

RESEARCH ARTICLE

Study of Functional Impairment in Students of Elementary and Secondary Public Schools in Iran

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Abstract

Objective: The current study aimed to investigate the frequency of impairment in different functional domains of life and the relationship between sex and age and functional impairment in school-based samples of Iranian children and adolescents.

Method: A sample of 270 children (ages 6-11) enrolled in two public elementary schools and a sample of 386 adolescents (ages 12-17) enrolled in four public secondary schools were selected by multistage sampling. The Persian version of the parent report form and self-report form of the Weiss Functional Impairment Rating Scale (WFIRS-P and WFIRS-S) were used for evaluating functional impairment in children and adolescents, respectively. Two-way analyses of variance (two-way ANOVAs) were conducted to explore the main effects and the interaction effect of sex and age on functional impairment.

Results: 11.9% of children and 29.5% of adolescents showed impairment in at least two functional domains of life. The most frequent impaired domain was life skills (22.6% of children and 30.3% of adolescents). While no significant sex and age effect was found during childhood, male adolescents showed more impairment in externalizing domains and female adolescents showed more internalizing difficulties. In addition, older adolescents showed more functional impairment relative to younger adolescents. **Conclusions:** Detailed knowledge of the relationship between sex and age and functional impairment could be a starting point to target the major psychosocial elements of these challenges.

Key Words: functional impairment, children, adolescents, sex and age differences, Weiss Functional Impairment Rating Scale (WFIRS)

Résumé

Objectif: La présente étude visait à investiguer la fréquence de la déficience dans différents domaines fonctionnels de la vie et la relation entre le sexe et l'âge et la déficience fonctionnelle dans des échantillons recrutés en milieu scolaire d'enfants et adolescents iraniens. **Méthode:** Un échantillon de 270 enfants (de 6 à 11 ans) inscrits dans deux écoles primaires publiques et un échantillon de 386 adolescents (de 12 à 17 ans) inscrits dans 4 écoles secondaires publiques ont été choisis par un échantillonnage à plusieurs degrés. La version persane du formulaire du rapport des parents et du formulaire d'auto-déclaration de la Weiss Functional Impairment Rating Scale (WFIRS-P et WFIRS-S) a servi à évaluer la déficience fonctionnelle chez les enfants et les adolescents, respectivement. L'analyse de la variance à deux facteurs (ANOVA à deux facteurs) a été menée pour explorer les principaux effets et l'effet d'interaction du sexe et de l'âge sur la déficience fonctionnelle. **Résultats:** 11,9 % des enfants et 29,5 % des adolescents révélaient une déficience dans au moins deux domaines fonctionnels de la vie. Le domaine le plus fréquemment déficient était celui des compétences essentielles (22,6 % des enfants et 30,3 % des adolescents). Bien qu'aucun effet significatif du sexe et de l'âge n'ait

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Submitted: May 15, 2020; Accepted: December 6, 2020

été constaté durant l'enfance, les adolescents de sexe masculin affichaient plus de déficience dans les domaines externalisants et les adolescentes de sexe féminin montraient plus de difficultés d'internalisation. En outre, les adolescents plus âgés affichaient plus de déficience fonctionnelle relativement aux adolescents plus jeunes. **Conclusions:** Une connaissance détaillée de la relation entre le sexe et l'âge et la déficience fonctionnelle pourrait constituer un point de départ pour cibler les éléments psychosociaux majeurs de ces difficultés.

Mots clés: déficience fonctionnelle, enfants, adolescents, différences selon le sexe et l'âge, Weiss Functional Impairment Rating Scale (WFIRS)

Introduction

Functional impairment can be defined as the amount of restriction in a person's ability to carry out important daily life activities (e.g., personal, physical, and social) due to their disorder or symptoms (Palermo et al., 2008). The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; APA, 2013) includes a functional impairment criterion as one of the diagnostic criteria for most conditions. Assessment of functional impairment is an important component in the diagnostic process, distinct from symptoms (Barkley et al., 2006; Eriksen & Kress, 2005). Impairment in functional domains of life, not DSM symptoms, is the major contributor to referral for treatment (Angold, Costello, Farmer, Burns, & Erkanli, 1999; Lavigne et al., 1998). The evaluation of functional impairment is a major task in designing an appropriate intervention (Scotti, Morris, McNeil, & Hawkins, 1996). There is a fair amount of evidence indicating a need to consider and evaluate symptoms and functional impairment separately when making diagnostic decision (Angold et al., 1999; Shaffer et al., 1996). Angold et al. (1999) found that children with subthreshold symptoms and psychosocial impairment were as disturbed as those who met symptom criteria but without psychosocial impairment. Shaffer et al. (1996) found that the prevalence of disorders was reduced by adding an impairment criterion.

Longitudinal studies have assessed the relationship between general mental health disorders (such as attention-deficit/hyperactivity disorder (ADHD), depression, and anxiety) in childhood and functional impairment in adulthood. Several studies have shown that ADHD in childhood is associated with lower educational and occupational attainment (Kuriyan et al., 2013) and worse educational, occupational, economic, and social outcomes (Klein et al., 2012). Other studies have also demonstrated the association between childhood ADHD symptoms and poor functional outcomes in adulthood (Roy et al., 2017; Hechtman et al., 2016). A longitudinal study showed that a higher score in the Child Behavior Checklist-dysregulation profile in childhood

was associated with poorer overall functioning at age 19 (Holtmann et al., 2011). A recent longitudinal study demonstrated that childhood/adolescent depression, especially a persistent pattern of depressive symptoms, was associated with poorer health, criminality, and social functioning in adulthood (Copeland, Alaie, Jonsson, & Shanahan, 2020). Longitudinal studies also found associations between childhood anxiety disorders (Copeland, Angold, Shanahan, & Costello, 2014), childhood trauma exposure (Copeland et al., 2018), and common childhood psychiatric problems (Copeland, Wolke, Shanahan, & Costello, 2015) with functional impairment in adulthood.

