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Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED) among elementary school children in Finland

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ABSTRACT

Background: Anxiety disorders are the most common mental disorders in children and youth. Effective screening methods are needed to identify children in need of treatment. The Screen for Child Anxiety-Related Emotional Disorders (SCARED) questionnaire is a widely-used tool to assess childhood anxiety.

Aims: To evaluate the psychometric properties of the SCARED questionnaire, test the SCARED factor structure, and evaluate the prevalence of anxiety symptoms in a community sample of Finnish elementary school children, based on both a child and parent report.

Methods: The sample included all pupils (n=1,165) in grades 2 through 6 (ages 8-13) in four elementary schools in the city of Turku, Finland. Children completed a Finnish translation of the SCARED questionnaire at school, with one parent report questionnaire per child completed at home. In total, 663 child-parent dyads (56.9%) completed the questionnaire.

Results: Internal consistency was high for both child and parent reports on all subscales (0.71-0.92), except for school avoidance (0.57 child, 0.63 parent report). Inter-rater reliability ranged from poor to fair across subscales (intraclass correlation 0.27-0.47). Self-reported anxiety scores were higher than the parent reported scores. Females had significantly higher total scores than males based on the child reports ($p = 0.003$), but not the parent reports. In the confirmatory factor analysis, hypothesized models did not have a good fit with the data, and modification was needed.

Conclusion: The Finnish SCARED questionnaire has good internal consistency. Low child-parent agreement calls for the importance of including both child and parental reports in the assessment of anxiety symptoms.

Keywords: anxiety, child psychiatry, Finland, SCARED, screening

INTRODUCTION

Anxiety disorders are the most common mental health disorders among children and adolescents. They include specific phobias, separation anxiety disorders, social anxiety disorders, generalized anxiety disorders, panic disorders and agoraphobia. Estimates of the prevalence of childhood anxiety disorders have ranged from 2.5 % to more than 40 %, depending on the study population and methodology (Cartwright Hatton et al, 2006; Salum et al, 2013; Costello et al, 2005). The prevalence of current anxiety disorders is estimated to be 3-9% among pre-pubertal children, and 10-15% among adolescents (Kumpulainen et al, 2016).

Anxiety makes the child avoid anxiety-provoking situations, often manifesting as recurrent somatic symptoms, and causing significant functional impairment at home, at school and in social situations (Silverman, 2001). Additionally, anxiety in childhood is not only associated with an increased risk of anxiety in adulthood, but also with depression, substance abuse and suicidality (Kendall et al, 2010; Woodward et al, 2001). Thus, recognition and early treatment of anxious children is of major importance when considered from the perspectives of human suffering and economical costs.

However, childhood anxiety is under-recognized (Gyllenberg et al, 2014; Wölfle et al, 2014; Merikangas et al, 2011; Sourander et al, 2008; Sayal 2006). As it is an internal feeling, often not leading to disturbing behavior, it may be difficult to notice. The majority of children suffering from anxiety are not receiving any treatment (Essau et al 2000, Lempinen et al 2019). Additionally, in a Finnish study, there seemed to be several years' delay between the symptom onset and receiving a diagnosis (Gyllenberg et al, 2014). Thus, more effective screening methods are required to recognize the children in need of treatment.

To meet this need for earlier recognition and referral of anxious children, screening tools have been developed. The Screen for Child Anxiety Related Emotional Disorders (SCARED), developed by Birhamer et al. (1997), has been evaluated in several studies and has proven to be a reliable tool to assess childhood anxiety (Hale et al 2011; Runyon et al, 2018). It screens for overall anxiety and specific DSM-IV anxiety disorders (Birmaher et al, 1997, Birmaher et al, 1999), and has both child and parent report forms available, both of them consisting of the same 41 items.

In addition to earlier studies in clinical samples, SCARED has also been assessed in population-based samples in several countries (Leikanger et al 2012; Canals et al 2012; Wren et al, 2007). However, most of these studies have included only adolescents, i.e. 12 years or older. The results on adolescents cannot be generalized to younger children, as changes in e.g. biological and psychosocial development play a role in the occurrence of psychiatric symptoms. Studying the usefulness of screening tools among younger children is also important, considering the long delay in obtaining treatment and the negative effects of non-treated disorders. During the last 10 years, only one European study has assessed the validity of SCARED among younger children (Canals et al., 2012). Moreover, the evaluation of psychometric properties needs to be conducted in several countries, as the results are far from uniform in different kinds of cultures (Hale et al, 2011). Additionally, to our knowledge, the present study is the first North European study assessing the psychometric properties of the SCARED questionnaire among pre-pubertal children in a community sample.

