

UCLA

UCLA Previously Published Works

Title

ADHD Comorbid With Major Depression on Parents and Teachers Perceptions

Permalink

<https://escholarship.org/uc/item/0g91d81d>

Journal

Journal of Attention Disorders, 25(4)

ISSN

1087-0547

Authors

Coutinho, Daniele

Farias, Antonio Carlos

Felden, Erico Pereira Gomes

et al.

Publication Date

2021-02-01

DOI

10.1177/1087054718815574

Peer reviewed

ADHD Comorbid With Major Depression on Parents and Teachers Perceptions

Journal of Attention Disorders
1-11
© The Author(s) 2018
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/1087054718815574
journals.sagepub.com/home/jad


Daniele Coutinho^{1,2}, Antonio Carlos Farias^{2,3},
Erico Pereira Gomes Felden⁴, and Mara L Cordeiro^{1,2,5} 

Abstract

Objective: Examine the Strengths and Difficulties Questionnaire (SDQ) responses of parents and teachers for children with ADHD comorbid with major depressive disorder (MDD), with an emphasis on determining how well the respondent groups' responses correlate, and how well the results obtained perform as predictors of clinical diagnosis. **Method:** The SDQ was completed by parents and teachers of ($n = 215$ participants, 7-12 years old) in ADHD, MDD, ADHD + MDD, and healthy control groups. Agreement between parent and teacher SDQs and their concordance with *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; DSM-IV) diagnoses were assessed. Receiver operating characteristic (ROC) and Kappa concordance analyses were used to compare the groups with the health control group. **Results:** The comorbid group presented greater impairments than the ADHD, MDD, and control groups ($p < .001$). **Conclusion:** The presence of psychiatric comorbidity causes greater impairment for school children with ADHD. The SDQ has good sensitivity for detecting these children and correlates well with DSM diagnosis. (*J. of Att. Dis.* XXXX; XX(X) XX-XX)

Keywords

Strengths and Difficulties Questionnaire, ADHD, depressive disorders, diagnosis

Introduction

ADHD is a neurobiological condition characterized by a persistent pattern of behavior in which inattention, hyperactivity, and impulsivity interfere with an individual's functioning and development (American Psychiatric Association [APA], 2013). ADHD is frequently comorbid with other psychiatric disorders (Biederman, Newcorn, & Sprich, 1991). Indeed, studies conducted with school children referred for outpatient evaluation have shown that approximately 60% of children diagnosed with ADHD had psychiatric comorbidities (Harvey & Lugo-Candelas, 2016; Noordermeer, 2016; Rizzutti, Schuch, Augusto, Coimbra, & Reebye, 2015; Wilens et al., 2002), including conduct disorder (CD), oppositional defiant disorder (ODD), and learning disorders (Jacob, Srinath, Girimaji, Seshadri, & Vagar, 2016; Kim et al., 2017; Souza, Serra, Mattos, & Franco, 2001; Stringaris & Goodman, 2009). More specifically, Wilens and colleagues (2002) found that 60% of children with ADHD met the diagnostic criteria for ODD, while 47% met the criteria for major depressive disorder (MDD), 28% to 33% met the criteria for an anxiety disorder, and 15% met the criteria for CD.

MDD is a chronic, sometimes remitting and relapsing, psychiatric condition that can cause substantial problems in

the lives of affected adolescents, including substance abuse and suicidality, in addition to impairing their performance in school and disrupting their interpersonal and familial relationships (Dodig-Curkovic, Curkovic, Radic, Degmecic, & Filekovic, 2010). It is characterized by low self-esteem and feelings of worthlessness together with sadness, loss of interest, changes in appetite, and sleep disturbances, and thus can disrupt all spheres of the affected individual's life. Adolescents with comorbid ADHD and MDD are at a high risk of low self-esteem and academic underperformance (Nardi, Quevedo, & Silva, 2015). The dual-disorder condition is particularly difficult to diagnose and challenging to treat in children, which can compromise prognosis (Bradley et al., 2016). Emotional disorders, such as MDD, may be missed in children and adolescents with ADHD due to parents' and teachers' complaints

¹Faculdades Pequeno Príncipe, Curitiba, Brazil

²Pelé Pequeno Príncipe Research Institute, Curitiba, Brazil

³Universidade Positivo, Curitiba, Brazil

⁴Santa Catarina State University, Florianópolis, Brazil

⁵University of California, Los Angeles, USA

Corresponding Author:

Mara L Cordeiro, Neurosciences Core, Pelé Pequeno Príncipe Research Institute, Av. Silva Jardim 1632, Curitiba, PR 80250-120, Brazil.
Email: drmcordeiro@hotmail.com

being focused on ADHD-associated behavioral difficulties (Tandon, Cardeli, & Luby, 2009). To further complicate matters, MDD has been reported to occur in juveniles with ADHD at 5.5 times the rate seen in juveniles without ADHD (Angold, Costello, & Erkanli, 1999).

It has been reported that up to 45% of patients with a psychiatric diagnosis have a psychiatric/neurobehavioral comorbidity and that the symptoms are often overlapping signs shared by different psychiatric disorders (Van et al., 2013). Notwithstanding, psychiatric disorder diagnosis has been largely focused on the delineation of categorically distinct clinical symptoms (APA, 2013), with relatively little clarification of comorbidity identification. Recent neuroimaging, molecular, and genetic studies have suggested that many psychiatric disorders present with shared underlying neurobiological abnormalities (Goodkind et al., 2015). For example, single nucleotide polymorphisms in *DGKH*, the gene that encodes phosphatidyl inositol pathway enzyme diacylglycerol kinase ϵ , were found to be associated with both adult ADHD and bipolar disorder (Weber et al., 2011). Likewise, single nucleotide polymorphisms in *TACR1*, the gene that encodes tachykinin receptor 1, which had previously been associated with bipolar disorder, were found to associate with ADHD and alcohol dependence syndrome as well (Sharp et al., 2014). These shared genetic associations are suggestive of potentially shared molecular pathophysiological mechanisms among these often comorbid disorders.

Neuroimaging and molecular genetics studies can provide interesting and important information, but they are expensive, time consuming, and particularly difficult to perform in children. Furthermore, there are not yet any specific genetic, laboratory, or neuroimaging biomarkers that indicate a clinical diagnosis of ADHD or its common comorbidities. Diagnosis of ADHD is based on interviews with parents, psychometric behavioral rating scales, and comprehensive data analysis to identify symptom-related impairments and developmentally inappropriate behaviors (Austerman, 2015).

The Strengths and Difficulties Questionnaire (SDQ) is a brief, no-cost psychiatric and behavioral disorder screening tool that has been widely used to assess the impact of neuropsychiatric disorder symptoms on patients' lives (Goodman, 1997, 1999). Generally, it is considered to be a reliable and easy-to-access method that can be used without formal training to screen young children, adolescents, and adults for behavioral and emotional symptoms (Bolsoni & Zuairi, 2014; Fleitlich, Cortazar, & Goodman, 2000; Lapresa, Arizaleta, & Rajmil, 2014). The SDQ has been demonstrated to have good validity and reliability in 21 countries, including Brazil, indicating that it has cross-cultural applicability (Carballo, Rodríguez-Blanco, García-Nieto, & Baca-García, 2014; Saur & Loureiro, 2012; Takayanagi, Yoshida, Yasuda, & Adachi, 2016). Goodman (2001) found that the SDQ has acceptable internal consistency (overall Cronbach's alpha,

0.73), with good internal consistency for the Total Difficulties and Impact Score scale (Cronbach's alpha > 0.80).