Functional impairment in childhood predicts negative outcomes during adolescence (Costello, Angold, & Keeler, 1999). A longitudinal study on prevalence and development of psychiatric disorders from childhood to adolescence showed that there is a significant increase in functional impairment from ages 9 and 10 years to age 16 years in both boys and girls, especially in boys (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). In addition, the percentage of diagnosed boys showing functional impairment was more than diagnosed girls with functional impairment at 16 years (Costello et al., 2003).

In a study examining the effects of age and sex on functional impairment in a normative sample of children and adolescents, the 12-17 years age group was significantly higher than the 6-11 years age group in several life domains including interactions with parents and academic performance; however, no significant age effect was found within each age group (Barkley, 2012). Moreover, males had significantly higher impairment than females on school performance, community activities, visiting others, playing at school, managing money, self-care, doing chores, school homework, following rules, interaction with other adults, and playing sports (Barkley, 2012). In this study, no interaction effect of sex and age group (6-11 years and 12-17 years) on functional impairment was found (Barkley, 2012).

In order to measure functional impairment in children and adolescents, different global and multidimensional scales

have been developed. The Children's Global Assessment Scale (CGAS; Setterberg, Bird, & Gould, 1992) is used to rate a child's overall functioning based on a scale from 1 (the most serious impairment) to 100 (the best level of functioning). The Columbia Impairment Scale (CIS; Bird et al., 1993, 1996) includes 13 items covering multiple domains of functioning (interpersonal relationships, work, academic functioning, and use of leisure time). Each item of the CIS can be rated on a scale from 0 (no problem) to 4 (very big problem). The Child and Adolescent Functional Assessment Scale (CAFAS; Hodges, Doucette-Gates, & Liao, 1999) is used to assess a child in eight domains and to assess the caregiver in two domains. The Child and Adolescent Psychiatric Assessment (CAPA; Angold et al., 1995) is a structured diagnostic interview that consists of rating the symptoms and the extent to which the symptoms have affected the child's functioning. The Impairment Rating Scale (IRS; Evans, Allen, Moore, & Strauss, 2005) was developed to assess functional impairment across domains in children with ADHD and can be completed by the child's teacher and parents. The Barkley Functional Impairment Scale for children and adolescents (BFIS-CA; Barkley, 2012) can be used to rate the functioning of children ages 6-17 years in 15 domains based on a scale from 0 (not at all) to 9 (severe). Of these scales, the Weiss Functional Impairment Rating Scale (WFIRS) is unique in having multiple factors for the various domains, being sensitive to change in a short time frame, identifying impairment secondary to emotional or behavior problems, and being developed to be as specific as possible to functional impairment (Weiss, McBride, Craig, & Jensen, 2018).

In the current study, we used the WFIRS (Weiss et al., 2018) as an internationally used assessment tool that measures the impact of emotional and behavioral problems on functional impairment. The WFIRS has been translated into 20 languages (Swedish, Chinese, Danish, English, French, European Spanish, American Spanish, Portuguese, Haitian Creole, Japanese, Norwegian, Thai, Urdu, German, Dutch, Italian, Turkish, Polish, Russian, and Persian) and has a parent report form that allows for rating the child's or the adolescent's functioning by the parent and a self-report form that allows for adolescent or an adult self-report. Psychometric investigations of the WFIRS-parent report (WFIRS-P; Weiss et al., 2007; Qian et al., 2001; Gajria et al., 2015; Punyapas, Pornnoppadol, Boon-yasidhi, & Likhitkiatikhachorn, 2015; Tarakçioğlu, Çakın Memik, Olgun, Aydemir, & Weiss, 2014; Dose, Hautmann, & Doepfner, 2016; Kiani, Hadianfard, & Weiss, 2018) and the WFIRS-self-report (WFIRS-S; Punyapas et al., 2015; Canu, Hartung, Stevens, & Lefler, 2016; Takeda, Tsuji, Kanazawa, Sakai, & Weiss, 2016; Hadianfard, Kiani, & Weiss, 2017) have shown that

these rating scales are reliable and valid measures for assessment of functional impairment. Psychometric studies on the WFIRS-S in a sample of youth with ADHD (Punyapas et al., 2015) and in a school-based sample of adolescents (Hadianfard et al., 2017) showed strong internal consistency for the domains and total scale. Test-retest reliability was moderate to strong for the domains and strong for the total scale in one study (Hadianfard et al., 2017) and moderate for the total scale in another study (Punyapas et al., 2015). The seven-factor structure of the WFIRS-S has been confirmed (Takeda et al., 2017; Hadianfard et al., 2017). Strong convergent validity was found between the total scale of the WFIRS-S and Current Symptom Scale (a measure of impairment) (Canu et al., 2016) and the Pediatric Quality of Life Inventory (PedsQL) total and psychosocial health subscale (Hadianfard et al., 2017). Regarding the divergent validity, the WFIRS-S showed a relatively weak correlation with the Beck Depression Inventory (Takeda et al., 2017). Psychometric studies on the WFIRS-P demonstrated strong internal consistency for the total scale and moderate to high internal consistency for all domains (Weiss et al., 2007; Qian et al., 2011; Gajria et al., 2015; Punyapas et al., 2015; Tarakçioğlu et al., 2015). Studies showed strong test-retest reliability for the WFIRS-P (Gajria et al., 2015; Punyapas et al., 2015; Tarakçioğlu et al., 2015). The WFIRS-P had moderate convergent validity with the PedsQL total scale and psychosocial health subscale (Tarakçioğlu et al., 2015). The WFIRS-P domains and total scale were able to discriminate youth with and without ADHD (Qian et al., 2011) and also to distinguish groups based on overall ADHD severity (Tarakçioğlu et al., 2015). The six-factor structure of WFIRS-P has been confirmed by the root mean square error of approximation (Gajria et al., 2015).

