

## Why Is There a Gender Gap in Children Presenting for Attention Deficit/Hyperactivity Disorder Services?

Jeneva L. Ohan and Troy A. W. Visser

*School of Psychology, The University of Queensland*

This study addressed why girls are less likely to be referred for mental health services for attention deficit/hyperactivity disorder (ADHD) than boys. Ninety-six parents of children with elevated ADHD symptoms and 140 elementary school teachers read vignettes about children with ADHD. Half of the participants read vignettes with boys' names, and half read the same vignettes but with girls' names. Participants then rated their likeliness to seek or recommend services for the child in each vignette. Parents and teachers were less likely to seek or recommend services for girls than boys with ADHD, but results did not support the hypothesis that this is because girls are less disruptive than boys. Rather, differences in service seeking were explained by the fact that parents and teachers believed that learning assistance is less effective for girls than boys with ADHD.

The existence of a gender gap in mental health service access and research has long concerned clinicians and researchers (e.g., National Institutes of Health, 1994; Report of the Surgeon General, 2000). Certainly, in the area of youth mental health, boys are disproportionately brought for services compared to girls (e.g., Alegria et al., 2004). In fact, in three nationally representative surveys on youth mental health, girls had more unmet service needs than boys across all developmental stages (Kataoka, Zhang, & Wells, 2002). Identifying the source(s) of gender gaps in mental health service access is critical for promoting equitable service use in psychology and psychiatry. To do this, however, more research is needed on why needs go unmet for some children (Biederman et al., 2005; Power, Eiraldi, Clarke, Mazzuca, & Krain, 2005; Report of the Surgeon General, 2000).

To address this issue, we examined what is arguably the most sizeable and well-documented gender gap in youth mental health service access: attention-deficit/

hyperactivity disorder (ADHD). This disorder occurs in about 8 to 10% of children, and children with this disorder are at risk for serious and far-reaching consequences, such as peer and family problems, juvenile arrest, and school dropout (American Psychiatric Association [APA], 2000; Barkley, 2006; Graetz, Sawyer, & Baghurst, 2005). Unfortunately, compared to elementary-school-aged boys with ADHD, elementary-school-aged girls with ADHD in North America are far less likely to receive services (e.g., Neuman et al., 2005), with estimates suggesting that there are about 2.5 boys for every girl with ADHD in the community and about 6 boys for every girl with ADHD referred to U.S.-based clinics (e.g., Polanczyk & Jensen, 2008; Schneider & Eisenberg, 2006). Recent epidemiologic research indicates a similar gender gap in ADHD service use also exists in Australia. One study of nationally representative youth in Adelaide, South Australia found about two boys with ADHD-combined and ADHD-hyperactive-impulsive types receiving treatment for every girl with this disorder (Graetz, Sawyer, Baghurst, & Hirte, 2006). Furthermore, although girls with ADHD-inattentive type in this study were about as likely as boys with inattentive type to receive mental health services, the services that they received were not for ADHD but rather for a comorbid internalizing disorder during the teen years (Graetz et al., 2006). In sum,

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Correspondence should be addressed to Jeneva L. Ohan, School of Psychology, McElwain Building, The University of Queensland, St Lucia, Queensland, 4062, Australia. E-mail: j.ohan@uq.edu.au

gender is a bigger risk factor for failing to access ADHD services than poverty, rural living, and access to medical insurance combined (Bussing, Zima, & Belin, 1998; see also Schneider & Eisenberg, 2006).

Several accounts have been advanced to explain why girls with ADHD are less likely to receive ADHD services. For example, one possibility is that girls with ADHD are less impaired than boys with ADHD (Newcorn et al., 2001), which would motivate less service access (e.g., Greene, Biederman, & Faraone, 2001; Pelham, Fabiano, & Massetti, 2005). Another option is that because teachers are well able to recognize the ADHD symptoms in the *Diagnostic and Statistical Manual of Mental Disorders (DSM)*; e.g., Ohan, Cormier, Hepp, Visser, & Strain, 2008), more boys will be brought for ADHD services because they appear to express ADHD symptoms more consistent with the conceptualization in the DSM than do girls (Ohan & Johnston, 2005). A third possibility is that girls may be more likely to have the inattentive subtype of ADHD, resulting in less service access because their symptoms are more covert than the hyperactive-impulsive symptoms which are predominant in boys (Biederman et al., 2002).