In a recent Australian study in which the SDQ was used to detect comorbidities in children with ADHD, Bekker, Bruck, and Sciberras (2016) found ADHD associations with externalizing comorbidities, such as CD and ODD, but stressed the need for further research to identify internalizing comorbidities, such as MDD and anxiety disorders. Although the parent- and teacher-completed SDQs have been used in studies of children with ADHD (Øvergaard et al., 2018), to the best of our knowledge, there are not any studies in the literature in which the SDQ was used to investigate the consequences of ADHD comorbidity with internalizing disorders on behavior and performance, as perceived by parents and teachers, in a Brazilian study population.

Our main objective here was to use the SDQ to evaluate the effects of ADHD comorbid with MDD on children's lives from the perspective of parents and teachers. We tested the hypothesis that the SDQ can detect inattention/hyperactivity/impulsivity and depressive mood symptoms in 7- to 12-year-old youths. Second, we tested the hypothesis that the SDQ could differentiate among impairments and symptoms in youth with a confirmed diagnosis of ADHD, MDD, or comorbid ADHD with MDD, relative to a control group without psychopathologies. In addition, we examined the hypothesis that children with ADHD comorbid with MDD present more difficulties in the contexts that are inserted. To investigate this hypothesis, a retrospective documentary analysis of the SDQ was carried out to identify children and adolescents with the diagnoses mentioned earlier.

Materials and Method

Participants

The present study encompasses a subset of data obtained from a sample of children enrolled in public schools through a partnership with Mayo's Office, Secretary of Education who were referred by their teachers to our Research Institute for multidisciplinary evaluation because they were presenting behavioral, learning, and/or attentional problems. Previously established diagnostic methods were employed (Cordeiro et al., 2011; Farias et al., 2010). Briefly, participants were evaluated by a multidisciplinary team composed of a neurologist, a psychologist, a psycho-pedagogue, and a social worker, with a final diagnosis being determined based on *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*; APA, 2000) criteria. Intellectual capacity was assessed with the Wechsler Intelligence Scale for Children, third edition (Wechsler, 1991). Fundamental academic abilities (reading, writing, and arithmetic) were assessed with the *Teste de Desempenho Escolar* (Stein, 1994). For the current analyses, a total of 215 students, 7 to

12 years old of both sexes, were included. The inclusion criteria were a *DSM-IV*-based diagnosis of ADHD and/or MDD or no psychopathologies (for control subjects), completed SDQs from a parent and teacher, and intellectual quotient (IQ) > 70 on the Wechsler Intelligence Scale for Children third edition (Wechsler, 1991). The exclusion criteria were systemic disease, epilepsy, and any intellectual deficit. The research protocol was approved by the Ethics Committee of our Institution. All parents and/or legal guardians provided signed informed consent forms for the participating children.

Measures

SDQ

The SDQ is a brief psychometric questionnaire designed to track behavioral and emotional problems in children 4 to 16 years of age. It was translated from its original English language version (Goodman, 1997) into Portuguese and validated in Brazil (Fleitlich et al., 2000). All SDQ versions are consistent for study populations within the 4-to-17-year-old age range (Doi, Ishihara, & Uchiyama, 2014; Goodman & Goodman, 2012; Goodman, Meltzer, & Bailey, 1998; Lehmann, Havik, Havik, & Heiervang, 2013; Tzavidis, 2016). The SDQ has often been used to screen for internalizing and externalizing problems in young children and adolescents (Croft, Stride, Maughan, & Rowe, 2015; Lapresa et al., 2014). Although designed to track psychopathological symptoms, it is also useful for evaluating treatment efficacy (Goodman & Goodman, 2012; Roberts et al., 2015).

For each participant, an SDQ was completed by a parent and a teacher. We used the full 25-item version of the SDQ (Goodman, 1999), which includes items that assess chronicity, distress, social impairments, and disorder-associated burden, including impairments related to activities of daily life (Matos et al., 2015). The 25 items are divided into five scales: (a) Emotional Symptoms, (b) Conduct Problems, (c) Hyperactivity/Inattention, (d) Peer Relationship Problems, and (e) Prosocial Behavior. Specifically, 10 items assess abilities and 14 assess difficulties, and there is one neutral item, "I get along better with adults than with children." Scores (range = 0-10) for Scales 1 to 4 were summed together to generate a total difficulties score (range = 0-40). Higher scores indicate a more intense presentation of the scale domain.

Statistical Analyses

Inter-group differences were detected with Student *t*-tests for continuous variables, Mann-Whitney tests, and Kruskal-Wallis tests with Dunn's post hoc tests. We examined whether psychometric scores and emotional symptoms reported by parents correlated with those reported by teachers using Spearman correlation analysis.

Table 1. Summary of Cohort and Group Demographics.

Group	N	Gender, no. males	M IQ (SD)	M age (SD), years
Control	92	65	102.1 (16.44)	8.75 (1.42)
ADHD	53	41	101.8 (13.79)	9.03 (1.87)
MDD	42	28	92.5 (13.62)	9.59 (1.56)
ADHD + MDD	28	25	99.5 (13.91)	8.96 (1.89)
Total	215	159	99.8 (15.35)	9.01 (1.65)

Note. The mean age of the total sample was 9.01 years ($SD = \pm 1.65$) years, there being no statistical differences between the groups regarding age and IQ ($p > .05$, student's *t* test). IQ = intellectual quotient; MDD = major depressive disorder; ADHD + MDD = ADHD comorbid with MDD.

Optimal cut-off scores for SDQ scales were determined with receiver operating characteristic (ROC) analysis (Algorta, Dodd, Stringaris, & Yongstrom, 2016). ROC was also used to calculate the predictive capacity of SDQ dimensions for indicating diagnosis of ADHD, ADHD + MDD, and MDD, compared with the control group without psychopathologies. Participants were classified based on these cut-offs, and these classifications were verified relative to established *DSM-IV* diagnoses with the Kappa Concordance Test (Cohen, 1960). The degree of Kappa agreement was classified as follows: 0 = none, 0-0.19 = low, 0.20-0.39 = fair, 0.40-0.59 = moderate, 0.60-0.79 = substantial, and 0.80-1.00 = near perfect. All data were analyzed in the statistical software Statistical Package for Social Sciences 21.0® (SPSS) with a 5% significance level.

Results

Demographic Characteristics

Whole-cohort and group participant characteristics, including total *N*, gender, age, and IQ, are summarized in Table 1. Notably, the overall sample was 73.8% boys and 26.2% girls. The groups were similar with respect to age and IQ (both $p > .05$, Student's *t* test).