The current study first aimed at investigating the frequency of functional impairment in school-based samples of Iranian children (6-11 years) and adolescents (12-17 years). Second, this study assessed the effects of sex and age on the domains and total scale scores of the WFIRS-P in childhood. For this purpose, we conducted a study on children ages 6-11 years whose parents rated them in the WFIRS-P. Third, the current study examined the effects of sex and age on domains and total scale scores of the WFIRS-S in adolescence. For this purpose, we performed a study on adolescents ages 12-17 years who rated their function in the WFIRS-S. Given the consistent findings on the relationship between sex and internalizing and externalizing problems (Keiley, Bates, Dodge, & Pettit, 2000; Leadbeater, Blatt, & Quinlan, 1995), we hypothesized that males would have significantly more impairment than females in externalizing domains of functioning and females would have more impairment in internalizing domains of impairment such

as self-concept. Regarding the previous studies on the relationship between age and functional impairment (Barkley, 2012; Costello et al., 2003), we also hypothesized that adolescents with older ages would have significantly more functional impairment than those with younger ages.

Method

Study 1

Participants. Parents of 130 (48.1%) male and 140 (51.9%) female students participated in study 1. The age range of students was 6-11 years and they were enrolled in grades 1-6 in two public elementary schools in Shiraz, Iran. Table 1 shows the age equivalent for each grade based on the education board's criterion for enrollment.

Procedure. For collecting the data of study 1, we selected a typical school board district in education program, entrance condition, and socioeconomic status of the students' families from the four school board districts in Shiraz, Iran, using one school for boys and one school for girls. The schools and school board were selected on the basis of being most representative of the population based on available demographic and educational data. All the students in each school were eligible to participate.

The enrollment criteria for the schools are the same as other public elementary schools serving middle-class neighborhoods in Shiraz and in Iran. Ninety percent of schools in Iran are public schools and they follow the same curriculum. In Iran, there are four kinds of schools including public schools, private schools, schools for gifted and talented students, and schools for students with special needs. The same process was used for school selection for study 2.

Students who were between 6-11 years and in grades 1-6 were eligible for inclusion. The consent form along with the questionnaire was sent to the parents of all these students (a total of 400 students). In the consent form, the purpose of the study and the topics covered by the questionnaire were provided for parents. Parents were informed that the data of their children, would be de-identified and only group level data reported. No individual or personally identified data would be shared with the school, or used for other purpose other than research. In addition to the specific instruction about how to fill out the questionnaire, parents were asked to read each item carefully and to check the questionnaire to assure there were no missing items. Parents had the option to discuss any questions about the study or about the scale with the researchers. Parents provided informed consent and completed the questionnaire at home based on the instructions. In order to assure patient anonymity, questionnaires were delivered to the students in a sealed envelope

without identifying information and collected in a box that was placed in the school office. Parents of 94 students did not return the consent form and the questionnaire and 36 questionnaires were incomplete and were excluded from analyses.

Study 1 was approved by the Research Ethics Committee of the School of Psychology of Shiraz University and also by the research ethics committee of the Shiraz School Board. This study was conducted according to the ethical codes of the Psychology and Counseling Organization of Iran.

Measure. *Weiss Functional Impairment Rating Scale-Parent Report Form (WFIRS-P)-Persian version.* The WFIRS-P (Weiss et al., 2018) consists of 50 items that cover 6 domains: Family (10 items, e.g., "Causing fighting in the family"), School (10 items, e.g., "Problems with school administrators"), Life skills (10 items, e.g., "Problems getting ready for bed"), Self-concept (3 items, e.g., "My child does not have enough fun"), Social activities (10 items, e.g., "Problems getting along with other children"), and Risky activities (10 items, e.g., "Doing dangerous things"). The items are rated on a 4-point scale ranging from 0 (never or not at all) to 3 (very often or very much) and the items that are not relevant to the person can be rated as "not applicable". Parents are asked to report how their child's emotional and behavioral problems have impacted each item in the last month. The test-retest reliability of the Persian version of the WFIRS-P was between 0.74 and 0.90 for the school, risky activities, and total scale and between 0.60 and 0.68 for the family, life skills, self-concept, and social activities. Internal consistency was 0.72 for the self-concept and social activities, 0.81, 0.74, 0.62, and 0.42 for the family, school, life skills, and risky activities, and 0.88 for the total scale (Kiani et al., 2018).

Study 2

Participants. Participants of study 2 were 191 (49.5%) male and 195 (50.5%) female students. The age range of students was 12-17 years (mean age = 14.83, SD = 1.76) and enrolled in grades 7-12 in four public secondary schools in Shiraz, Iran. Table 1 shows the age equivalent for each grade based on the education board's criterion for enrollment.

Procedure. The procedure of recruiting the participants of study 2 was the same as the procedure we used for recruiting the participants of study 1, with the exception that we used two girls and two boys public secondary schools serving middle-class neighborhoods.

Students who were between 12-17 years and in grades 7-12 were eligible for inclusion. Participation in the study was voluntary and was done with the informed consent of the

parent and assent by the student. Adolescents received instructions for completing the questionnaire and were asked to read each item carefully and to check for missing items before submitting their responses. Participants were informed that the questionnaire would be administered anonymously, that only group data would be analyzed, and would not be used for any purpose other than the purpose of the research. Students filled out the questionnaire in the classroom environment independently. They were also informed that there is no right or wrong answer and were given the opportunity to raise any concerns they might have. The classroom was physically organized to provide sufficient distance between the chairs to assure privacy and prevent peer pressure, or verbal communication with other participants. Students were told that the forms had no personal identifying information and were specifically instructed not to write their names or other personal data on the forms before putting their completed questionnaires in a box. To collect the questionnaires, a box was placed in one of the school's office in coordination with the school, and students were asked to place the completed questionnaire in the box. Among the 400 questionnaires that were distributed among students, 14 questionnaires had incomplete data and 386 questionnaires were eligible to be included in data analyses.

