of parent and teacherreports for the ages between 4 and 16 and a self- report for the adolescents of age 11 to 16.

Many advantages of the SDQ like its brevity, easy administration, addressing positive and negative behaviors, good correlation of its subscales with the diagnostic categories in DSM-IV and ICD-10 classifications, and its availability, have made it a widely used screening questionnaire in communities and

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clinical settings in youths. The SDQ has been translated into more than 40 languages and its psychometric properties have been evaluated in many countries. These studies have provided a pool of information to investigate the differences and similarities of children's behaviors across the different cultures.[3]

Studies on the SDQ in the Nordic countries have shown that the normative data of the SDQ are very similar across these countries.[4] The psychometric studies included two reports on the parent version[5,6] and the self-report version,[7] while cross-informant reliability and consistency had not been evaluated. The measures of sensitivity and specificity of the SDQ have been found using the psychiatric interviews such as the DAWBA (development and wellbeing assessment)[8] and K-SADS (schedule for affective disorders and schizophrenia for school-age children).[9,10] There are major differences among these studies with respect to recruitment, attrition rates and sample characteristics, so caution should be made in interpreting the results. However, the findings of studies from both Norway and Finland showed lower mean scores compared to what found in the UK, and the differences across the Nordic countries might be rather small.[4]

Marzocchi et al compared the results of the studies on the SDQ in southern European countries (Italy, Spain, Portugal, Croatia, and France). According to this study, the results of teacher reports showed that Italian pupils had less prosocial behaviors than their Spanish and Portuguese age mates, whereas the Portuguese children were rated as being more hyperactive and inattentive than comparable Italian and Spanish children.[11]

Evaluations and applications of the SDQ beyond Europe have been surveyed by Woerner et al. They concluded that the findings of using the SDQ in other continents (Brazil, Canada, Middle East, Asian countries, Australia) and across a huge variety of cultures and languages supported European evidence of good psychometric properties and clinical utility of this questionnaire in clinical settings.[12]

Considering the easy administering of the SDQ with acceptable validity in many countries,[13-18] we decided to evaluate the psychometric properties of the Persian version of this questionnaire in an Iranian community sample. Normative data and cut–off points were also produced.

Methods
Procedure
Stage I: Through random and cluster sample recruitment, three central geographic parts of Tehran (the capital city of Iran) were chosen. Ten schools in each part and 20 students from each school (4 students in each academic level) were selected. Parent form of the SDQ and child behavior checklist (CBCL) accompanying with a written consent form were sent to the students' homes. The parents were asked to declare whether they wanted to continue to participate in the second stage of the study.

After two weeks, the questionnaires were gathered from the schools. The unanswered or unreceived questionnaires were followed up through phone contact. If the parents agreed, the questionnaires would be completed within the next week, and if not, they were replaced randomly by new ones to reach the expected numbers in each school. During this period, the teacher version of CBCL (teacher rating form, TRF) and SDQ were also completed by the teachers.

Stage II: After analyzing the questionnaires, 15% of the students whose total difficulties scores of the SDQ were above 13 (the reported cut–off by Goodman) and 15% of those whose scores were below 13 were selected randomly for stage II. To find any psychiatric problems according to DSM-IV criteria, they were interviewed by a board certified child and adolescent psychiatrist at Roozbeh psychiatry hospital in Tehran. The kiddie schedule for affective disorders and schizophrenia -present and lifetime version– Persian version (K-SADS-PL-P)[19] were accomplished by a child and adolescent psychiatrist to confirm the diagnoses. The clinical diagnosis was used as the gold stan-

dard to evaluate the validity of the SDQ and find the cut-off points.