Of all of the explanations for the gender gap in ADHD service use, by far the most cited emphasizes the importance of well-recognized gender differences in conditions that are comorbid with ADHD, in particular, disruptive behavior. According to this disruptive behavior hypothesis, parents and teachers seek help for girls with ADHD symptoms less often than boys because girls are less disruptive to those around them and are therefore less likely to be noticed or seen as a treatment priority (Arcia & Conners, 1998; Berry, Shaywitz, & Shaywitz, 1985; Biederman et al., 2005; Biederman et al., 2002; Gaub & Carlson, 1997). This hypothesis is consistent with evidence that boys with ADHD are more physically aggressive and hyperactive than girls with ADHD (e.g., Gaub & Carlson, 1997; Gershon, 2002). It is also consistent with evidence that girls with ADHD display higher levels of internalizing behavior problems than boys, and thus are less likely to disrupt those around them (e.g., Gaub & Carlson, 1997; Gershon, 2002). Thus, this hypothesis predicts that disruptiveness predicts service use for ADHD and accounts for the gender differences in service use.

The disruptive behavior hypothesis is so well accepted and widely cited in clinical psychology that it is taught to undergraduate psychology majors in textbooks as fact (e.g., Mash & Wolfe, 2006). However, empirical support for this hypothesis is surprisingly limited. In a survey of parents whose children were at high risk for ADHD, Bussing, Zima, Gary, and Garvan (2003) found that although disruptive behavior was related to the likelihood that parents had used services

for their child, it accounted for only a small portion of the large gender discrepancy in service use. Similarly, in a sample of children receiving special education services, Bussing et al. (1998) found that girls who met full diagnostic criteria for ADHD were *more* disruptive than their male counterparts but were still far less likely to have used ADHD services.

Notably, while the aforementioned studies suggest that the disruptive behavior hypothesis may not account for gender imbalances in parents' service seeking for ADHD, their use of naturalistic methodologies did not allow for control of gender-related factors (e.g., ADHD subtype differences, comorbidities, social skills) that might have influenced their results. Overcoming some of these limitations, Scuitto, Nolfi, and Bluhm (2004) examined teachers' perceptions of service needs for children with ADHD-like symptoms by asking them to read report cards of hypothetical children (half with boys' names and half with girls') that contained statements describing inattention, hyperactivity, or hyperactivity plus aggression. Relative to hyperactivity statements with boys' names, teachers saw hyperactivity statements with girls' names as less in need of clinical services, indicating that a gender imbalance in teachers' perceived service needs persisted despite equivalent levels of disruptiveness (aggression). Although this study did not examine ADHD per se, disruptive behavior other than aggression, or actual service use, the results nevertheless shed doubt on the disruptive behavior hypothesis.

An alternative and as-yet largely untested explanation for the gender gap emphasizes the role that teachers play in service seeking for ADHD. Pisecco, Huzinec, and Curtis (2001) noted that because teachers have different expectations of and behave differently toward boys and girls (e.g., AAUW, 1992; Duffy, Warren, & Walsh, 2001; Li, 1999; Sadker & Sadker, 1994), they may also hold gender-specific expectations about ADHD treatments. To test this, they presented teachers with hypothetical vignettes describing children with ADHD (half with boys' names and half with girls') and then asked teachers to rate how useful they believed different types of interventions would be for these children. As hypothesized, teachers did hold gender-specific expectations about treatment. Specifically, they rated medication as more beneficial for boys than girls, and nonpharmacological treatments (specifically, changes that could be accomplished within the classroom, such as response cost) as more beneficial for girls than boys.

On the basis of these results, Pisecco et al. (2001) proposed that teachers might access services for boys more often than girls with ADHD because they expect medication will be more beneficial for boys. At the same time, they might seek help less often for girls than boys because they believe that girls' ADHD symptoms can be sufficiently treated within the classroom. Logically,

this explanation could also apply to parents, who are also known to hold gender different expectations (e.g., Tenenbaum & Leaper, 2003). To wit, parents may hold gender-specific beliefs about how children with ADHD respond to various treatments, and these beliefs may explain why they seek ADHD services for boys more often than girls.

In sum, there is ample research to suggest that there is a significant gender gap in service seeking for childhood ADHD; however, the reason for this gap is uncertain (e.g., APA, 2000; Schneider & Eisenberg, 2006). It cannot be sufficiently explained on the basis of gender differences in functional impairment, expressions of symptomology, or ADHD subtype. Still at issue is the importance of disruptiveness and teacher/parent beliefs about treatment effectiveness. To address this uncertainty, the present work directly tested whether (a) disruptiveness of the child heightens the likelihood of service seeking, and (b) parent and teacher perceptions of the potential benefits of treatments mediate the relation between child gender and service seeking for ADHD symptoms. To our knowledge, ours is the first work to examine the gender gap in ADHD service seeking among both parents and teachers of elementary school children and to directly test hypotheses that have been advanced to explain this gap in both of these samples.