Study 2 was approved by the Research Ethics Committee of the School of Psychology of Shiraz University and also by the research ethics committee of the Shiraz School Board. This study was conducted under the ethical codes of the Psychology and Counseling Organization of Iran.

Measure. *Weiss Functional Impairment Rating Scale- Self-Report Form (WFIRS-S)-Persian version.* The WFIRS-S (Weiss et al., 2018) includes 69 items that cover 7 domains: Family (8 items, e.g., "Problems losing control with family"), Work (11 items, e.g., "Problems working to your potential"), School (10 items, e.g., "Problems getting your work done efficiently"), Life skills (12 items, e.g., "Problems getting ready to leave the house"), Self-concept (5 items, e.g., "Feeling discouraged"), Social activities (9 items, e.g., "Problems having fun with other people"), Risky activities (14 items, e.g., "Breaking or damaging things"). The instruction is to rate each item on a 4-point rating scale from 0 (never or not at all) to 3 (never or not at all) based on how emotional or behavioral problems have impacted functioning in the last month. The items of the WFIRS-S that are not relevant to the person can be rated as "not applicable". The test-retest reliability of the Persian version of the WFIRS-S was between 0.70 and 0.87 for risky activities, total score, school, self-concept, and social activities and between 0.59 to 0.66 for family, work, and life skills. Internal consistency was 0.72, 0.80, 0.82, 0.79, 0.90, 0.81, and 0.85 for the family, work, school, life skills, self-concept, social activities,

Table 1. Age equivalent for each grade in sample 1 and sample 2

Sample 1	
Grade	Age equivalent
First	6
Second	7
Third	8
Fourth	9
Fifth	10
Sixth	11
Sample 2	
Grade	Age equivalent
Seventh	12
Eight	13
Ninth	14
Tenth	15
Eleventh	16
Twelfth	17

and risky activities and 0.94 for the total scale (Hadianfard et al., 2017).

Statistical Analyses

All statistical analyses were performed using IBM SPSS Statistics 22 program. Frequency and percentage of participants with functional impairment in the domains and total scale of the WFIRS-P (for the 6-11 years age group) and WFIRS-S (for the 12-17 years age group) were generated. Based on clinical guidance, any domain with two items rated 2 (much) or one item rated 3 (very much) was considered as an impaired domain (Weiss et al., 2018; Canu et al., 2016). The total scale was considered impaired when two or more domains were impaired (Weiss et al., 2018; Canu et al., 2016). Psychometric evaluation of the WFIRS has found very high inter-item correlations, and correlations between domains (Weiss et al., 2018). The likelihood is that if two items are rated 2 or one item rated 3, the subject will also be above any psychometric cut points. The advantage of our using the simpler clinical scoring procedure, is that the findings of the study will have more relevance to the understanding of the measure as used in practice. Descriptive statistics including means, 95% confidence intervals for means, and standard deviations were computed for the domains and total scale of the WFIRS-P in 6-11 years age group by sex and age and for the domains and total scale of the WFIRS-S in 12-17 years age group by sex and age. Two-way analyses of variance (two-way ANOVAs) were

Table 2. Frequency and percentage of functional impairment in children (n = 270)

WFIRS-P	Frequency	Percentage
Family	23	8.5
School	27	10
Life skills	61	22.6
Self-concept	9	3.3
Social activities	11	4.1
Risky activities	8	3
Total	32	11.9

WFIRS-P = Weiss Functional Impairment Rating Scale-Parent Report

performed to assess the main effects and the interaction effect of sex and age on the domains and total scale of the WFIRS-P in 6-11 years age group and on the domains and total scale of the WFIRS-S in 12-17 years age group. Because in the 6-11 years age group, there were two empty cells in the design, the Type IV sum of squares was considered. Pairwise comparisons were performed using Scheffé's method. The statistical significance level was considered as $p < 0.05$. Partial eta squared (partial η^2) values of 0.01, 0.04, and 0.1, respectively were considered low, moderate, and high effect sizes (Huberty, 2002).

Results

Findings for study 1 on children ages 6-11 years

Frequency of functional impairment

Table 2 shows the frequency of functional impairment in the domains and total scale of the WFIRS-P in children. 11.9% of children showed impairment in the total scale of the WFIRS-P. Among the WFIRS-P domains, impairment in life skills, school, and family had the highest frequency, respectively (22.6% for life skills, 10% for school, and 8.5% for family).

Descriptive statistics on the WFIRS-P scores

Table 3 shows means, 95% confidence intervals for means, and standard deviations of each domain and total scale of the WFIRS-P by child's sex and age. Life skills had the highest rated impairment and risky activities had the lowest rated impairment in all ages and in both males and females.

Sex and age differences on the WFIRS-P scores

No significant main effect of sex was found on the total scale ($F(1,260) = 0.23, p > 0.05$) of the WFIRS-P. The main effect of age on the total scale of the WFIRS-P was

not significant ($F(5,260) = 1.43, p > 0.05$). The interaction effect of sex and age on the WFIRS-P total scale was not significant ($F(3,260) = 1.43, p > 0.05$).

Findings for study 2 on adolescents ages 12-17 years

Frequency of functional impairment

Table 4 shows the frequency of functional impairment in the domains and total scale of the WFIRS-S in adolescents. 29.5% of adolescents had impairment in the total scale of the WFIRS-S. Among the WFIRS-S domains, impairment in life skills, school, and family had the highest frequency, respectively (30.3% for life skills, 24.9% for school, and 17.6% for family).

Descriptive statistics of the WFIRS-S scores

Table 5 depicts means, 95% confidence intervals for means, and standard deviations of each domain and total scale of the WFIRS-S by adolescent's sex and age. In males, the highest rated impairment was found in the school domain at age 17 years and the lowest rated impairment was in the work domain for age 15 years. In females, the highest rated impairment was found in self-concept at age 17 years and the lowest rated impairments was work in age 12 years and in risky activities in age 14 years.