Measures

Strengths and difficulties questionnaire (SDQ)-Persian version:

This is a 25 item, one paper questionnaire with three response categories (not true, somewhat true, and certainly true). The first version of SDQ was developed by Robert Goodman based on Rutter's questionnaire.[2] This instrument produces five subscales and a "total difficulties" score by totaling the deficit subscales (all except for prosocial behavior). An impact score is also produced based on five items, to show the impact of symptoms on other people, the child's functioning and quality of life. According to Goodman's findings the Cronbach's alpha coefficient for the different scores and informants are generally satisfactory (mean 0.73). The mean retest stability of the SDQ after 4 to 6 months is 0.62 (0.73 for teacher rating and 0.51 for youth version). Its sensitivity in terms of hyperactivity and conduct problem is %68 and %74 respectively for the parent version. This percentage for the specificity is %89 for all parent, teacher and youth versions.[20]

The SDQ has been translated into many languages including Persian under supervision of Goodman in England which is available through the SDQ homepage. The Persian version of the SDQ was used in this study.

Child behavior checklist (CBCL) -Persian version:

This is a 113 items questionnaire completed by parents about their child (parent rating form).[21] There is also a teacher form filled in by teachers (teacher rating form, TRF).[22] Items are scored on a three-point scale. A total score, externalizing and internalizing scores, as well as eight subscales are derived from this questionnaire.[18] It is a well known dimensional rating scale, in worldwide use, the psychometric properties of which have been reported in most countries including Iran. In terms of the psychometric properties of the Persian version of the CBCL, its internal consistency was %88. The mean total score of the Iranian population was 27.5 which were in the range of the other countries (16.8-28.1).[23] This measure was used to evaluate the concurrent validity of the SDQ.

Schedule for affective disorders and schizophrenia for school–age children -present and lifetime version-Persian version (K-SADS-PL-P)

The K-SADS-PL-P is a semi-structured interview for assessing psychiatric diagnoses in children and adolescents. It assesses the present and lifetime status of psychiatric disorders as well as the severity of the symptoms. Kaufman et al10 introduced the K-SADS-PL from K-SADS-P according to the 4th edition of DSM.

K-SADS-PL is capable of generating 32 DSM-III-R and DSM-IV Axis I child and adolescent psychiatric disorders. Diagnoses are made as definite, probable (equal to or greater than 75% of symptom criteria met), or not present. The different components of the K-SADS-PL are described comprehensively in Kaufman's and Ambrosini's articles.9,10 The K-SADS-PL-P was validated by Shahrivar et al in Iran19 and its specificity was more than %81 and the sensitivities for most major diagnoses were between %75 and %100. The kappa agreement for most diagnoses was higher than 0.4 and the test-retest reliability was between 0.38 and 0.87.

Statistical analysis

Statistical analysis was performed using the SPSS (release 11.5). Through the descriptive statistics, the prevalence of the subscales and indexes were calculated. T test and analysis of variance were used to evaluate the relation among dependent and independent variables respectively. The correlation between parent and teacher questionnaires was assessed by the Pearson correlation test. Cronbach's Alpha coefficient was used to find the internal consistency of the SDQ. Using the ROC analysis (receiver operating characteristic), the sensitivity and specificity of the SDQ subscales were calculated to find the appropriate cut-off scores comparing with the clinical diagnosis as the gold standard.

Results

A total number of 681 children from 20

elementary schools were selected for the study. The parents and teachers of 600 children completed the questionnaires. The data were collected for 275 boys (45.88%) and 325 girls (54.16%) with the mean age of 9.11 years (SD = 1.45). At the second stage of the study 25 students whose total difficulties scores of the parent SDQ were above the Goodman's cut points and 27 children whose scores were below this point were selected to be interviewed.

Table 1 shows the mean scores of the parent and teacher SDQ subscales in this study compared to Goodman's report. The table also compares the results between boys and girls in this sample. Girls had higher scores than boys in prosocial behaviors (parent and teacher reports) (p = 0.000, p = 0.008), but the total difficulties score and peer problems based on teacher reports (p = 0.031, p = 0.000) and conduct problems based on parent and teacher reports (p = 0.036, p = 0.001) were significantly higher among boys. No correlation was found between socioeconomic status and children's age and their mean scores on different subscales.

Internal Consistency
Internal consistencies (Cronbach's α) of the parent SDQ and teacher SDQ total scores were 0.73 and 0.69, respectively, which can be considered partially reliable.