Consistent with other studies (e.g., Pisecco et al., 2001; Scuitto et al., 2004), we used an analog study consisting of vignettes that described children with either ADHD or ADHD and disruptive behavior (comorbid oppositional defiant disorder [ODD]). Half of the participants read vignettes with girls' names, and half read the same vignettes but with boys' names. We chose a vignette methodology over a naturalistic study because the latter does not permit control over extraneous variables associated with child gender (such as symptom number and severity, comorbidity, and prosocial behavior) that may influence results rather than gender per se. Participants were either elementary school teachers or parents of children with elevated levels of inattention and/or hyperactivity. Together, these two groups account for the vast majority of service seeking for childhood ADHD (Sax & Kautz, 2003). We included parents of children with high levels of ADHD symptoms (some of whom have children diagnosed with ADHD), rather than just parents of children who have been diagnosed with ADHD, because it is precisely these parents who are most likely to be making decisions about whether to seek services for their children. After reading each vignette, parents and teachers rated their likelihood of service seeking for the child, and how much benefit they expected from three of the most common ADHD treatments (medication, learning assistance/special education, and behavior management in the classroom or at home).

## METHODS

### Participants

**Teachers.** Participants were 140 elementary school teachers (119 women) who were teaching in the greater metropolitan area of Melbourne, Australia. Teachers were recruited through placing notices about the study in the school and letters and questionnaire packets in the teachers' mailboxes at participating schools. On average, teachers were 42.33 years old ( $SD = 9.87$ ) and had 19.76 years of teaching experience ( $SD = 9.76$ ). All teachers reported teaching at least one student with ADHD in their career, with more than half instructing 20 or more students with ADHD (range = 1 to more than 50). The majority of teachers (89.30%) said that they had recommended and/or sought services on behalf of one or more of these children. Teachers were predominantly of Caucasian descent ( $n = 127$ ; 90.71%), with 2 teachers of Asian descent (1.43%), 1 Maori (Aboriginal; 0.71%), and the remaining 10 (7.14%) not reporting their ethnicity.

**Parents.** Participants were 96 parents living in the greater metropolitan area of Melbourne, Australia. Parents were recruited through advertisements placed in the community (e.g., libraries), newspapers, and schools asking for parents of children with high levels of inattention and/or hyperactivity. Parents averaged 40.29 years old ( $SD = 4.34$ ) and had 1.19 sons ( $SD = 0.93$ ) and 1.21 daughters ( $SD = 0.77$ ) aged 8.05 years ( $SD = 2.88$ ) on average. Parents were mostly married ( $n = 86$ ; 89.58%), employed ( $n = 58$ ; 60.42%), and of European Caucasian descent ( $n = 84$ ; 87.50%), with 5 (5.21%) of Asian descent, 2 (2.08%) of South American descent, and 5 (5.21%) not reporting their ethnicity. Education level varied, with 26 (27.08%) not completing high school, 19 (19.79%) with a high school degree, 43 (44.79%) with college or some university education, 4 (4.17%) with a bachelor's degree, and 6 (6.25%) with a graduate degree. Socioeconomic status also varied widely, with incomes from less than \$20,000 to more than \$150,000 per year ( $Mdn = \$75,000$  per year). About 29.17% ( $n = 28$ ) of parents reported that they had sought services for their child's ADHD symptoms from a qualified professional (18 pediatricians, 4 general physicians, 4 psychiatrists, and 2 psychologists), which approximates service-seeking rates in epidemiologic surveys (e.g., about 29% in Australia; Sawyer et al., 2004). Of the 28 children receiving services for ADHD, 23 (82.14%) were boys, representing about a 5:1 gender ratio, and 21 (75%) were currently being prescribed stimulant medication.

To confirm elevated levels of ADHD symptoms in their own children, parents were first asked the gender

of their child. Sixty-four (66.67%) parents identified that their concerns about elevated ADHD symptoms were for their son, and 32 (33.33%) for their daughter, resulting in a 2:1 gender ratio. Parents then rated their child's behavior over the past 6 months, off of medication, on the ADHD Rating Scale-IV (ADHD RS-IV; DuPaul, Power, Anastopoulos, & Reid, 1998), which contains the 18 *DSM* symptoms of ADHD on a 0 (*never or rarely*) to 3 (*very often*) scale. Factor analyses of the ADHD RS-IV are consistent with the theoretical structure of ADHD, the subscales are highly internally consistent, there is good test-retest reliability, and excellent external validity as evidenced by its ability to discriminate youth with ADHD from nonclinical and clinical controls, and correlations with other attention problems scales and observations of ADHD behaviors (DuPaul et al., 1998).