Sex and age differences on the WFIRS-S scores

Two-way ANOVAs on the WFIRS-S domains and total scale indicated a significant main effect of sex on work ($F(1,374) = 5.63, p = 0.02$), school ($F(1,374) = 8.89, p = 0.003$), self-concept ($F(1,374) = 4.32, p = 0.04$), social activities ($F(1,374) = 4.52, p = 0.03$), and risky activities ($F(1,374) = 11.49, p = 0.001$) with small effect sizes (partial $\eta^2 = 0.01-0.03$) (Table 6). Male adolescents had significantly higher means (greater impairment) than females in the work, school, social activities, and risky activities domains (Table 6). Female adolescents had significantly higher means (greater impairment) than males in the self-concept domain (Table 6). While the association between sex and some WFIRS-S domains was significant, the proportion of total variability accounted for by variation in sex was very small (partial $\eta^2 = 0.007$) (Table 6).

Significant main effect of age was found on the total scale of the WFIRS-S ($F(5,374) = 10.05, p = 0.001$) with large effect size (partial $\eta^2 = 0.12$). In other words, 12% of the total variability in functional impairment was attributable to age. Age had a significant main effect on all domains of the WFIRS-S with moderate to large effect sizes (partial $\eta^2 = 0.05-0.14$) (Table 7). Fourteen percent of the variability in functional impairment in school was attributable to age. Pairwise comparisons showed a significant difference

Table 3. WFIRS-P scores by sex and years of age in a school-based sample of 270 children

Domain	Male (n = 130)											
	Child's age (years)											
	7 (n = 34)		8 (n = 14)		9 (n = 21)		10 (n = 32)		11 (n = 29)		Mean (95% CI)	SD
Family	.39 (.25-.54)	0.42	.26 (.13-.38)	0.21	.32 (.17-.48)	0.33	.25 (.13-.37)	0.34	.26 (.08-.43)	0.45		
School	.19 (.11-.27)	0.23	.28 (-.009-.57)	0.50	.18 (.09-.26)	0.19	.24 (.14-.34)	0.27	.25 (.15-.35)	0.26		
Life skills	.62 (.47-.77)	0.42	.59 (.40-.79)	0.34	.60 (.43-.77)	0.37	.53 (.41-.64)	0.32	.47 (.34-.60)	0.34		
Self-concept	.27 (.12-.43)	0.45	.19 (-.12-.50)	0.53	.14 (.02-.27)	0.27	.22 (.07-.36)	0.40	.23 (.10-.36)	0.33		
Social activities	.28 (.15-.41)	0.38	.15 (.04-.27)	0.2	.12 (.03-.22)	0.21	.23 (.10-.36)	0.37	.13 (.05-.20)	0.20		
Risky activities	.09 (.05-.14)	0.12	.05 (-.03-.13)	0.13	.09 (.03-.14)	0.12	.07 (.03-.12)	0.12	.04 (-.002-.09)	0.12		
Total	.32 (.23-.40)	0.25	.27 (.14-.40)	0.22	.26 (.17-.36)	0.20	.26 (.19-.33)	0.20	.23 (.15-.32)	0.23		
Female (n = 140)												
Child's age (years)												
Domain	6 (n = 14)		8 (n = 46)		9 (n = 26)		10 (n = 26)		11 (n = 28)		Mean (95% CI)	SD
	Mean (95% CI)	SD	Mean (95% CI)	SD	Mean (95% CI)	SD	Mean (95% CI)	SD	Mean (95% CI)	SD		
	Mean (95% CI)	SD	Mean (95% CI)	SD	Mean (95% CI)	SD	Mean (95% CI)	SD	Mean (95% CI)	SD		
Family	.21 (.08-.34)	0.22	.28 (.19-.36)	0.29	.32 (.20-.44)	0.29	.17 (.09-.25)	0.2	.24 (.14-.34)	0.26		
School	.19 (.09-.28)	0.16	.16 (.10-.22)	0.20	.30 (.17-.43)	0.32	.16 (.09-.23)	0.18	.30 (.18-.41)	0.29		
Life skills	.44 (.31-.57)	0.22	.51 (.40-.61)	0.36	.53 (.39-.66)	0.33	.37 (.30-.44)	0.18	.51 (.35-.68)	0.43		
Self-concept	.14 (-.07-.35)	0.36	.15 (.06-.24)	0.3	.36 (.15-.56)	0.51	.26 (.02-.50)	0.59	.43 (.16-.70)	0.70		
Social activities	.15 (.05-.26)	0.18	.15 (.07-.23)	0.27	.23 (.13-.33)	0.24	.04 (.01-.08)	0.08	.21 (.12-.30)	0.24		
Risky activities	.08 (-.02-.17)	0.16	.08 (.05-.12)	0.12	.07 (.02-.11)	0.11	.02 (-.007-.04)	0.05	.05 (.01-.08)	0.09		
Total	.21 (.13-.29)	0.14	.24 (.18-.29)	0.18	.30 (.21-.38)	0.20	.16 (.13-.20)	0.1	.28 (.19-.36)	0.21		

WFIRS-P = Weiss Functional Impairment Rating Scale-Parent Report

CI = confidence interval

SD = standard deviation

between the youngest adolescents and the oldest (i.e., age 12 and age 17) in most domains and total scale of the WFIRS-S and significant differences between age 12 and some older ages in several domains and total score of the WFIRS-S (Table 7). There were no significant interaction effects of sex and age on domains and total scale of the WFIRS-S.

WFIRS-S domains correlations

The family domain showed high and significant correlation with the life skills, self-concept, and social activities domains ($r = .58$ to $.59$, $p < .01$). The work domain indicated high and significant correlation with the school and social activities domains ($r = .59$ and $.52$, respectively, $p < .01$). The school domain showed high and significant correlation with the life skills and social activities ($r = .53$ and $.57$, respectively, $p < .01$). The life skills indicated high and significant correlation with the self-concept and social activities ($r = .55$ and $.61$, respectively, $p < .01$). High and significant correlation was found between self-concept and social activities ($r = .53$, $p < .01$) and between social activities and risky activities ($r = .52$, $p < .01$).