Concurrent Validity
The convergent validity of the SDQ was assessed by calculating the correlations between SDQ and the corresponding parent/teacher versions of CBCL. All correlations among the SDQ and CBCL subscales were highly significant (p < 0.01). In particular, the conduct problems and hyperactivity subscale of the SDQ showed a strong correlation with the CBCL subscales of externalizing symptoms and aggressive behavior. There was a correlation between attention problem of CBCL and hyperactivity subscale of the SDQ as well. The emotional symptoms scores of the SDQ were correlated with internalizing score of CBCL.

Table 1. Mean and standard deviations of the parent and teacher SDQ subscales in Iranian population compared to British children and of boys and girls in Iranian children (n = 600).

Subscales	Mean and SD (Iranian)	Mean and SD (British)	Girls (n = 325) Mean (SD)	Boys (n = 275) Mean (SD)	Level of Significance (P)
Total Difficulties					
Parent	10.05 (5.76)	8.4 (5.8)	9.82 (9.89)	10.31 (10.98)	ns*
Teacher	10.39 (6.19)	6.6 (6.0)	9.89 (5.64)	10.98 (6.74)	0.031
Emotional Symptoms					
Parent	2.25 (1.97)	1.9 (2.0)	2.35 (2.06)	2.13 (1.85)	ns
Teacher	2.51 (2.14)	1.4 (1.9)	2.62 (2.14)	2.39 (2.14)	ns
Conduct Problems					
Parent	1.76 (1.75)	1.6 (1.7)	1.62 (1.64)	1.92 (1.86)	0.036
Teacher	1.81 (2)	0.9 (1.6)	1.56 (1.77)	2.11 (2.21)	0.001
Hyperactivity / Inattention					
Parent	3.99 (2.29)	3.5 (2.6)	3.90 (2.19)	4.09 (2.40)	ns
Teacher	3.62 (2.4)	2.9 (2.8)	3.52 (2.21)	3.73 (2.61)	ns
Peer Problems					
Parent	2.04 (1.68)	1.5 (1.7)	1.95 (1.66)	2.16 (1.70)	ns
Teacher	2.43 (1.66)	1.4 (1.8)	2.21 (1.55)	2.72 (1.75)	0.000
Prosocial Behavior					
Parent	8.11 (1.75)	8.6 (10.6)	8.37 (1.63)	7.80 (1.84)	0.000
Teacher	7 (2.04)	7.2 (2.4)	7.80 (2.04)	7.36 (2.01)	0.008

*ns = Non Significance

There was an agreement between teacher and parent judgments about hyperactivity and inattention. We found an interesting high inverse correlation between the SDQ prosocial behavior subscale and the somatic complaints of CBCL and TRF. Correlations of equivalent SDQ and CBCL subscales are summarized in table 2.

Table 2. Correlations of equivalent SDQ and CBCL subscales.

Subscales*	SDQ – CBCL Correlations	
	Parents	**Teacher**
Total	0.75	0.71
Externalizing/Conduct	0.65	0.70
Inattention/Hyperactivity	0.65	0.67
Internalizing/Emotional	0.63	0.52
Social/Peer	0.51	0.45

*All subscales are significantly correlated at $p < 0.01$.

Correlations among the SDQ subscales

Table 3 presents the correlations among the five SDQ subscales. Each subscale was correlated significantly ($p < 0.01$) with the others, ranging from -0.1 (prosocial and emotional symptoms) to 0.82 (hyperactivity and total). The strengths and directions of the correlations are as expected in regard with known comorbidities. For example, the conduct

problems and hyperactivity were positively correlated with each other ($r = 0.52$). Prosocial behavior was negatively correlated with conduct problem ($r = -0.40$) and total difficulties score ($r = -0.42$).

Inter rater correlations for the SDQ scores

All subscales of the parent and teacher versions of the SDQ were correlated significantly ($p < 0.01$).