The aim of this population-based study is to evaluate the psychometric properties of the SCARED questionnaire among elementary school children. We also aimed to study the prevalence of anxiety, as well as age and gender distribution of anxiety symptoms, based on both child and parental reports.

MATERIAL AND METHODS

Study design and sample

This study was a cross-sectional, community-based survey of elementary school children in Finland. The ethical standards of the 1964 Declaration of Helsinki and its revisions were followed. The study protocol was approved by the Ethics Committee of the Turku University Hospital and permissions were obtained from school authorities.

Four elementary schools in different geographical areas of the city of Turku, Finland, were selected to participate in the study, in order to represent both urban and suburban areas. Schools were recruited by contacting their head teachers and asking for their willingness to participate. The target sample included all students in grades 2 through 6 in the selected elementary schools, representing children between the ages of 8 and 13. In Finland, nine years of comprehensive school is mandatory, and children enter the school system at the age of seven. The 1st grade students were excluded from the study, as their reading skills would have been insufficient to complete the questionnaire. Data was collected during May 2014.

Participation in the study was voluntary. Children were given a letter to take home to their parents, and they were given a deadline by which the questionnaires should be returned to the teacher. The letter to the parents included information on the study, parental informed consent and the SCARED parental version. After parental permission, children completed their questionnaires in a classroom situation during the school day, and returned the completed questionnaires to the teacher. All question forms were returned in sealed envelopes so that teachers had no opportunity to see either the child's or their parents' answers. Finally, the teachers returned all the completed questionnaires from the pupils and their parents to the research group.

A total of 1,165 children were registered in grades 2 to 6 across the four schools included. Of those, 942 (89.8%) children and 688 (59.1%) parents completed the questionnaires. Only cases with both the child and the parent report available were included in the main analysis (N=663, 56.9%). This sample included 335 boys (50.5%) and 328 girls (49.5%). In additional analysis, the difference between those children with a parent report available and those missing a parent report was studied. This data included 663 children with both a parent and a child report and 279 children with a child report only.

The SCARED

The SCARED questionnaires both for parents and children were used to measure the children's anxiety symptoms. According to good research practices, the questionnaires were translated into Finnish by members of the research group, followed by a back-translation. The 41-item SCARED scale consists of five subscales, which screen for four specific anxiety disorders - panic disorder (13 items), generalized anxiety disorder (nine items), separation anxiety disorder (eight items) and social anxiety disorder (seven items) - as well as a subscale for school phobia (four items), which is not classified as a DSM-IV anxiety disorder. The items are scored on a 0-2 scale (0 = "not true or hardly ever true"; 1 = "somewhat true or sometimes true"; and 2 = "very true or often true"). The maximum total score is 82, and the maximum scores for panic disorder, generalized anxiety disorder, separation anxiety, social anxiety and school phobia are 26, 18, 16, 14 and 8, respectively.

In this study, the differences between the child and parental reports, as well as age and gender distribution of the symptoms were evaluated. The parent and child reported SCARED total scores and subscale scores were used as continuous variables, and to put the results into perspective also in a clinical sense, 90 percentile cutoff points were identified for the total scores.

Statistical Analysis

Differences between sexes were examined for each subscale using independent t-tests. The inter-rater agreement between child and parent reported SCARED scale scores was analyzed using a two-way mixed, absolute agreement, averages measures ICC (intraclass correlation). The internal consistency of both the child and parent report SCARED scale scores was analyzed with standardized Cronbach's alpha coefficient. Additionally, the difference between those children whose parent did not complete the SCARED questionnaire, and those with both a parent and a child report available was examined for each child reported scale using independent t-tests. Because the distributions of the SCARED scales were not normally distributed, the results of the t-tests were verified using a non-parametric Mann-Whitney U-test.