SDQ: Parents and Teachers

The Total Difficulties summed scores from the parent SDQs for the ADHD, MDD, and ADHD + MDD groups differed significantly from those of the control group. The Total Difficulties summed scores from the teacher SDQs for the ADHD and ADHD + MDD groups differed significantly from those of the control group (Figure 1). Interestingly, with respect to Total Difficulties and Impact observations, teacher observations were not discriminative of MDD, although parent observations were, suggesting that teachers may not observe their students' internalizing behaviors. Patient group to control group comparisons for the SDQ

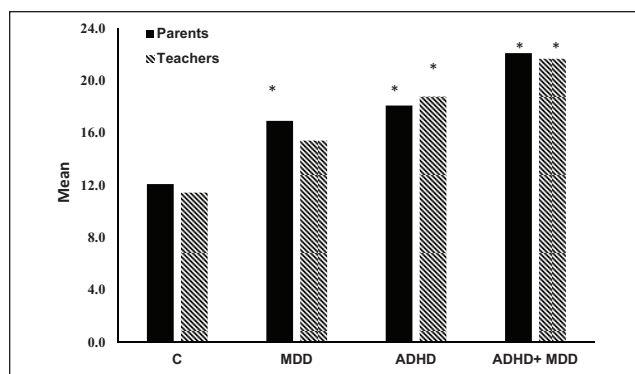


Figure 1. SDQ Total Difficulty scale results obtained from parents and from teachers.

Note. The MDD (parents), ADHD (parents and teachers), and ADHD + MDD (parents and teachers) groups were differentiated from the control group (C) at $*p < .005$, Mann-Whitney and Kruskal-Wallis test. The items in each scale were coded inversely, so that the higher scores indicate greater severity of symptoms. SDQ = Strengths and Difficulties Questionnaire; MDD = major depressive disorder; ADHD + MDD = comorbid ADHD and MDD.

scale scores obtained for parents and for teachers are shown in Figures 2 and 3, respectively. The results of the inter-group statistical comparisons for these scale scores are reported in Table 2. Overall, both parents' and teachers' scores for the Emotional Symptoms and Peer Problems scales were elevated in both the MDD and ADHD + MDD groups, relative to the control group. Meanwhile, both parents' and teachers' scores for the Conduct Problems and Hyperactivity/Inattention domains were elevated in the ADHD and ADHD + MDD groups, relative to scores obtained for the control group. Both parents and teachers distinguished only the ADHD + MDD group from the control group in their Impact Scores. With respect to Prosocial Behavior, the control group received the highest scores from both parents and teachers. Teachers tended to score the ADHD + MDD group lower on the Prosocial Behavior scale than parents, and tended to give lower scores than parents for the Emotional Symptoms scale overall.

The results of our Spearman correlational analysis comparing parent versus teacher responses are reported in Table 3. Total Difficulties and Conduct Problems scale scores had very strong positive correlations between parents and teachers, while Hyperactivity/Inattention and Peer Problems scale scores had moderately strong positive correlations. In order of r value (higher to lower), Impact Score, Emotional Symptoms scale, and Prosocial Behaviors, results did not correlate significantly between the parent and teacher SDQs, although most of the dimensions within the Emotional Symptoms scale correlated weakly.

SDQ Diagnostic Capacity ROC Analysis for MDD

The ROC analysis results (AUCs, p values, 95% confidence intervals [CIs], cutoffs, sensitivities, and specificities) for

the diagnostic capacity of SDQ for both parents and teachers are reported in Table 4. Briefly, the parents' Total Difficulties and Peer Problems SDQ scales were found to be diagnostic predictors, while none of the teachers' SDQ scales emerged as significant predictors.

With respect to diagnostic efficiency, the parent and teacher SDQ scales that demonstrated the best accuracy for ADHD screening were Total Difficulties, Conduct Problems, Hyperactivity/Inattention, and Impact Score (Table 4). The AUCs for MDD screening were generally lower than those for ADHD, especially for teachers (Table 4). Conversely, the AUCs for ADHD + MDD screening tended to be higher than for ADHD or MDD, especially for teachers (Table 4).

Tests Cutoff Points and Clinical Diagnosis Agreement

The Kappa test results for all SDQ dimensions are summarized in Table 5. The scale that showed the highest clinical agreement (based on ROC analysis) with a cutoff established by Goodman (1997) was the Prosocial Behaviors scale, which reached 0.999 for the MDD group for both parents and teachers. The Total Difficulties and Peer Problems scales showed moderate agreement with the previously established cutoffs for both respondents' SDQs and for parents' SDQs, respectively. Most of our ROC-based cutoffs were lower, at least slightly, than the clinical cutoff stands (Table 5).

For ADHD, the Impact Score (Kappa = 0.999) for SDQ-parents presented a clinical point concordant with that established by Goodman (1997). Although the Total Difficulties, Behavior Problems, Peer Problems, and Prosocial Behaviors scales had cutoff points that were different from those proposed by Goodman (1997), they showed moderate Kappa test agreement (Table 5). For teachers, the scales that showed high agreement for ADHD were Hyperactivity/Inattention with a cutoff point of 7 (Kappa = 0.999) and Impact Score with a cutoff point of 2 (Kappa = 0.999). Overall, the Total Difficulties scale showed strong agreement with Goodman's cutoff, while the Conduct Problems and Prosocial Behavior scales demonstrated moderate agreement (Table 5).

For ADHD + MDD, parent SDQ scales with the highest clinical agreement were Emotional Symptoms and Impact Score (Kappa = 0.999). The Total Difficulties and Peer Problems scales were found to have lower clinical thresholds than those proposed by Goodman (1997), but still showed strong agreement in the Kappa test (Table 5).

Discussion

In the present study, we investigated the SDQ's utility for screening symptoms of behavioral and emotional disorders in 7- to 12-year-olds with a *DSM-IV* diagnosis of ADHD, MDD, or ADHD + MDD, while verifying the congruence