Discussion

Our findings indicate high levels of perceived functional impairment in a non-clinical sample of children in Iran, especially in the life skills, school, and family domains, both by parent report in latency and by self-report in adolescents. Our finding that 11.9% of children and 29.5% of adolescents had impairment in at least two functional domains of life indicates that even in a community sample, functional impairment is significant. While a direct comparison between the data on children and adolescents is not possible given the differences in informant, it is notable that adolescents had significantly more impairment.

This study found that more than a quarter (29.5%) of adolescents experienced significant functional impairment and almost a third described themselves as having impairment in life skills (30.3%). It is of interest that older adolescents report almost twice the level of impairment of younger adolescents. As adolescents approach adulthood, they face increased academic pressure, the need for more independence in life skills, and the challenge of separating and individuating from parents. These findings are also consistent with a study of a community sample of Vietnamese children and adolescents, where rates of impairment were 20% for the overall functioning, 12% for interpersonal relationships, 7% for the school/academic functioning, and 5% for the self-care functioning (Dang, Weiss, & Trung, 2015). These findings suggest the need for greater supports for adolescents, especially in the school setting, in teaching life skills,

Table 4 Frequency and percentage of functional impairment in adolescents (n = 386)

WFIRS-S	Frequency	Percentage
Family	68	17.6
Work	36	9.3
School	96	24.9
Life skills	117	30.3
Self-concept	55	14.2
Social activities	57	14.8
Risky activities	50	13
total	114	29.5
WFIRS-S = Weiss Functional Impairment Rating Scale-Self-Report		

and in supporting self-esteem in adolescent girls. These types of community-based interventions could be delivered both in school settings, family clinics, and in general parenting courses.

The finding of relatively low rates of impairment in the work domain may be interpreted as a floor effect in the relatively low rates of employment or employment demands in the adolescent population. The relatively low rates of impairment in risky activities are consistent with the psychometric properties of this domain, meant to capture rare but salient events, in which mean scores in both clinical and normative samples are much lower (Weiss et al., 2018).

We note that the findings in our study contrast with those of Barkley's population study of adolescents using the BFIS-CA (2012) in which no relationship was found between age and functional impairment in the age group 12-17 years. There are several methodological explanations which can explain this difference. We used a self-report rather than a parent measure. The WFIRS instruction is to assess impairment secondary to emotional and behavioral issues over the short term (a state), rather than absolute normative levels of impairment over the past six months (a trait). Another limitation of parent report is a potential lack of sensitivity to how internal states of mind that may drive some aspects of impairment such as self-concept, or lack of awareness of misbehavior at school or risky activities that go unreported. Further research would be needed using both parent report across all ages and parent and self-report in adolescence to determine if the sex and age effects we found are related to the developmental differences between childhood and adolescence or to informant.

Functional impairment is not fully associated with symptoms (Gili et al., 2013, McGrath et al., 2013) and can be present in children and adolescents without a diagnosed psychiatric disorder (Sanford, Offord, Boyle, Peace, & Racine, 1992) and associated with other psychosocial factors (McLaughlin et al., 2009).

Our findings suggested that male adolescents rated themselves as more impaired in work, school, social activities, and risky activities domains relative to female adolescents. On the other hand, female adolescents rated themselves as more impaired in self-concept. This replicates previous findings. Barkley's (2012) study showed males were significantly more impaired than females on social, academic, and self-care, and life activities domains. In Sanford et al.'s (1992) study, male adolescents reported more school impairment than females and females reported more social impairment than males. These findings are consistent with the research showing a bias towards externalizing difficulties in males (Keiley et al., 2000; Stanger, Achenbach, & Verhulst, 1997) and internalizing difficulties in females (Angold, Costello, & Worthman, 1998). The literature is consistent in showing that females struggle more with self-concept and self-esteem than males (Bleidorn et al., 2016; Bachman, O'Malley, Freedman-Doan, Trzesniewski, & Donnellan, 2011).

High correlations were found between several domains of the WFIRS-S. Similar associations observed for the WFIRS-S domains and sex and age might be explained by high correlations between the functional impairment domains.

It is of interest that these sex findings were not evident in childhood. This raises the question of when and why sex and age differences become evident during the adolescent period. Our findings also illustrate that in measurement of functional outcome, total scores may mask the most clinically relevant outcomes which is found at the domain or item level. This argues for further research looking at more refined and domain-specific impairments as a target of investigation. Replication of these results will be needed looking at adult populations and in different cultural settings.

The prevalence of psychiatric disorders in Iranian children and adolescents (Mohammadi et al., 2019) aged 6-18 years has been estimated at 22.31%, but there are no previous studies reporting of functional impairment in children and adolescents. This is the first study to report the frequency of functional impairment and its relationship with sex and age in Iran. We need to know much more about youth who are impaired but subsyndromal, or impaired by virtue of issues other than mental illness to address critical issues such as

social determinants of health, trauma and increasing rates of suicide in youth.

We note that the prevalence of psychiatric disorders in Iran is 22.31% (Mohammadi et al., 2019) which is quite close to the prevalence of impairment as we defined it. It should be noted that many if not most psychiatric disorders require functional impairment as a criterion for making the diagnosis.