We analyzed ratings on the ADHD-IV RS in three ways. First, we compared the total ADHD symptom severity on the inattention and hyperactivity-impulsivity scales in this sample to U.S. norms by summing ratings (DuPaul et al., 1998). Our sample's symptom severity was significantly greater for inattention: sons,  $z(1, 63) = 13.90, p < .001$ ; daughters,  $z(1, 31) = 8.05, p < .001$ ; and hyperactivity, sons,  $z(1, 63) = 10.08, p < .001$ ; daughters,  $z(1, 31) = 9.01, p < .001$ . Second, we examined the number of children in excess of 1 standard deviation above U.S. norms. All children were rated as above this cutoff on inattention, and all but eight were rated above this cutoff on hyperactivity-impulsivity. Finally, we scored results based on whether ADHD symptoms were present or absent. Consistent with others (e.g., Gomez, Harvey, Quick, Sharer, & Harris, 1999), we counted ratings above the midpoint (i.e., *pretty often* or *very often*) as a present symptom. Based on this analysis, 83.33% of the children (48 boys, 32 girls) met symptom criteria for ADHD (6 of 9 symptoms on either or both subscales), with the remaining children having at least 4 symptoms on at least one of the subscales.

## Measures

**Demographic and background questions.** The first section of the survey contained demographic questions (i.e., age, gender, education). For parents, there were questions regarding any services sought for their child, and if so, what for, by whom, and the results of the visit (e.g., diagnosis, treatment, etc.). For teachers, teaching experience (number of years taught, grades taught), and experience instructing a child with ADHD (number of students with ADHD taught, and number of students for whom the teacher had sought services) was assessed.

**Vignettes.** Twelve 140- to 155-word vignettes that described elementary school children were given to all

participants. For a randomly chosen half of parents and teachers, child names in the vignettes were male, and for the other half the names were associated female names. Thus, all participants received identical vignettes *except* for the gender of the child name (e.g., Alexander-Alexandra, Eric-Erica) and gender pronouns.

Of the 12 vignettes, 10 described children with ADHD-combined type, half with and half without accompanying disruptive ODD (see the Appendix), and 2 vignettes described a child without either disorder (control vignettes). For ADHD-only vignettes, the described behavior met *DSM-IV-TR* symptom criteria for ADHD-combined type (APA, 2000) including six symptoms of inattention and six of hyperactivity-impulsivity. For ADHD+ODD vignettes, the child described met the six symptom criteria for each of inattention and hyperactive-impulsive behavior and met symptom criteria for ODD. To ensure that vignettes described children who clearly met *DSM-IV-TR* ADHD and ODD symptom criteria, one clinical psychology graduate student, two undergraduate psychology students, and the first author reviewed and revised each vignette to ensure that all raters agreed on the number and types of symptoms present in the description of the child's behavior and that these met *DSM-IV-TR* symptom criteria. All of the symptom criteria for ADHD and ODD were fully included over the 12 vignettes. As a control condition, 2 vignettes described a generally well-functioning child who had low levels of ADHD symptoms (defined as 1 *DSM-IV-TR* inattention symptom and 1 *DSM-IV-TR* hyperactive-impulsive symptom).

Following each vignette, participants rated (a) how *disruptive/serious* the child's behavior would be in the class/at home, from 1 (*not at all*) to 9 (*extremely*); (b) how likely the participant would be to *seek services* (including medical, mental health, or school-based services, but not self-help, such as in Graetz et al., 2006) (parents) or seek services/recommend that parents seek services (teachers), from 1 (*not at all*) to 9 (*would definitely go* [parents], *would definitely go/encourage* [teachers]); (c) how much the child would *benefit from medication*, from 1 (*no benefit*) to 9 (*definite benefit*); (d) how much the child would *benefit from learning assistance/special education* services (i.e., services given by special education teachers to children who require assistance in academics beyond those which can be met within the regular-stream classroom, from 1 (*no benefit*) to 9 (*definite benefit*); and (e) how much the child would *benefit from behavior management* changes in the classroom (teachers) or home (parents), from 1 (*no benefit*) to 9 (*definite benefit*). Overall ratings for ADHD-only and ADHD+ODD vignettes were constructed by averaging ratings for each of the items across the vignettes. Internal consistencies were excellent, with alphas

ranging from .82 (for parents' ratings of benefit of medication for ADHD vignettes) to .93 (for teachers' ratings of service-seeking for the ADHD + ODD vignettes).

We selected the three treatments (medication, learning assistance, and behavior management) because these are the primary ADHD treatment strategies used in both Australia and the United States (Graetz et al., 2006; Rowland et al., 2002). In addition, there are broad similarities in service delivery in both countries. For example, in Australia and the United States, nonpsychiatric medical practitioners (family practitioners and pediatricians) act as gatekeepers to mental health services (Dulcan et al., 1990), although in Australia pediatricians may also specialize in ADHD care (Sawyer et al., 2004). In both countries, medication is a frequently accessed form of ADHD treatment, with boys being more likely to receive medication than girls (Graetz et al., 2006; Rowland et al., 2002). Finally, both countries rely on the school system to provide ADHD services (in the form of educational assistance and counseling), with about 25% of youth with ADHD in the United States and a similar 17% of youth with ADHD in Australia (e.g., Sawyer et al., 2004) accessing school-based services for ADHD (e.g., Bussing et al., 2005).