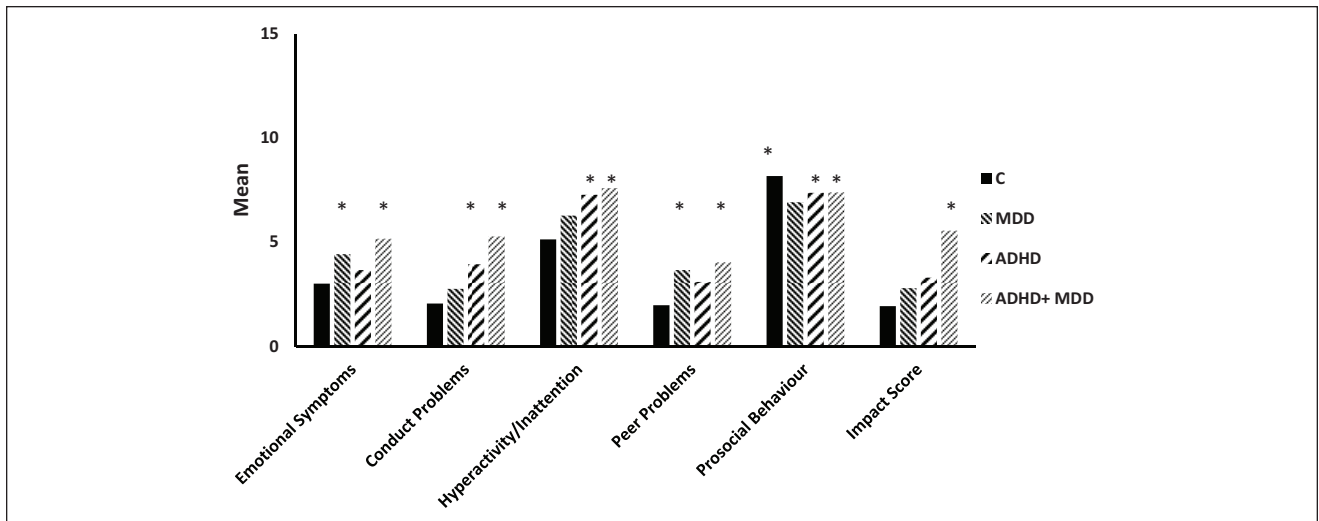


Figure 2. SDQ variables parents.

Note. SDQ = Strengths and Difficulties Questionnaire; C = Control; MDD = major depressive disorder; ADHD + MDD = ADHD comorbid with MDD (differences between groups for both respondents. * $p < .005$, Mann–Whitney test and Kruskal–Wallis test).

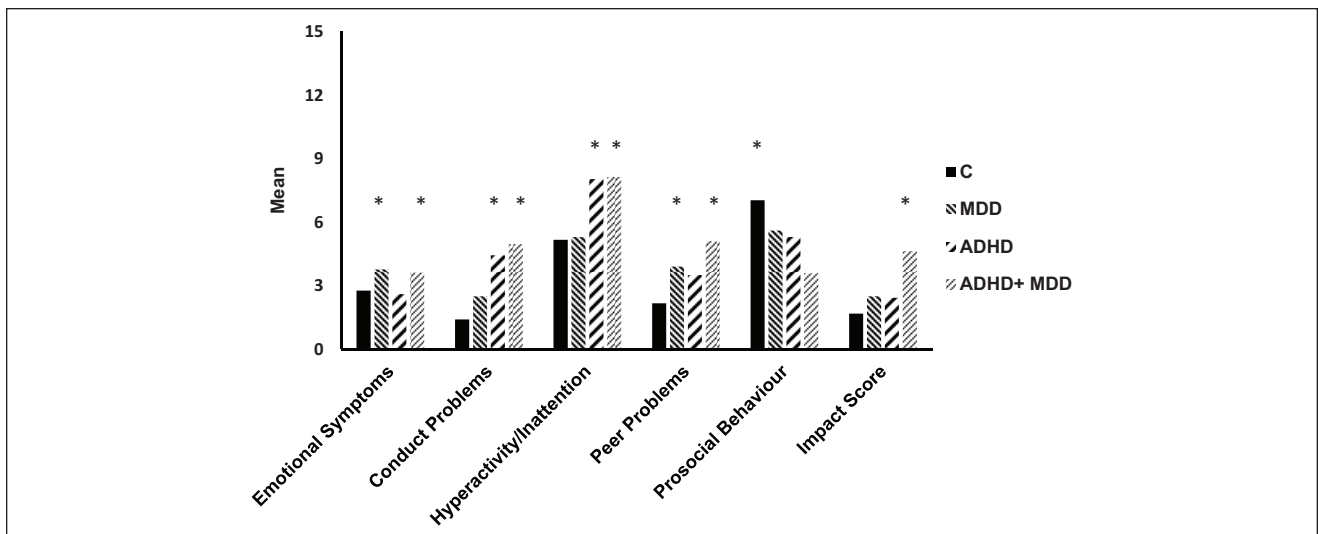


Figure 3. SDQ variables teachers.

Note. SDQ = Strengths and Difficulties Questionnaire; C = Control; MDD = major depressive disorder; ADHD + MDD = ADHD comorbid with MDD (differences between groups for both respondents. * $p < .005$, Mann–Whitney test and Kruskal–Wallis test).

of informants, namely, parents and teachers, as well as the overall effects of the disorders on scores. Our Kappa test results showed particularly good agreement with the algorithms established by Goodman (1997) for the Emotional Symptoms scale and Impact Score (0.999). The Total Difficulties, Peer Problems, and Prosocial Behaviors scales showed variances from the clinical values proposed by Goodman (1997) but retained good agreement with respect to Kappa test results. We obtained very high Impact Score Kappa values in both the ADHD and ADHD + MDD groups for parent and teacher SDQs.

For the ADHD group, scores in the clinical range were found for the Total Difficulties, Conduct Problems, Hyperactivity/Inattention, and Peer Problems scale scores as well as for Impact Score. Parent and teacher SDQs both showed good sensitivity and specificity for children with ADHD, consistent with the results of R. Goodman, Ford, Simmons, Gatward, and Meltzer (2003), which showed good sensitivity (75.4%) for both parent and teacher SDQs with respect to children with ADHD, as well as good sensitivity (63.3%) and specificity (94.6%) for individuals with any psychiatric disorder.

Table 2. Post Hoc Inter-Group Analysis Results.

SDQ-Parents	Compared groups	<i>p</i>
Total Difficulties	Control × MDD	<.001
	Control × ADHD	<.001
	Control × ADHD + MDD	<.001
	MDD × ADHD + MDD	.032
Emotional Symptoms	Control × MDD	.021
	Control × ADHD + MDD	<.001
Conduct Problems	Control × ADHD	<.001
	Control × ADHD + MDD	<.001
	MDD × ADHD + MDD	.003
Hyperactivity/Inattention	Control × ADHD	<.001
	Control × ADHD + MDD	<.001
	MDD × ADHD + MDD	.033
Peer Problems	Control × MDD	.001
	Control × ADHD	<.001
	Control × ADHD + MDD	<.001
Prosocial Behavior	Control × MDD	.037
Impact Score	Control × ADHD	.007
	Control × ADHD + MDD	<.001
	MDD × ADHD + MDD	.042
SDQ-Teachers	Groups	<i>p</i>
Total Difficulties	Control × MDD	.014
	Control × ADHD	<.001
	Control × ADHD + MDD	<.001
	MDD × ADHD + MDD	.003
Emotional Symptoms	—	
Conduct Problems	Control × ADHD	<.001
	Control × ADHD + MDD	<.001
	MDD × ADHD	.002
	MDD × ADHD + MDD	.001
Hyperactivity/Inattention	Control × ADHD	<.001
	Control × ADHD + MDD	<.001
	MDD × ADHD	<.001
	MDD × ADHD + MDD	<.001
Peer Problems	Control × MDD	.003
	Control × ADHD	.005
	Control × ADHD + MDD	<.001
Prosocial Behavior	Control × ADHD	.002
	Control × ADHD + MDD	<.001
	MDD × ADHD + MDD	.030
Impact Score	Control × ADHD + MDD	<.001
	MDD × ADHD + MDD	.002
	ADHD × ADHD + MDD	.021

Note. In the analyzed Mann–Whitney, Kruskal–Wallis, and post hoc Dunn tests, the groups MDD, ADHD, ADHD + MDD showed significantly higher clinical results compared with group Control ($p < .001$). SDQ = Strengths Difficulties Questionnaire; MDD = major depressive disorder; ADHD + MDD = ADHD comorbid with MDD.