Confirmatory factor analysis (CFA) was used to test the hypothesized factor structure of SCARED for both child and parent data. Chi-Square, Comparative fit index (CFI), Tucker-Lewis index (TLI) and root mean square error of approximation (RMSEA) were used to evaluate the fit of the models (Hu, Bentler, 1999). The CFI indicates how much better the model fits compared to the independence model. The CFI index varies between 0 and 1, and the value should be close to .90 for the model to be suitable (Bentler, 1990). However, according to Little (2013), values between .85 and .90 are considered to be moderate. When the proposed five factor structure of SCARED was tested, hypothesized factors for the models were allowed to correlate, while errors were defined as uncorrelated. Missing data was replaced in the analysis using imputation.

For all analyses, a two-sided p-value of 0.05 was considered statistically significant. Analyses were carried out using SPSS version 22 and CFA-analysis were carried out using Mplus version7.

RESULTS

The SCARED total mean scores, shown by grade, sex and respondent are displayed in Figure 1. Table 1 shows, in addition to the total scores, the mean parent and child reported SCARED subscale scores stratified by grade and sex. All child reported SCARED total and subscale scores were higher than the corresponding parent SCARED scores. When the sex differences were examined, the child reported SCARED scores were significantly higher for females compared to males as regards the total score ($p = 0.003$), generalized anxiety ($p = 0.041$), separation anxiety ($p < 0.001$) and social anxiety ($p < 0.001$). No significant differences between sexes existed for panic disorder ($p = 0.58$) or school phobia ($p = 0.19$). In the parent reported SCARED results, no significant differences between sexes were found for any SCARED subscale scores. The nonparametric test results were almost parallel. Inter-rater reliability between child and parent, assessed using ICC for the total score, was 0.37, indicating poor agreement (Cicchetti, 1994). The cross-informant agreement ranged from 0.27 (panic disorder) to 0.47 (separation anxiety).

In additional analysis, we examined the subscale scores between the children with a corresponding parent report available and those missing a parent report. No significant differences were found (Supplementary table S1). The school phobia subscale was an exception, with those children missing a parent report reporting higher mean school phobia ($p=0.018$). The results were the same in nonparametric analyses.

Table 2 shows the internal consistency in child and parent reported SCARED subscales. Both child and parent reported scores had high internal consistency in four of the five subscales, ranging from 0.71 to 0.92 based on Cronbach's alpha. The only exception was the school phobia subscale, the alpha values for child and parent report being 0.57 and 0.63, respectively. There was little variation between child and parent report alphas.

Table 3 shows the results of the confirmatory factor analysis separately for the child and parent data. According to the model fit indices, hypothesized models did not have a good fit with the data, neither among the children nor among the parents. CFI and TLI were both < 0.9 in the child and parent models and thus remained below the recommended good model fit value. To obtain a better model fit, the models were slightly modified. A certain number of errors between two items were allowed to correlate: three in the child model and ten in the parent model (see Table 3). The number of correlating errors was defined by modification indices. After these modifications, CFI and TLI both were >0.9, RMSEA <0.05 and $\chi 2/df < 2$, reflecting a good model fit.

Figure 2 shows the distribution of child and parent reported total scores for the whole sample. For clinical purposes, we defined the 90^{th} percentile cut-offs in this sample, separately for the child and parent SCARED total scores, which were 31 for the children and 19 for the parents. The results are shown in Table 4. Of those children reporting a total score of 31 or more, 55.9 % were females, while in the parent reports, 44.4% of those scoring 19 or more were females.

DISCUSSION

The present study found the Finnish version of SCARED to have good internal consistency. The inter-rater reliability and cross-informant agreement was low, with the children reporting higher anxiety scores than their parents. Based on the child reports, there were also more significant differences in anxiety between the sexes and grades; the scores in parental reports being more consistent. These findings are important both in clinical practice and research when assessing childhood anxiety problems.

Our CFA results suggest that the present SCARED factor structure is not ideal for our sample in a statistical sense. To improve the model fit, further modification was needed. However, all the item errors that were allowed to correlate within each anxiety subscale in the statistical analyses, were very similar to each other (e.g. “I am shy” and

“I feel shy with people I don’t know well”). This explains our results and is one of the common reasons for not reaching an optimal model fit.