### Procedure

This study was approved by the University of Melbourne's ethics committee and the regional school board. Consent letters attached to each questionnaire described the study, requirements of participation, the voluntary nature of participation, and confidentiality. For all participants, consent to participate was assumed by the completion of the questionnaire.

Parents were recruited through advertisements in the community (e.g., libraries), newspapers, and schools asking for parents of children with high levels of inattention and/or hyperactivity. When parents contacted the lab, the study was described and interested parents were sent a questionnaire that arrived the next business day via mail. A research assistant followed up the next day, and then again each week. The questionnaire return rate was 66.13%.

To recruit teachers, schools were randomly selected from a master list of schools that we had permission to contact from the regional school board. The principal of each randomly selected school was then contacted about the study. Of these principals, 30 of 36 (83%) agreed to have their school participate. After this consent was obtained, all teachers at participating schools were invited to participate via letters (with the attached questionnaire) placed in their work mailboxes. Teachers' participation rate was 63.97%. All participating schools and the school districts were given a copy of the study results.

## RESULTS

### Manipulation Check

To ensure that disruptiveness increased as a function of whether vignettes described children with no disorder, ADHD only, or ADHD + ODD, we conducted separate 2 (between-subjects factor, gender of child in vignette: boy vs. girl)  $\times$  3 (within-subjects factor, behavior problem: no ADHD/ODD, ADHD only, ADHD + ODD) mixed analysis of variance models for parents and teachers. This yielded a main effect of behavior problem for both parents,  $F(2, 90) = 32.83$ ,  $p < .001$ ,  $\eta^2 = .30$ , and teachers,  $F(2, 132) = 48.80$ ,  $p < .001$ ,  $\eta^2 = .33$ . Follow-up  $t$  tests using a Bonferroni correction confirmed that, as intended, parents and teachers saw vignettes of children without ADHD or ODD as least disruptive (Parents:  $M = 2.06$ ,  $SD = 1.56$ , 95% CI = 1.70–2.43; Teachers:  $M = 2.55$ ,  $SD = 1.80$ , 95% CI = 2.13–2.97), ADHD-only vignettes as more disruptive (Parents:  $M = 6.04$ ,  $SD = 1.34$ , 95% CI = 5.73–6.35; Teachers:  $M = 5.59$ ,  $SD = 1.60$ , 95% CI = 5.22–5.96), and vignettes of children with ADHD + ODD as most disruptive (Parents:  $M = 7.00$ ,  $SD = 1.39$ , 95% CI = 6.68–7.32; Teachers:  $M = 6.69$ ,  $SD = 1.64$ , 95% CI = 6.31–7.07). Child gender and interactions were not significant (all  $ps > .07$ ).

### Tests of the Disruptive Behavior Hypothesis

According to the disruptive behavior hypothesis, a main effect of disruptive behavior should be found such that more service seeking would be reported for ADHD + ODD vignettes than ADHD-only vignettes—regardless of gender. Examination of scores showed no floor or ceiling effects, as mean service-seeking scores ranged from 4.7 to 6.9 out of 9. To determine the influence of child disruptiveness and gender on ratings of how likely the participant would be to seek or recommend services for the child in the vignette, 2 (between-subjects factor, gender of child in vignette: boy vs. girl)  $\times$  2 (within-subjects factor, disruptive behavior: ODD present vs. ODD absent) mixed-model analyses of variance were conducted separately for parents and teachers (see Table 1 for means and standard deviations).

**Parents.** The main effect of disruptive behavior was not significant,  $F(1, 94) = 1.09$ ,  $p = .52$ ,  $\eta^2 < .01$ . Thus, results did not support the disruptive behavior hypothesis. Gender was also not significant,  $F(1, 94) = 1.11$ ,  $p = .44$ ,  $\eta^2 = .01$ ; however, there was a significant Gender  $\times$  Disruptiveness interaction,  $F(1, 94) = 5.63$ ,  $p < .02$ ,  $\eta^2 = .07$ , indicating a medium effect size (Cohen, 1988). Within-gender follow-up contrasts indicated that parents were more likely to seek services for girls with ADHD + ODD than for girls with ADHD only,  $t(2,$

TABLE 1  
Distribution of Parents' and Teachers' Ratings of the Likelihood of Seeking ADHD Services, by Child Gender and Disruptiveness

Sex of Child in Vignette	ADHD-Only Vignettes			ADHD + ODD Vignettes		
	M	SD	95% CI	M	SD	95% CI
Parents						
Boys	6.90	(1.97)	6.53–7.29	6.65	(2.00)	6.25–7.05
Girls	6.14	(1.99)	5.54–6.52	6.77	(1.67)	6.44–7.10
Teachers						
Boys	5.54	(1.77)	5.25–5.83	5.77	(1.98)	5.44–6.12
Girls	4.70	(1.87)	4.39–5.01	6.34	(1.65)	6.05–6.61

Note. ADHD = attention deficit/hyperactivity disorder; ODD = oppositional defiant disorder; CI = confidence interval.