Depressed adolescents are at high risk of behavioral and substance abuse changes (Jerrell & McIntyre, 2016). In our study, the SDQ appeared to be effective for identifying children with internalizing symptoms, with the MDD group

Table 3. Correlation Between Parent and Teacher SDQ Responses.

Variables	<i>R</i>	<i>p</i>
Total Difficulties	.453	<.001
Emotional Symptoms	.102	.151
Conduct Problems	.519	<.001
Hyperactivity/Inattention	.304	<.001
Peer Problems	.373	<.001
Prosocial Behavior	.085	.231
Impact Score	.213	.014

Note. The correlation analysis performed by the Spearman test ($p < .001$) between the scales of the parents and teachers SDQ. The scales that presented positive and significant correlations were Total Difficulties and Problems of Conduct ($p < .001$). SDQ = Strengths Difficulties Questionnaire.

presenting general difficulties with emotional and social behavior. Hence, our findings complement the prior work of Bekker et al. (2016), who showed that the SDQ could be used to identify children with ADHD combined with a comorbidity.

It is noteworthy that our ADHD + MDD group presented higher Total Difficulty scores than the other groups in both parent and teacher SDQs. Children with ADHD and MDD tend to be highly anxious, presenting with high frequencies of anxiety disorders and social phobias, as well as often exhibiting withdrawal, submission, irritability, aggression, social challenges, and academic underperformance. In addition, ADHD-MDD comorbidity is associated with low self-esteem, especially in an academic context (Nardi et al., 2015). One longitudinal study of adolescent girls and young women reported that ADHD with MDD carried an increased risk for suicide attempts, compared with either disorder alone, in addition to being associated with negative influences on quality of life, relationships, and learning (Biederman et al., 2008). We obtained significant ROC analysis results for the ADHD + MDD group of children in both respondent cohort SDQs, showing that the SDQs of both parents and teachers had good diagnostic capacity for screening for ADHD and MDD, especially for children with ADHD + MDD (precision AUC = 0.93, and sensitivity = 94.7%), findings somewhat similar to those of Russell, Rodgers, and Ford (2013) with respect to identifying children with ADHD only (0.91 and 90%, respectively).

It is not surprising that the ADHD + MDD comorbid group received higher SDQ ratings than the single-diagnosis groups, especially for Impact Score, with the reverse trend occurring for Prosocial Behaviors. These results support the hypothesis that ADHD comorbid with an internalizing disorder, such as MDD, is associated with higher levels of impairments, psychosocial difficulties, and general stress than children with either disorder alone (Biederman et al., 2008). These enhanced negative effects

Table 4. ROC Analysis of SDQ-Parents and -Teachers for ADHD, MDD, and ADHD + MDD.

Domain	p			AUC			CI [%95]			Cutoff			Sensitivity			Specificity		
	ADHD	MDD	ADHD + MDD	ADHD	MDD	ADHD + MDD	ADHD	MDD	ADHD + MDD	ADHD	MDD	ADHD + MDD	ADHD	MDD	ADHD + MDD	ADHD	MDD	ADHD + MDD
SDQ-Parents																		
Total Difficulties	<.001	<.001	<.001	0.78	0.75	0.88	[0.70, 0.84]	[0.66, 0.81]	[0.80, 0.93]	13	13	16	81.1	73.8	82.1	65.2	65.2	75.0
Emotional Symptoms	.076	.002	<.001	—	0.66	0.74	—	[0.57, 0.73]	[0.65, 0.81]	—	2	5	—	81.0	50.0	—	46.7	77.2
Conduct Problems	<.001	.027	<.001	0.75	0.62	0.82	[0.66, 0.81]	[0.53, 0.70]	[0.74, 0.88]	3	1	3	54.7	73.8	71.4	80.4	43.5	80.4
Hyperactivity/Inattention	<.001	.008	<.001	0.76	0.64	0.81	[0.68, 0.83]	[0.55, 0.72]	[0.72, 0.87]	5	4	6	69.8	88.1	82.1	73.9	42.4	73.9
Peer Problems	<.001	<.001	<.001	0.69	0.71	0.76	[0.60, 0.76]	[0.62, 0.78]	[0.66, 0.82]	2	2	1	60.4	61.9	89.3	71.7	71.7	48.9
Prosocial Behavior	.021	.003	.261	0.61	0.62	—	[0.52, 0.68]	[0.53, 0.70]	—	6	1	—	34.0	73.8	—	87.0	43.5	—
Impact Score	.002	.165	<.001	0.70	—	0.84	[0.60, 0.79]	—	[0.73, 0.91]	2	—	2	67.5	—	85.0	66.7	—	66.7
SDQ-Teachers																		
Total Difficulties	<.001	.001	<.001	0.83	0.68	0.90	[0.75, 0.88]	[0.59, 0.76]	[0.83, 0.95]	15	15	18	66.0	47.2	74.1	83.7	83.7	93.0
Emotional Symptoms	.238	.131	.118	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Conduct Problems	<.001	.076	<.001	0.84	—	0.89	[0.76, 0.89]	—	[0.81, 0.93]	2	—	2	74.0	—	77.8	81.4	—	81.4
Hyperactivity/Inattention	<.001	.968	<.001	0.81	—	0.84	[0.73, 0.87]	—	[0.76, 0.90]	7	—	6	68.0	—	92.6	82.6	—	65.1
Peer Problems	<.001	.001	<.001	0.69	0.68	0.82	[0.60, 0.76]	[0.59, 0.76]	[0.74, 0.88]	1	2	3	82.0	69.4	77.8	48.8	62.8	76.7
Prosocial Behavior	<.001	.009	<.001	0.70	0.64	0.83	[0.61, 0.77]	[0.54, 0.72]	[0.74, 0.89]	6	4	5	68.0	41.7	81.5	66.3	80.2	75.6
Impact Score	.006	.037	<.001	0.66	0.66	0.88	[0.55, 0.75]	[0.54, 0.76]	[0.78, 0.94]	1	1	2	73.0	77.8	94.7	52.5	52.5	75.4

Note. ROC analysis of the diagnostic capacity of SDQ-Parents and -Teachers. ROC = receiver operating characteristic; SDQ = Strengths Difficulties Questionnaire; MDD = major depressive disorder; ADHD + MDD = ADHD comorbid with MDD; AUC = area under the curve; CI = confidence interval.

Table 5. Agreement of ROC Cut-Offs for the SDQ With Previously Established Clinical Classifications for ADHD, MDD, and ADHD + MDD.