Limitations

This study is subject to several limitations. The findings are limited to a relatively small sample, and a specific cultural setting. We used a parent report of function in children and a self-report in adolescents, which precludes direct comparison between the two groups. Self-report of function may be limited by a lack of insight and parent report by limitations in proxy perceptions of domains such as self-concept. Future studies are needed to look at the differences and similarities between adolescent and parent report across domains and populations. Our findings are also limited by missing data in about one-third of participants in sample 1. There were no sex and age differences between the students who returned the questionnaires and those who did not, however, it is possible that there were other differences we are unaware of. As a cross-sectional study, it is impossible to determine the time course of functional impairment, which would require a prospective follow up study. The samples of this study were population samples in which individuals with psychiatric disorders were not excluded, and so our results do not distinguish those with and without psychiatric illness. Although the WFIRS was developed with the distinct purpose of avoiding the overlap of symptoms and function and has less overlap with DSM symptoms than other measures of function (Weiss et al., 2018), some overlap conceptually is inevitable in that DSM-5 diagnoses include items that have a functional component. In this study, we only evaluated the relationship between sex and age and functional impairment. Future studies are required to assess the effects of other demographic factors on functional impairment. In this study, the sensitivity and specificity of the criteria used to define the impairment in the WFIRS domains and total scale were not examined. Future studies are needed to examine these properties. The design of our study on children ages 6-11 years had two empty cells (no 6-year-old boys; no 7-year-old girls) that might influence the ANOVA results. The ANOVA findings should be interpreted with caution in the 6-11 years age group.

Table 5. WFIRS-S Scores by Years of Age in a school-based Sample of 386 adolescents

		Male (n = 191)											
		Adolescent's age (years)											
		12 (n = 40)		13 (n = 33)		14 (n = 26)		15 (n = 25)		16 (n = 43)		17 (n = 34)	
Domain		Mean (95% CI)	SD	Mean (95% CI)	SD	Mean (95% CI)	SD	Mean (95% CI)	SD	Mean (95% CI)	SD	Mean (95% CI)	SD
Family		.23 (.17-.30)	0.22	.40 (.27-.53)	0.37	.45 (.26-.64)	0.47	.37 (.22-.51)	0.36	.43 (.33-.52)	0.31	.52 (.28-.76)	0.57
Work		.17 (.13-.21)	0.12	.34 (.22-.45)	0.33	.38 (.22-.54)	0.40	.11 (.07-.15)	0.10	.38 (.25-.51)	0.42	.39 (.21-.57)	0.43
School		.23 (.14-.32)	0.27	.44 (.26-.63)	0.52	.45 (.28-.61)	0.41	.27 (.1-44)	0.41	.70 (.52-.88)	0.58	.85 (.56-1.14)	0.68
Life skills		.33 (.23-.42)	0.30	.45 (.30-.60)	0.41	.48 (.30-.65)	0.43	.23 (.09-.36)	0.33	.55 (.38-.72)	0.54	.62 (.39-.85)	0.55
Self-concept		.15 (.05-.24)	0.29	.40 (.15-.65)	0.70	.52 (.20-.84)	0.79	.22 (.07-.37)	0.36	.55 (.34-.75)	0.67	.51 (.25-.77)	0.62
Social activities		.17 (.11-.24)	0.20	.40 (.21-.58)	0.52	.38 (.20-.55)	0.43	.22 (.07-.36)	0.35	.53 (.4-.66)	0.43	.48 (.21-.75)	0.65
Risky activities		.17 (.11-.22)	0.17	.23 (.1-.36)	0.38	.17 (.1-.24)	0.17	.19 (.09-.3)	0.25	.42 (.26-.59)	0.55	.38 (.13-.63)	0.59
total		.21 (.17-.26)	0.14	.37 (.25-.50)	0.36	.39 (.27-.51)	0.30	.22 (.14-.3)	0.19	.50 (.40-.61)	0.34	.53 (.34-.73)	0.46
		Female (n = 195)											
		Adolescent's age (years)											
		12 (n = 35)		13 (n = 32)		14 (n = 28)		15 (n = 35)		16 (n = 34)		17 (n = 31)	
Domain		Mean (95% CI)	SD	Mean (95% CI)	SD	Mean (95% CI)	SD	Mean (95% CI)	SD	Mean (95% CI)	SD	Mean (95% CI)	SD
Family		.18 (.1-26)	0.23	.37 (.25-.49)	0.34	.39 (.25-.52)	0.35	.48 (.35-.6)	0.37	.53 (.41-.66)	0.35	.52 (.38-.65)	0.37
Work		.09 (.03-.14)	0.16	.23 (.15-.31)	0.22	.26 (.19-.33)	0.18	.3 (.22-.39)	0.24	.25 (.18-.33)	0.21	.23 (.18-.28)	0.13
School		.17 (.08-.25)	0.25	.40 (.27-.52)	0.35	.28 (.16-.39)	0.30	.35 (.24-.46)	0.32	.47 (.35-.58)	0.33	.51 (.38-.64)	0.36
Life skills		.29 (.16-.42)	0.37	.57 (.36-.79)	0.60	.33 (.18-.48)	0.38	.47 (.35-.59)	0.35	.51 (.38-.63)	0.35	.64 (.47-.81)	0.46
Self-concept		.21 (.11-.31)	0.29	.66 (.37-.94)	0.80	.38 (.16-.59)	0.55	.62 (.33-.92)	0.86	.59 (.34-.84)	0.73	.74 (.41-1.07)	0.90
Social activities		.11 (.05-.17)	0.18	.34 (.2-49)	0.40	.17 (.06-.28)	0.29	.29 (.2-39)	0.28	.39 (.27-.51)	0.34	.37 (.22-.52)	0.42
Risky activities		.10 (.04-.15)	0.16	.24 (.12-.35)	0.33	.09 (.04-.13)	0.11	.13 (.05-.22)	0.24	.19 (.12-.27)	0.22	.15 (.08-.22)	0.20
total		.16 (.11-.21)	0.15	.38 (.26-.5)	0.33	.25 (.17-.34)	0.22	.35 (.26-.44)	0.27	.39 (.31-.48)	0.24	.42 (.32-.51)	0.26
WFIRS-S = Weiss Functional Impairment Rating Scale-Self-Report													
SD = standard deviation													
CI = Confidence interval													

Table 6. Sex differences in the WFIRS-S domains and total scale in adolescents (n = 386)