Intercorrelations of different subscales of the SDQ and CBCL

The correlations between three main domains of psychopathology (externalizing problems, inattention-hyperactivity, and internalizing symptoms) with one another were tapped by each questionnaire separately. The externalizing–inattention correlations obtained from the SDQ or CBCL were comparable (parent: 0.52 vs. 0.69, teacher: 0.60 vs. 0.76). The inattention-internalizing correlations were significantly higher with the CBCL than with the SDQ (parent: 0.36 vs. 0.67, teacher: 0.40 vs. 0.67). The externalizing-inattention correlations were lower with the SDQ than with the CBCL (parent: 0.36 vs. 0.63, teacher: 0.27 vs. 0.49).

Table 4 shows detailed information on the performance of different SDQ subscales according to findings from ROC analyses (discriminative validity). The highest AUC (area under curve) group (the parent SDQ based on clinical diagnosis) were composed by conduct

Table 3. Correlations among the SDQ subscales*.

		Total	Emotional Symptoms	Conduct Problems	Hyperactivity	Peer Problems
Emotional Symptoms	Parent	0.73				
	Teacher	0.69				
Conduct Problems	Parent	0.76	0.36			
	Teacher	0.77	0.27			
Hyperactivity	Parent	0.77	0.36	0.52		
	Teacher	0.82	0.40	0.60		
Peer Problems	Parent	0.70	0.44	0.43	0.33	
	Teacher	0.68	0.37	0.43	0.37	
Prosocial Behavior	Parent	-0.25	-0.10	-0.29	-0.60	-0.21
	Teacher	-0.42	-0.16	-0.40	0.35	-0.34

*All subscales are significantly correlated at $p < 0.01$.

Table 4. The performance of the SDQ subscales at the optimum cut-off scores and the AUC for each score reported with 95% confidence interval (CL).

		Based on Clinical Diagnosis				Based on K-SADS			
		Cut-off	Sensitivity (%)	Specificity (%)	AUC (P Value)	Cut-off	Sensitivity (%)	Specificity (%)	AUC (P Value)
Total Difficulties	Parent	10.5	61	85	0.81(0.001)	10.5	64	60	0.59(0.25)
	Teacher	9.5	56	31	0.57(0.41)	10.5	64	57	0.69(0.33)
Hyperactivity Inattention	Parent	4.5	74	70	0.76(0.002)	4.5	79	73	0.76(0.002)
	Teacher	5.5	63	79	0.74(0.004)	4.5	63	61	0.73(0.006)
Emotional Symptoms	Parent	1.5	59	40	0.50(0.99)	1.5	68	48	0.63(0.11)
	Teacher	1.5	62	35	0.45(0.55)	1.5	62	37	0.45(0.57)
Conduct Problems	Parent	5.5	67	98	0.97(0.007)	3.5	75	75	0.83(0.03)
	Teacher	2.5	67	65	0.76(0.13)	1.5	75	52	0.70(0.19)

problems (0.97), total difficulties (0.81) and hyperactivity–inattention (0.76). These subscales had AUCs that differed significantly from chance line. The AUCs of the conduct problems and hyperactivity–inattention subscales of the teacher SDQ (with regard to diagnoses based on clinical interview and the K-SADS) were also high.

Table 5 shows the comparison between the cut-off points of the SDQ derived from ROC analyses and that based on the 80th and 90th percentile. The three cut points of emotional symptoms are nearly the same but the cut points of the other subscales derived from ROC analysis were lower than that based on the 80th and 90th percentiles.

Discussion

Different aspects of the Persian parent and teacher versions of the SDQ were addressed in a sufficiently large and representative community sample aged from 6 to 12 years. The findings of this study agreed well with the psychometric properties of the SDQ in other countries.

The primary aim of the study was to validate the Persian version of the parent and teacher SDQ. Additionally, the obtained means and distributions were compared with those reported in British sample.[2,20] The cut point for the abnormality, as defined by percentile of 90,

Table 5. Iranian cut-off points of the SDQ (parent/teacher) scores.