Domain	SDQ clinical cut-off	Kappa			P		
		ADHD	MDD	ADHD + MDD	ADHD	MDD	ADHD + MDD
Parents							
Total Difficulties	17	0.538	0.570	0.868	<0.001	<0.001	<0.001
Emotional Symptoms	5	—	0.205	0.999	—	<0.001	<0.001
Conduct Problems	4	0.724	0.154	0.770	<0.001	<0.001	<0.001
Hyperactivity/Inattention	7	0.352	0.202	0.642	<0.001	<0.001	<0.001
Peer Problems	4	0.423	0.531	0.879	<0.001	<0.001	<0.001
Prosocial Behavior	0-4	0.548	0.999	—	<0.001	<0.001	—
Impact Score	2	0.999	—	0.999	<0.001	—	<0.001
Teachers							
Total Difficulties	16	0.865	0.785	0.928	<0.001	<0.001	<0.001
Emotional Symptoms	6	—	—	—	—	—	—
Conduct Problems	4	0.614	—	0.613	<0.001	—	<0.001
Hyperactivity/Inattention	7	0.999	—	0.588	<0.001	—	<0.001
Peer Problems	5	0.188	0.401	0.620	<0.001	<0.001	<0.001
Prosocial Behavior	0-4	0.557	0.999	0.864	<0.001	<0.001	<0.001
Impact Score	2	0.999	0.512	0.999	<0.001	<0.001	<0.001

Note. ROC = receiver operating characteristic; SDQ = Strengths Difficulties Questionnaire; MDD = major depressive disorder; ADHD + MDD = comorbid ADHD and MDD.

may be related to an additional burden caused by an abnormal interaction of neuronal network modules (Goekoop & Goekoop, 2014). Accordingly, the network theory of psychopathology argues that mental disorders can be viewed as a system of interacting (bridging) symptoms (Fried et al., 2017), and that comorbidities may arise when symptoms bridge two or more disorders, possibly thus causing additional network (neuronal) overload and, therefore, leading to the phenotypic revelation of the additional burden. Our data are, at the behavioral level, confluent with this theory.

Clinical Implications

Accurate assessment of children with comorbid ADHD and MDD has implications for pharmacological and behavioral treatments (Daviss, 2008). Frequently, attending physicians target the symptoms that are most troublesome to the patient first. Stimulants are the first line of pharmacotherapy for ADHD (Shier, Reichenbacher, Ghuman, & Ghuman, 2013) but may exacerbate mood disorder symptoms in patients with a psychiatric comorbidity (Dias et al., 2013). Given that MDD carries a risk for suicidality, it is advised to treat internalizing symptoms before treating ADHD symptoms in patients with a dual diagnosis (Turgay & Ansari, 2006). In addition, although stimulants may be helpful in some depressive patients, patients with ADHD comorbid with MDD have been reported to be less responsive to treatment with methylphenidate (Golubchick, Kodesh, & Weizman, 2013).

Our study has demonstrated that the SDQ is useful for detecting ADHD comorbid with depressive symptoms. Such results should alert attending health care professionals to further investigate these symptoms. Given the difficulties that individuals with ADHD comorbid with MDD may endure, early identification of such patients can hasten the commencement of appropriate behavioral and medication therapeutic interventions (Daviss, 2008). However, for diagnosis validity, it is important that children be evaluated by a multidisciplinary team using valid and effective instruments for detection of the target disorder. Identification and treatment of mental health issues during childhood may prevent significant academic and social problems, as well as soften the progression of these difficulties in adulthood (Biel et al., 2015). Children diagnosed with ADHD and MDD should be offered individualized bio-psychosocial interventions, with a focus on identifying the functional difficulties particular to each patient, as well as developing education-supporting practices and pharmacological therapies (Casadei, Cartabia, Reale, Costantino, & Bonati, 2017).

Our study had some noteworthy limitations. First, because we employed a referred sample, the results may not generalize to the broader community. Second, the sample was relatively small, although statistically significant results were nonetheless obtained. Third, because our study are cross-sectional, we did not collect data over time to determine whether the findings are persistent. Nonetheless, our study provides novel information about ADHD comorbidity in a population of Brazilian children and demonstrates the utility of the SDQ for

screening children who may need professional clinical evaluations for ADHD and/or MDD, after which appropriate therapeutic recommendations can be made.

Conclusion

Parent and teacher completed SDQs presented reliable statistical parameters for ADHD and ADHD + MDD screening in 7- to 12-year-old children, while also showing good access to domains of impairment in these youth. The SDQs had predictive value for probable diagnosis with an acceptable level of sensitivity. The Total Difficulties scale showed the highest specificity, relative to controls, for each patient group in both the parent and teacher SDQs.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was founded by the SETI State Secretary of Science, Technology and Superior Education of Paraná (SETI, grant# conv. 07/14).