49) = 2.46,  $p < .02$ ; however, disruptiveness did not impact parents' ratings for boys,  $t(2, 49) = .50$ ,  $p > .62$ . Follow-up contrasts between genders indicated that parents reported that they would more likely seek help for ADHD-only vignettes with boys' names than girls' names,  $t(1, 94) = 2.54$ ,  $p < .02$ ; however, there were no gender differences for ADHD + ODD vignettes,  $t(1, 94) = 1.64$ ,  $p > .11$ . In sum, disruptiveness only impacts help seeking for girls, not boys. This is inconsistent with the disruptive behavior hypothesis, which predicts only disruptiveness to have an impact on ratings, not gender.

**Teachers.** The main effect of child gender was not significant,  $F(1, 138) = 0.16$ ,  $p > .68$ ,  $\eta^2 < .01$ . However, there was a main effect of disruptive behavior,  $F(1, 138) = 24.85$ ,  $p < .001$ ,  $\eta^2 = .16$ , such that vignettes of children with ADHD + ODD were rated as more in need of services than children with ADHD alone. This main effect was qualified by a disruptive behavior by gender interaction,  $F(1, 138) = 10.67$ ,  $p < .001$ ,  $\eta^2 = .09$  (indicating a medium-large effect size). Again, this finding is inconsistent with the disruptive behavior hypothesis, which predicts only disruptiveness, not gender, to impact participants' reports of service access. Within-gender follow-up contrasts indicated that teachers were more likely to recommend services for girls with ADHD + ODD than for girls with ADHD only,  $t(2, 67) = 5.61$ ,  $p < .001$ ; however, this was not true for boys,  $t(2, 67) = 1.29$ ,  $p > .20$ . Between-gender follow-up contrasts indicated that teachers reported more service seeking for ADHD-only vignettes with boys' names than girls' names,  $t(1, 134) = 2.89$ ,  $p < .02$ , but no differences for ADHD + ODD vignettes,  $t(1, 134) = 1.08$ ,  $p > .30$ . As with parents, this suggests that child gender played a unique role in determining reported service seeking for children with ADHD only.

**Follow-up analyses.** Odds ratios were calculated to assess the likelihood of service seeking for boys' versus

girls' names. To calculate odds ratios, (a) the probability of service seeking was calculated by transforming the 1-to-9 rating to a 0-to-1 scale by subtracting 1 from each rating and dividing the remainder by 8, (b) the relative probability for each gender was calculated by dividing the probability of service seeking by 1-probability, and (c) the ratio of the probabilities was calculated (Bland & Altman, 2000). For ADHD-only vignettes, the odds ratio of service seeking was 1.58:1 (boys: girls) for parents (95% CI = 1.01:1–2.66:1), and 1.39:1 (boys:girls) for teachers (95% CI = 1.11:1–1.93:1). For ADHD + ODD vignettes, the odds ratio for service seeking was 0.90:1 (boys:girls) for parents (95% CI = 0.61:1–1.43:1), and 0.81:1 (boys:girls) for teachers (95% CI = 0.56:1–1.05:1).

### Tests of the Role of Treatment Beliefs as Mediators of Service Seeking

The hypothesis that beliefs in treatment effectiveness for ADHD symptoms mediate the impact of child gender on service seeking was tested via the method recommended by Holmbeck (2002). Using ordinary least squares regression with centered variables, we tested the significance of (a) the association between child gender and service seeking, (b) the association between child gender and each of our three possible mediator variables (i.e., benefits of medication, learning assistance, and behavior management), and (c) if both of these steps yielded significant results, the association between each of the three possible mediators and service seeking, with child gender controlled. Finally, Sobel (1982) mediation tests were conducted to determine if the relation between child gender and service seeking decreased significantly when the possible mediator was introduced into the model, indicating that mediation was occurring.

Because child gender was not significantly related to service seeking for ADHD + ODD vignettes, only data from ADHD-only vignettes were used in regression analyses. Following our analytic approach, we examined first the relation between child gender and service seeking. Both parents,  $F(1, 94) = 3.84$ ,  $p < .05$ , and teachers,  $F(1, 138) = 4.10$ ,  $p < .05$ , were more likely to report service seeking for boys than girls. The ensuing steps are reported separately next for each mediator tested (mediation models are presented in Figures 1–3). That is, first the association between mediator (perceived treatment benefit) and child gender is calculated, followed by tests of the association between the mediator and service seeking with child gender controlled, and finally Sobel mediation tests.