		Clinical Range	Abnormal Range (> 90th percentile)	Borderline Range (80th – 90th percentile)
		Raw Score	Raw Score	Raw Score
Total Difficulties	Parent	10.5	19-40	15
	Teacher	9.5	19-40	15
Emotional Symptoms	Parent	4.5	5-10	4
	Teacher	5.5	6-10	4
Conduct Problems	Parent	1.5	4-10	3
	Teacher	1.5	5-10	3
Hyperactivity/ Inattention	Parent	5.5	7-10	6
	Teacher	2.5	7-10	5
Peer Problems	Parent		4-9	3
	Teacher		5-8	4

was above 19 in parent version of SDQ in this study, compared to 17 in British sample. These scores were 19 and 16 for teacher reports, in Iranian and British communities respectively. The British mean scores of the SDQ subscales were lower in comparison with what found in this study (except for prosocial behavior, which was higher in British sample). These minor differences in SDQ scores, which have been reported in other countries,[12, 16, 18] may be due to age and gender differences, and some methodological differences. But it could show real differences in children's behaviors or parents'/teachers' expectations of children's behaviors. This would suggest cross-cultural issues when comparing the psychometric properties of rating scales.

Gender effects on SDQ scores agreed well with those found by other studies in different countries. Parents and teachers reported higher scores of conduct problems in boys while the emotional problems and prosocial behaviors were higher in girls.

The internal consistency of the SDQ was good in this study. The agreement among the SDQ subscales was higher than that reported by Goodman.[20] It was also better than that found for the CBCL and that reported for other measures.[20]

The concurrent validity of the SDQ was evaluated comparing the subscales of the SDQ and the CBCL/TRF. Strong correlations were found among similar subscales. This suggests good concurrent validity for the SDQ which is consistent with the other studies.[4,10,11,13,14,16]

Comparing the SDQ and CBCL, our findings showed that the correlation between the internalizing and externalizing subscales and between the inattention and internalizing subscales were lower for the SDQ (parent/teacher) than for the CBCL/TRF, but the externalizing–inattention correlation was almost equal in both measures. This finding is similar to what Goodman found. Goodman suggests that this difference may show that the co-morbidity is overestimated by CBCL/TRF, and that the internalizing and externalizing subscales of

CBCL are more contaminated by one another than are the comparable SDQ subscales.[18]

Cross–scale correlations among the subscales of the SDQ showed that the internalizing–externalizing correlations were nearly half the magnitude of the externalizing–externalizing correlations. This finding is similar to Goodman's results[18] and also supports his idea that the internalizing and externalizing subscales of the SDQ are relatively "uncontaminated" by one another.

To apply the validity of the SDQ to the community sample, Goodman found that the proportion of true negatives (specificities) was higher than true positives (sensitivities).[20] It suggests that the SDQ is an acceptable measure for screening aims. Our study showed better validity when the sensitivity and specificity of the SDQ were compared to psychiatric diagnoses based on the K-SADS-PL-P interview. The ROC analysis demonstrated that the total difficulties scores and externalizing subscales of parent SDQ distinguished effectively between patient and no patient sample. It suggests that the SDQ is more powerful to detect hyperactivity and conduct problems than emotional problems in the community.

One limitation of this study was the narrow age band (6-12 years old) of the participants, which limits the generalization of the findings to other age groups. Nonetheless, our findings were near to the British findings (5-15 year old children and adolescents).

In summary, the findings of this study confirm the usefulness of the SDQ for screening, clinical and epidemiological research on Farsi speaking children and adolescents.

Further research is recommended on other age populations using the self report version of the SDQ.

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Conflict of Interests
The authors have no conflicts of interest.

Authors' Contributions
ZSh contributed in designing the study and monitoring all steps of the research. She prepared the manuscript.

MTD carried out the design of the study and coordinated the research and monitored all steps of the study. He analyzed the data and provided assistance in preparing the manuscript.

BP, AR and FA carried out the data gathering and data entering. The authors have read the manuscript and approved its contents.

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