	Male (n = 191)		Female (n = 195)		F (1, 374)	p-value	Partial eta-squared
	Mean (95% CI)	SD	Mean (95% CI)	SD			
Family	0.39 (0.33-0.44)	0.38	0.41 (0.36-.46)	0.36	0.09	0.77	0
Work	0.29 (0.25-0.34)	0.34	0.23 (0.20-0.26)	0.2	5.63*	0.02	0.02
School	0.49 (0.41-0.56)	0.53	0.36 (0.31-0.41)	0.34	8.89**	0.003	0.02
Life skills	0.44 (0.38-0.51)	0.45	0.47 (0.40-0.53)	0.44	0.31	0.58	0.001
Self-concept	0.39 (0.30-0.47)	0.61	0.53 (0.43-0.64)	0.73	4.32*	0.04	0.01
Social activities	0.36 (0.30-0.43)	0.45	0.28 (0.23-0.33)	0.34	4.52*	0.03	0.01
Risky activities	0.27 (0.21-0.32)	0.4	0.15 (0.12-0.18)	0.22	11.49**	0.001	0.03
Total	0.37 (0.32-0.42)	0.33	0.33 (0.29-0.36)	0.26	2.5	0.12	0.007

WFIRS-S = Weiss Functional Impairment Rating Scale-Self-Report
SD = standard deviation
CI = confidence interval
*p < .05
**p < .01

Conclusion

In summary, this cross-sectional study reported the frequency of functional impairment in youth and the relationship between impairment, and domains of impairment with sex and age in a community population. This study has identified a high frequency of functional impairment in a community sample, distinct differences in impairment in different domains, and a marked increase in impairment as adolescents move towards early adulthood. This pattern of functional impairment in a non-clinical sample, is useful as a reference to understand the ways in which functional impairment in clinical populations is driven by particular disorders and supersedes the challenges faced by all adolescents. Our findings are consistent with other results that boys have more difficulty than girls in externalizing domains (Keiley et al., 2000; Stanger, Achenbach, & Verhulst, 1997), that girls have more difficulty with self-esteem (Bleidorn et al., 2016; Bachman et al., 2011), and that adolescence is a developmental period in which youth face significant challenge, which increase as they enter the transition years into adulthood (Lerner & Galambos, 1998; Zarrett & Eccles, 2006).

A better understanding of the details of how sex and age are impacting specific domains of functional impairment would allow us to start to target some of the social and cultural factors that may underlie these difficulties. From a clinical point of view, these data can allow us to identify how findings obtained in clinical settings compare to a non-clinical baseline.

Conflicts of Interest

The authors declare that they have no competing interests.

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Table 7. Age differences in the WFIRS-S domains and total scale in adolescents (n = 386)

	12 (n = 75)		13 (n = 65)		14 (n = 54)		15 (n = 60)		16 (n = 77)		17 (n = 55)		F (5, 374)	p	η^2	PC
	Mean (95% CI)	SD														
Family	0.21 (0.16-0.26)	0.22	0.39 (0.30-0.47)	0.35	0.42 (0.31-0.53)	0.41	0.43 (0.33-0.52)	0.37	0.47 (0.40-0.55)	0.33	0.52 (0.39-0.64)	0.46	6.35**	0.001	0.09	12 < 15*, 16**, 17**
Work	0.13 (0.10-0.17)	0.15	0.29 (0.21-0.36)	0.29	0.32 (0.24-0.40)	0.31	0.22 (0.17-0.28)	0.22	0.32 (0.25-0.40)	0.35	0.30 (0.22-0.38)	0.31	5.70**	0.001	0.07	12 < 13*, 14**, 16**, 17*
School	0.20 (0.14-0.26)	0.26	0.42 (0.31-0.53)	0.44	0.36 (0.26-0.46)	0.36	0.32 (0.23-0.41)	0.36	0.60 (0.49-0.71)	0.50	0.66 (0.51-0.81)	0.54	12.06**	0.001	0.14	12 < 16**, 14 < 17*, 15 < 16**, 17**
Life skills	0.31 (0.24-0.39)	0.33	0.51 (0.38-0.64)	0.52	0.40 (0.29-0.51)	0.41	0.37 (0.28-0.46)	0.36	0.53 (0.43-0.63)	0.46	0.63 (0.50-0.76)	0.50	4.91**	0.001	0.06	12 < 17*
Self-concept	0.17 (0.11-0.24)	0.29	0.53 (0.34-0.71)	0.76	0.45 (0.26-0.63)	0.67	0.45 (0.27-0.64)	0.72	0.57 (0.41-0.72)	0.69	0.64 (0.43-0.85)	0.79	4.03**	0.001	0.05	12 < 16*, 17**
Social activities	0.14 (0.10-0.19)	0.19	0.37 (0.26-0.49)	0.46	0.27 (0.17-0.37)	0.37	0.26 (0.18-0.34)	0.31	0.47 (0.38-0.56)	0.4	0.42 (0.28-0.56)	0.53	6.78**	0.001	0.08	12 < 13*, 16**, 17**
Risky activities	0.13 (0.09-0.17)	0.17	0.23 (0.15-0.32)	0.35	0.13 (0.08-0.17)	0.15	0.16 (0.10-0.22)	0.25	0.32 (0.22-0.42)	0.45	0.25 (0.13-0.37)	0.43	3.76**	0.002	0.05	12 < 17*
Total	0.19 (0.15-0.22)	0.15	0.38 (0.29-0.46)	0.34	0.32 (0.25-0.39)	0.27	0.30 (0.23-0.36)	0.24	0.46 (0.39-0.52)	0.30	0.47 (0.37-0.57)	0.36	10.05**	0.001	0.12	12 < 13**, 16**, 17**

WFIRS-S = Weiss Functional Impairment Rating Scale-Self-Report
SD = standard deviation
CI = confidence interval
PC = Pairwise comparisons
*p < .05
**p < .01
 η^2 = Partial eta squared

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