The correlation between child and parent reports was low, with children reporting higher anxiety levels than their parents. On the subscales, 14.5 % of children reported elevated panic disorder scores, only separation anxiety being more common. By contrast, panic disorder was reported by parents less than any other anxiety disorder, and parent-child correlation for panic disorder was very poor. Overall, parent-child correlations ranged from poor to fair. In earlier studies, the inter-rater agreement has had varying results (Birmaher et al, 1999; Su et al, 2008; Wren et al, 2007). Compared to some earlier studies (Su et al, 2008; Wren et al, 2007), we found lower correlations, which may be partially explained by the young age of the sample, as adolescent scores have been found to correlate better with the parent report (Wren et al, 2007). In a clinical study by Birhamer et al. (1999), the parent-child agreement was clearly stronger among those over 12 years of age than those between 9-12 years of age. Moreover, in this study, similar to our study, the cross-information correlations were higher in school phobia and separation anxiety than in generalized anxiety and social anxiety. These results may reflect the fact that some anxiety disorders, such as separation anxiety, are often manifested by behavior that is noticed by the parent, whereas panic disorder, and in particular its somatic symptoms, are more difficult to notice.

The weakness of the child-parent correlation is not only unique to SCARED. In a Finnish study, cross-informant correlation was weaker for CBCL when measuring childhood internalizing problems, such as anxiety (Pihlakoski et al, 2006). As anxiety is mostly an internal feeling, often not noticed by external observers, it should always be investigated by also questioning the child and not just the parents.

In general, there were more significant differences between grades and gender among the child reports, while the parental reports were more consistent. Females scored higher than males based on the self-reports, but not based on the parent reports.

This is in line with previous studies – anxiety being more common among girls than among boys (Hale et al, 2011; Su et al, 2008), which might reflect e.g. differences in psychosocial expectations and cognitive styles (such as tendency to worry and ruminate) among the sexes.

Internal consistency for both the child and the parent reports was high, with the exception of the school avoidance subscale. This is in line with previous studies. All the SCARED subscales have proven highly reliable in cross-cultural settings when measured by Cronbach's alpha coefficient (α = 0.72-0.84), excluding the school phobia subscale with a value of 0.62. In a meta-analysis, the mean alpha values for the subscales ranged from 0.62 to 0.82, the lowest being school avoidance (Hale et al, 2011). This subscale consists of only four items, which may partly explain the lower values.

The cut-offs for our 90th percentile scores for the SCARED total score (31 for children and 19 for parents) somewhat differ from those identified in prior publications. In a US sample of 8 to 12 year-old children attending primary care clinics, the 90th percentile scores from the child and parent reports were 35 and 24, respectively (Wren et al., 2007); while based on a large Spanish community sample, cut-offs of 25 and 17 for children and parents were proposed (Canals et al, 2012). A cut-off of 25 for both children and parents was determined by the SCARED authors to indicate a presence of an anxiety disorder (Birmaher et al., 1997).

A strength of this study is the large community based sample including both the child and the parent report. However, the study had some limitations. First, the study was cross-sectional, assessing anxiety at one time point only. Second, it can be questioned whether the youngest of the elementary school children are advanced enough to answer questions about their feelings in a written form, even though children only had to tick the correct answer, with no need to produce text themselves. However, the questionnaires were completed during a school lesson, and the children had a possibility to ask the teachers if they did not understand the wordings. Finally, the attrition rate among parents was high, with 59.1 % of parents completing the questionnaire, while the response rate among the children was 89,8%. This said, we consider the results to be widely usable despite the high attrition rate, as there were no significant differences between the child-parent dyad child reports and those where the parent report was unavailable.

CONCLUSION

The present study is the first to assess the psychometric properties of the SCARED questionnaire in preadolescent children in Nordic countries. The internal consistencies of both child and parent versions of the SCARED were found to be good. The low child-parent agreement calls for the importance of investigating the symptoms from both the child and the parents.

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Conflicts of interest and funding

None of the authors report any financial interests or potential conflicts of interests.

Table 1. Mean and standard deviation of child and parent report SCARED scale scores stratified by grade and sex, with inter-rater reliability of child and parent reports.