ORCID iD

Mara L Cordeiro  <https://orcid.org/0000-0002-0235-8001>

References

- Algorta, G. P., Dodd, A. L., Stringaris, A., & Yongstrom, E. A. (2016). Diagnostic efficiency of the SDQ for parents to identify ADHD in the UK: A ROC analysis. *European Child & Adolescent Psychiatry*, 25, 949-957.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., Text Revision). Washington, DC: Author
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Angold, A., Costello, E. J., & Erkanli, A. (1999). Comorbidity. *Journal of Child Psychology and Psychiatry*, 40, 57-87.
- Austerman, J. (2015). ADHD and behavioral disorders: Assessment, management, and an update from DSM-5. *Cleveland Clinic Journal of Medicine*, 82, S2-S7. doi:10.3949/ccjm.82.s1.01
- Bekker, J., Bruck, D., & Sciberras, E. (2016). Congruent validity of the Strengths and Difficulties Questionnaire to screen for comorbidities in children with ADHD. *Journal of Attention Disorders*. Advance online publication. doi:10.1177/1087054713496462
- Biederman, J., Ball, S. W., Monuteaux, M. C., Mick, E., Spencer, T. J., McCreary, M., & Faraone, S. V. (2008). New insights into the comorbidity between ADHD and major depression in adolescent and young adult females. *Journal of the American Academy of Child & Adolescent Psychiatry*, 47, 426-434. doi:10.1097/CHI.0b013e31816429d3
- Biederman, J., Newcorn, J., & Sprich, S. (1991). Comorbidity of attention deficit hyperactivity disorder with conduct, depressive, anxiety, and other disorders. *American Journal of Psychiatry*, 5, 564-577. doi:10.1176/ajp.148.5.564
- Biel, M. G., Kahn, N. F., Srivastava, A., Mete, M., Banh, M. K., Wisson, L. S., & Anthony, B. J. (2015). Parent reports of mental health concerns and functional impairment on routine screening with the Strengths and Difficulties Questionnaire. *Academic pediatrics*, 15, 412-420. doi:10.1016/j.acap.2015.01.007
- Bolsoni, L. M., & Zuardi, A. W. (2014). Psychometric studies of brief screening tools for multiple mental disorders. *Revista Brasileira de Psiquiatria*, 64, 63-69. doi:10.1590/0047-2085.000000058
- Bradley, K. A. L., Colcombe, S., Henderson, S. E., Alonso, C. M., Milham, M. P., & Gabbay, V. (2016). Neural correlates of self-perceptions in adolescents with major depressive disorder. *Developmental Cognitive Neuroscience*, 19, 87-97.
- Carballo, J. J., Rodríguez-Blanco, L., García-Nieto, R., & Baca-García, E. (2014). Screening for the ADHD phenotype using the Strengths and Difficulties Questionnaire in a clinical sample of newly referred children and adolescents. *Journal of Attention Disorders*. Advance online publication. doi:10.1177/1087054714561858
- Casadei, G., Cartabia, M., Reale, L., Costantino, M. A., & Bonati, M. (2017). Italian regional health service costs for diagnosis and 1-year treatment of ADHD in children and adolescents. *International Journal of Mental Health Systems*, 11, Article 33. doi:10.1186/s13033-017-0140-8
- Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, 20, 37-46. doi:10.1177/001316446002000104.
- Cordeiro, M. L., Farias, A. C., Cunha, A., Benko, C. R., Farias, L. G., Costa, M. T., . . . McCracken, J. T. (2011). Co-occurrence of ADHD and High IQ: A case series empirical study. *Journal of Attention Disorders*, 15, 485-490.
- Croft, S., Stride, C., Maughan, B., & Rowe, R. (2015). Validity of the Strengths and Difficulties Questionnaire in preschool-aged children. *Pediatrics*, 135, e1210-e1219.
- Daviss, W. B. (2008). A review of co-morbid depression in pediatric ADHD: Etiologies, phenomenology, and treatment. *Journal of Child and Adolescent Psychopharmacology*, 18, 565-571. doi:10.1089/cap.2008.032
- Dias, T. G. C., Kieling, C., Graeff-Martins, A. S., Moriyama, T. S., Rohde, L. A., & Polanczyk, G. V. (2013). Developments and challenges in the diagnosis and treatment of ADHD. *Revista Brasileira de Psiquiatria*, 35, S40-S50. doi:10.1590/1516-4446-2013-S103
- Dodig-Curkovic, K., Curkovic, M., Radic, J., Degmecic, D., & Filekovic, P. (2010). Suicidal behavior and suicide among children and adolescents-risk factors and epidemiological characteristics. *Collegium Antropologicum*, 34, 771-777.
- Doi, Y., Ishihara, K., & Uchiyama, M. (2014). Short communication reliability of the Strengths and Difficulties Questionnaire in Japanese preschool children aged 4-6 years. *Journal of Epidemiology*, 24, 514-518. doi:10.2188/jea.JE20140050
- Farias, A. C., Cunha, A., Benko, C. R., McCracken, J. T., Costa, M. T., Farias, L. G., & Cordeiro, M. L. (2010). Manganese in children with attention-deficit/hyperactivity disorder:

- Relationship with methylphenidate exposure. *Journal of Child and Adolescent Psychopharmacology*, 20, 113-118.
- Fleitlich, B., Cortazar, P. G., & Goodman, R. (2000). Questionário de Capacidades e Dificuldades (SDQ) [Strengths and Difficulties Questionnaire]. *Infanto Rev. Neuropsiquiatr Infanc Adolesc*, 8, 44-50.
- Fried, E. I., Borkulo, C. D. V., Cramer, A. O. J., Boschloo, L., Schoevers, R. A., & Borsboom, D. (2017). Mental disorders as networks of problems: A review of recent insights. *Social Psychiatry & Psychiatric Epidemiology*, 52, 1-10. doi:10.1007/s00127-016-1319-z
- Goekoop, R., & Goekoop, J. G. (2014). A network view on psychiatric disorders: Network clusters of symptoms as elementary syndromes of psychopathology. *PLoS ONE*, 9(11), e112734. doi:10.1371/journal.pone.0112734
- Golubchick, P., Kodesh, A., & Weizman, A. (2013). Attention-deficit/hyperactivity disorder and comorbid subsyndromal depression: What is the impact of methylphenidate on mood? *Clinical Neuropsychopharmacology*, 36, 141-145.
- Goodkind, M., Eickhoff, S. B., Oathes, D. J., Jiang, Y., Chang, A., Jones-Hagata, L. B., . . . Etkin, A. (2015). Identification of a common neurobiological substrate for mental illness. *JAMA Psychiatry*, 72, 305-315.
- Goodman, A., & Goodman, R. (2012). Strengths and Difficulties Questionnaire scores and mental health in looked after children. *The British Journal of Psychiatry*, 200, 426-427. doi:10.1192/bjp.bp.111.104380
- Goodman, R. (1997). The Strengths and Difficulties Questionnaire: A research note. *Journal of Child Psychology and Psychiatry*, 38, 581-586.
- Goodman, R., Meltzer, H., & Bailey, V. (1998). The Strengths and Difficulties Questionnaire: A pilot study on the validity of the self-report version. *European Child & Adolescent Psychiatry*, 7, 125-130.
- Goodman, R. (1999). The extended version of the Strengths and Difficulties Questionnaire as a guide to child psychiatric case-ness and consequent burden. *Journal of Child Psychology and Psychiatry*, 40, 791-799.
- Goodman, R. (2001). Psychometric properties of the Strengths and Difficulties Questionnaire. *Journal of the American Academy of Child & Adolescent Psychiatry*, 40, 1337-1345. doi:10.1097/00004583-200111000-00015
- Goodman, R., Ford, T., Simmons, H., Gatward, R., & Meltzer, H. (2003). Using the Strengths and Difficulties Questionnaire (SDQ) to screen for child psychiatric disorders in a community sample. *British Journal of Psychiatry*, 177, 166-172.
- Harvey, E. A., & Lugo-Candelas, C. I. (2016). Early development of comorbidity between symptoms of attention-deficit/hyperactivity disorder (ADHD) and oppositional defiant disorder (ODD). *Journal of Abnormal Psychology*, 125, 154-167. doi:10.1037/abn0000090
- Jacob, P., Srinath, S., Girimaji, S., Seshadri, S., & Vagar, J. V. (2016). Co-morbidity in attention-deficit hyperactivity disorder: A clinical study from India. *East Asian Archives of Psychiatry*, 26, 148-153.
- Jerrell, J. M., & McIntyre, R. S. (2016). Factors differentiating childhood-onset and adolescent-onset schizophrenia: A claims database study. *The Primary Care Companion for CNS Disorders*, 18(2), 1-8. doi:10.4088/PCC.15m01901
- Kim, M. J., Park, I., Lim, M. H., Paik, C., Cho, S., Know, H.-J., . . . Ha, M. (2017). Prevalence of attention-deficit/hyperactivity disorder and its comorbidity among Korean children in a community population. *Journal of Korean Medical Science*, 32, 401-406.
- Lapresa, L. M. B., Arizaleta, L. H., & Rajmil, L. (2014). Reference values of the Strengths and Difficulties Questionnaire (SDQ) version for parents in the Spanish population, 2006. *Actas Españolas de Psiquiatría*, 42(2), 43-48.
- Lehmann, S., Havik, O. E., Havik, T., & Heiervang, E. R. (2013). Mental disorders in foster children: A study of prevalence, comorbidity and risk factors. *Child and Adolescent Psychiatry and Mental Health*, 7, Article 39.
- Matos, M. B., Cruz, A. C. N., Dumith, S. C., Dias, N. C., Carret, R. B. P., & Quevedo, L. A. (2015). Eventos estressores na família e indicativos de problemas de saúde mental em crianças com idade escolar [Stressor events in the Family environment that are indicative of mental health problems in children of school age]. *Ciência & Saúde Coletiva*, 20, 2157-2163. doi: 10.1590/1413-81232015207.17452014
- Nardi, A. E., Quevedo, J., & Silva, A. G. (2015). *Transtorno de déficit de atenção/hiperatividade: teoria e clínica* [Attention Deficit / Hyperactivity Disorder: Theory and Clinical]. Porto Alegre, Brazil: Artmed.
- Noordermeer, S. D. S. (2016). A systematic review and meta-analysis of neuroimaging in oppositional defiant disorder (ODD) and conduct disorder (CD) taking attention-deficit hyperactivity disorder (ADHD) into account. *Neuropsychology Review*, 26, 44-72. doi:10.1007/s11065-015-9315-8
- Øvergaard, K. R., Oerbeck, B., Friis, S., Pripp, A. H., Biele, G., Aase, H., & Zeiner, P. (2018). Attention-deficit/hyperactivity disorder in preschoolers: The accuracy of a short screener. *Child & Adolescent Psychiatry*, 57, 428-435.
- Rizzutti, S., Schuch, V., Augusto, B. M., Coimbra, C. C., & Reebye, P. N. (2015). Neuropsychological profiles correlated with clinical and behavioral impairments in a sample of Brazilian children with attention-deficit hyperactivity disorder. *Frontiers in Psychiatry*, 6, Article 163. doi:10.3389/fpsyt.2015.00163
- Roberts, S., Wrigth, B., Moore, K., Smith, J., Allgar, V., Tennant, A., & Rogers, K. (2015). Translation into British Sign Language and validation of The Strengths and Difficulties Questionnaire. *Health Services and Delivery Research*, 3. doi: 10.3310/hsdr03020
- Russell, G., Rodgers, L. R., & Ford, T. (2013). The Strengths and Difficulties Questionnaire as a predictor of parent-reported diagnosis of autism spectrum disorder and attention deficit hyperactivity disorder. *PLoS ONE*, 8(12), e80247. doi:10.1371/journal.pone.0080247
- Saur, A. M., & Loureiro, S. R. (2012). Psychometric properties of the Strengths and Difficulties Questionnaire: A literature review. *Estudos de Psicologia (Campinas)*, 29, 619-629.
- Sharp, S. I., McQuillin, A., Marks, M., Hunt, S. P., Stanford, S. C., Lydall, G. J., . . . Gurling, H. M. (2014). Genetic association of the tachykinin receptor 1 TACR1 gene in bipolar disorder, attention deficit hyperactivity disorder, and the alcohol dependence syndrome. *American Journal of Medical Genetics Part B: Neuropsychiatric Genetics*, 165, 373-380.