**Benefits of medication.** Parents reported that medication would be more likely to benefit vignettes with girls' names than boys' names,  $F(1, 94) = 26.93$ ,

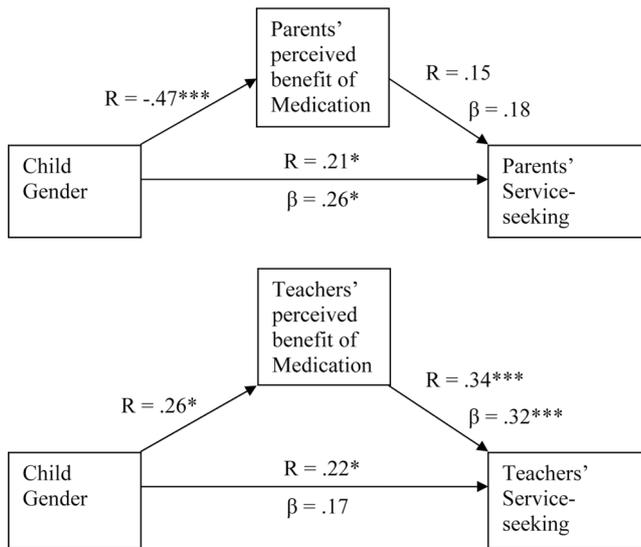


FIGURE 1 Parents' (first model) and teachers' (second model) perceived benefit of medication as mediators of the influence of child gender on the likelihood of service seeking. *Note:* Beta weights in the positive direction indicate greater levels for boys; significance indicated by \* $p < .05$ , \*\* $p < .01$ , and \*\*\* $p < .001$ .

$p < .001$ . In contrast, teachers reported that medication would be more likely to benefit vignettes with boys' names than girls' names,  $F(1, 138) = 4.02, p < .05$ . When child gender and perceived benefit of medication were

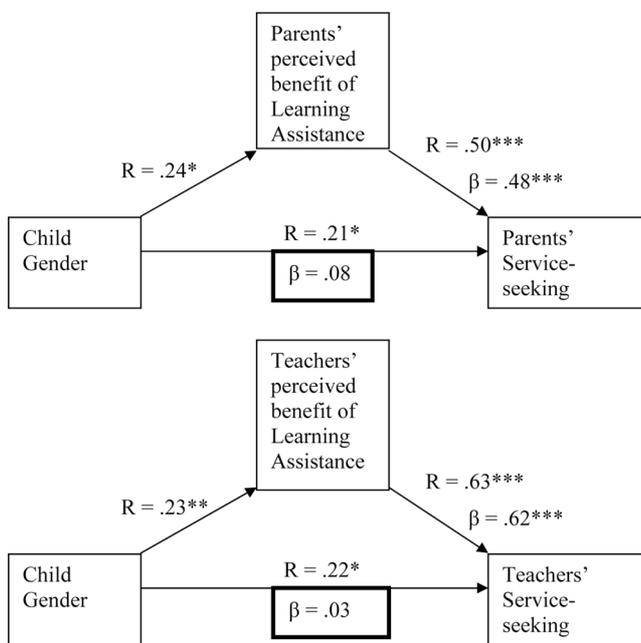


FIGURE 2 Parents' (first model) and teachers' (second model) perceived benefit of learning assistance as mediators of the influence of child gender on the likelihood of service seeking. *Note:* Beta weights in the positive direction indicate greater levels for boys; significance indicated by \* $p < .05$ , \*\* $p < .01$ , and \*\*\* $p < .001$ .

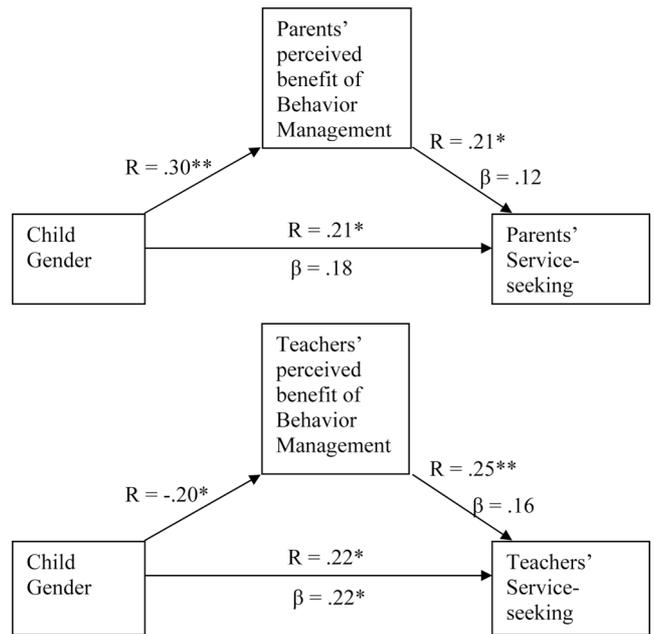


FIGURE 3 Parents' (first model) and teachers' (second model) perceived benefit of behavior management as mediators of the influence of child gender on the likelihood of service seeking. *Note:* Beta weights in the positive direction indicate greater levels for boys; significance indicated by \* $p < .05$ , \*\* $p < .01$ , and \*\*\* $p < .001$ .