Scared subscale	Child report Mean (SD)					Parent report Mean (SD)					
	Grade 2 (n = 82/86)[a]	Grade 3 (n = 77/57)	Grade 4 (n = 72/74)	Grade 5 (n = 41/73)	Grade 6 (n = 63/38)	Grade 2 (n = 82/86)	Grade 3 (n = 77/57)	Grade 4 (n = 72/74)	Grade 5 (n = 41/73)	Grade 6 (n = 63/38)	ICC[b]
Total											0.37
Male	16.07 (11.22)	17.64 (10.11)	17.24 (11.04)	14.98 (10.12)	12.10 (7.49)	8.84 (6.41)	8.88 (9.26)	9.49 (7.42)	8.23 (6.48)	6.13 (5.82)	
Female	16.72 (10.21)	21.00 (11.50)	19.93 (12.60)	15.26 (9.80)	20.00 (10.79)	10.20 (7.52)	7.91 (6.91)	9.46 (8.05)	8.23 (6.86)	8.32 (6.89)	
Panic											0.27
Male	3.56 (3.91)	3.69 (3.24)	3.68 (3.31)	3.00 (2.98)	2.17 (2.18)	0.58 (1.14)	0.88 (1.80)	0.74 (1.29)	0.65 (1.49)	0.51 (1.86)	
Female	2.76 (2.85)	4.37 (4.11)	3.96 (4.22)	2.75 (3.23)	3.87 (3.45)	0.67 (1.88)	0.75 (1.58)	0.95 (1.92)	0.60 (1.66)	0.66 (1.51)	
General anxiety											0.43
Male	3.78 (3.55)	4.51 (3.08)	4.67 (3.23)	5.32 (3.83)	3.44 (2.83)	2.59 (2.63)	2.66 (3.51)	3.35 (3.16)	2.90 (2.61)	1.87 (2.15)	
Female	4.10 (3.32)	5.46 (3.41)	5.23 (3.88)	3.93 (3.30)	6.39 (4.21)	2.97 (3.01)	2.64 (2.63)	2.88 (2.73)	2.49 (2.53)	3.34 (3.29)	
Separation anxiety											0.47
Male	3.73 (2.93)	3.99 (2.70)	3.43 (2.68)	2.24 (2.24)	1.67 (1.36)	2.12 (2.15)	1.72 (2.19)	1.90 (2.31)	1.55 (2.15)	0.90 (1.33)	
Female	4.66 (3.12)	4.63 (2.78)	4.34 (3.28)	2.82 (2.24)	3.26 (2.43)	2.50 (2.46)	1.46 (1.85)	1.72 (2.40)	1.55 (2.12)	0.89 (1.18)	
Social anxiety											0.30

Male	4.11 (2.57)	4.35 (2.46)	4.57 (3.16)	3.46 (2.85)	4.10 (2.90)	3.05 (2.70)	2.99 (3.08)	2.92 (2.87)	2.68 (2.54)	2.29 (2.50)	
Female	4.27 (2.56)	5.46 (2.99)	5.14 (2.63)	5.10 (2.84)	5.16 (2.44)	3.57 (2.78)	2.34 (2.08)	3.28 (2.94)	3.14 (2.54)	2.68 (2.79)	
School avoidance											0.46
Male	0.88 (1.02)	1.10 (1.25)	0.89 (0.97)	0.95 (1.09)	0.71 (0.87)	0.51 (0.92)	0.62 (1.04)	0.57 (0.73)	0.45 (0.78)	0.56 (1.13)	
Female	0.93 (1.20)	1.09 (1.39)	1.27 (1.26)	0.71 (0.99)	1.32 (1.56)	0.49 (0.79)	0.71 (1.20)	0.64 (0.96)	0.45 (0.82)	0.74 (1.11)	

[a]Maximum n for males/females, <4% missing in all categories. [b]Inter-rater reliability: two-way mixed, absolute agreement, averages measures ICC (intraclass correlation).

Table 2. Internal consistency of child and parent report SCARED.

SCARED subscale	Internal consistency	
	αa: child report	αa: parent report
Total	0.92	0.90
Panic	0.82	0.82
General anxiety	0.83	0.83
Separation anxiety	0.75	0.75
Social anxiety	0.71	0.85
School avoidance	0.57	0.63

[a]Chronbach's standardized alpha coefficient.

Table 3. Hypothesized and modified five factor model results for child and parent reported SCARED.