- Shier, A. C., Reichenbacher, T., Ghuman, H. S., & Ghuman, J. (2013). Pharmacological treatment of attention deficit hyperactivity disorder in children and adolescents: Clinical strategies. *Journal of Central Nervous System Disease*, 5, 1-17. doi:10.4137/JCNSD.S6691
- Souza, I., Serra, M. A., Mattos, P., & Franco, V. A. (2001). Comorbidity among children and adolescents with attention-deficit disorder: Preliminary results. *Arquivos de Neuro-Psiquiatria*, 59, 401-406.
- Stein, L. M. (1994). *Teste de Desempenho Escolar (TDE): Manual de Aplicação e Interpretação* [Scholastic Achievement Test: Manual of administration and interpretation]. São Paulo, Brazil: Casa do Psicólogo.
- Stringaris, A., & Goodman, R. (2009). Three dimensions of oppositionality in youth. *Journal of Child Psychology and Psychiatry*, 50, 216-223.
- Takayanagi, N., Yoshida, S., Yasuda, S., & Adachi, M. (2016). Research in developmental disabilities psychometric properties of the Japanese ADHD-RS in preschool children. *Research in Developmental Disabilities*, 55, 268-278. doi:10.1016/j.ridd.2016.05.002
- Tandon, M., Cardeli, E., & Luby, J. (2009). Internalizing disorders in early childhood: A review of depressive and anxiety disorders. *Child and Adolescent Psychiatric Clinics of North America*, 18, 593-610.
- Turgay, A., & Ansari, R. (2006). Major depression with ADHD. *Psychiatry (Edgmont)*, 3(4), 20-32.
- Tzavidis, N. (2016). Longitudinal analysis of the Strengths and Difficulties Questionnaire scores of the Millennium Cohort Study children in England using M-quantile random-effects regression. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 197, 427-452.
- Van Loo, H. M., Romeijn, J. W., De Jongem, P., & Schoevers, R. A. (2013). Psychiatric comorbidity and causal disease models. *Preventive Medicine*, 57, 748-752.
- Weber, H., Kittel-Schneider, S., Gessner, A., Domschke, K., Neuner, M., Jacob, C. P., . . . Reif, A. (2011). Cross-disorder analysis of bipolar risk genes: Further evidence of DGKH as a risk gene for bipolar disorder, but also unipolar depression and adult ADHD. *Neuropsychopharmacology*, 36, 2076-2085.
- Wechsler, D. (1991). *Wechsler Intelligence Scale for Children* (3rd ed.). San Antonio, TX: The Psychological Corporation.
- Wilens, T. E., Biederman, J., Brown, S., Tanguay, S., Monuteaux, M. C., Blake, C., & Spencer, T. J. (2002). Psychiatric comorbidity and functioning in clinically referred preschool children and school-age youths with ADHD. *Journal of the American Academy of Child & Adolescent Psychiatry*, 41, 262-268. doi:10.1097/00004583-200203000-00005

Author Biographies

Daniele Coutinho, MS, is a clinical psychologist at the research institute Pelé Pequeno Príncipe. Master in biotechnology applied to child health and teen in the Faculdades Pequeno Príncipe (FPP, Curitiba, Brazil). Her research interests include child and adolescent mental health and neurodevelopmental disorders.

Antonio Carlos Farias, MD, PhD, is a neuropsychiatrist, board-certified specialist on behavioral and mood disorders in children and adolescents. His research interests include neurodevelopment, treatment outcomes, psychopharmacology, and neurochemical aspects of neuropsychiatric disorders of childhood.

Erico Pereira Gomes Felden, PhD, is a neuroscientist with graduate works on statistics, currently an associate professor at the Center for Health Science Research, Santa Catarina State University, Brazil.

Mara L Cordeiro, PhD, is a neuroscientist, earned both her BS and PhD at University of California, Los Angeles (UCLA), adjunct assistant professor at UCLA Department of Psychiatry and Biobehavioral Sciences, research scientist at the Semel Neuroscience Research Institute at David Geffen School of Medicine at UCLA, and professor/coordinator of neuroscience research at the Faculdades Pequeno Príncipe e Pelé Pequeno Príncipe Research Institute in Brazil. Her research centers on the genetics, and psychological and neurochemical aspects of behavioral and mood disorders in children and adolescents.