	χ2	DF	χ2/df	RMSEA	CFI	TLI
Child report						
Hypothesized model	1359.102***	769	1.767	0.034	0.886	0.879
Modified model[a]	1226.367***	766	1.601	0.030	0.911	0.905
Parent report						
Hypothesized model	1517.296***	769	1.973	0.038	0.820	0.809
Modified model[b]	1140.244***	759	1.502	0.028	0.909	0.901

[a] Errors between Scared items 41-32, 14-5 and 38-6 were allowed to correlate. [b] Errors between Scared items 38-6, 14-5, 38-27, 20-16, 31-16, 40-39, 13-4, 36-17, 27-6 and 41-32 were allowed to correlate.

Abbreviations: DF=degree of freedom, RMSEA=root mean square error of approximation, CFI=comparative fit index, TLI=Tucker-Lewis index.

Table 4. Number of child and parent report SCARED scale scores above and below the cut-off values based on the current sample.

Child cut-offs (>90%)	Child report n (%)	Parent cut-offs (>90%)	Parent report n (%)
Total		Total	
<31	595 (89.7)	<19	596 (90.4)
≥31	68 (10.3)	≥19	63 (9.6)

Supplementary table S1. Mean and standard deviation for child report SCARED scale scores in those children with a corresponding parent SCARED report and children missing a parent SCARED report.

SCARED scale	Parent and child report available (N=663)		Parent report missing (N=279)		
	Mean	SD	Mean	SD	P-value
Total	17.01	10.80	16.74	16.93	0.73
Panic	3.36	3.45	3.36	3.36	1.00
General anxiety	4.54	3.50	4.74	4.60	0.44
Separation anxiety	3.58	2.82	3.23	3.48	0.083
Social anxiety	4.56	2.78	4.20	4.46	0.068
School avoidance	.97	1.16	1.18	1.03	0.018

[a]P-value based on independent t-test of difference in mean child report SCARED scale scores.

Figure 1. Child and parent SCARED report total scores by grade and sex.

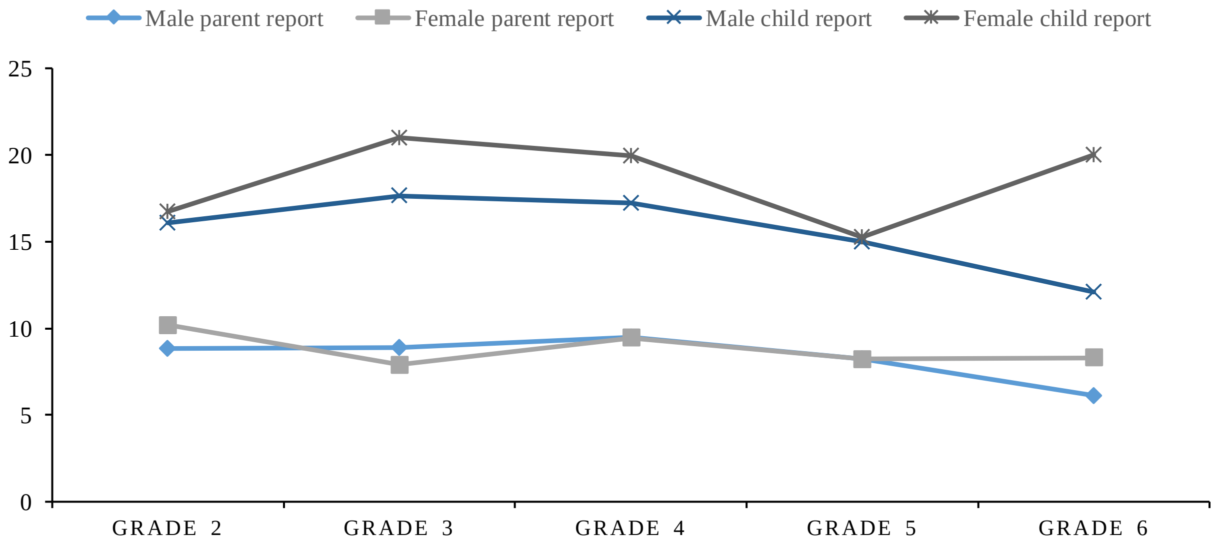

Figure 2. The distribution of child and parent reported total scores for the whole sample.