entered into a regression to predict likelihood of service seeking, child gender remained a significant predictor for parents,  $F(2, 93) = 4.39, p < .02$ , and teachers,  $F(2, 138) = 3.99, p < .05$ . Moreover, the magnitude of the relationship between child gender and service seeking did not change (Sobel tests,  $z = 1.20, p > .20$ ). Thus, perceived benefits of medication did not mediate the relation between child gender and service seeking.

**Benefits of learning assistance.** Both parents,  $F(1, 94) = 5.92, p < .01$ , and teachers,  $F(1, 138) = 7.11, p < .01$ , reported that learning assistance would be more likely to benefit vignettes with boys' names than girls' names. When child gender and perceived benefit of learning assistance were entered in a regression to predict service seeking, the overall model was significant for both parents,  $F(2, 93) = 15.72, p < .001$ , and teachers,  $F(2, 138) = 44.71, p < .001$ , but gender no longer significantly predicted service seeking for parents,  $F(2, 93) = .85, p = .39$ , or teachers,  $F(2, 138) = 0.48, p = .63$ . Sobel tests indicated that this decline was significant for parents ( $z = 2.21, p < .02$ ) and teachers ( $z = 2.88, p < .002$ ). Thus, the perceived benefit of learning assistance significantly mediated the relation between child gender and service seeking.

**Benefits of behavior management.** Parents reported that behavior management strategies would

more likely benefit vignettes with boys' than girls' names,  $F(1, 95) = 9.67, p < .002$ . In contrast, teachers reported that behavior management would more likely benefit vignettes with girls' than boys' names,  $F(1, 138) = 7.03, p < .01$ . When both child gender and the perceived benefit of behavior management were entered into a regression to predict service seeking, the model was marginally significant for parents,  $F(2, 93) = 2.73, p < .07$ , and significant for teachers,  $F(2, 138) = 5.84, p < .005$ , and gender no longer significantly predicted service seeking for parents,  $F(2, 93) = 2.70, p < .07, p = .06$ , but did so for teachers,  $F(2, 138) = 3.92, p < .04$ . However, for both parents and teachers, Sobel tests were nonsignificant ( $z = 1.27, p > .15$ ), indicating that the perceived benefit of behavior management did not mediate the relation between child gender and service seeking.

## DISCUSSION

It is clear that elementary-school-aged girls with ADHD symptoms are less likely to be brought for services than boys (e.g., APA, 2000; Arnold, 1996; Bussing et al., 1998; Polanczyk & Jensen, 2008). What is less certain is why this gender gap exists. Here, we addressed this question by asking parents of children with high levels of ADHD symptoms and elementary school teachers about how likely they would be to seek services or refer a child for services based on vignettes of boys and girls with ADHD. Contrary to one often-cited hypothesis, the presence of disruptive behavior did not explain gender differences in parent and teacher reports of service seeking for children with ADHD. Instead, we found that parents and teachers seek or refer for services more boys than girls with ADHD. This seemed due to their perception that boys would be more likely to benefit from services, in particular, learning assistance.

The most prominent hypothesis about the gender gap in ADHD posits that disruptive behavior determines who is seen as in need of help; thus, the reason why boys with ADHD use services more than girls is because they are more disruptive than girls (e.g., Arcia & Conners, 1998; Berry et al., 1985; Biederman et al., 2002; Gaub & Carlson, 1997). Based on this reasoning, the disruptive behavior hypothesis would predict that disruptive children are brought for services more than less or non-disruptive children, regardless of their gender. In the present work, this account predicted that parents and teachers would report more service seeking (defined as medical, mental health, or school-based services) for vignettes describing boys and girls with ADHD + ODD than boys and girls with ADHD-only. Instead, we found an interaction between gender and disruptive behavior such that parents and teachers reported less service seeking for girls with ADHD only than all other

vignette types (i.e., boys with ADHD-only and ADHD + ODD, and girls with ADHD + ODD). This surprising result has implications for understanding service utilization for childhood ADHD. Looking within gender, we found that disruptiveness did not influence parents' or teachers' reports of service seeking for vignettes with boys' names, suggesting that disruptive behavior is not an important factor for teachers and parents when they make ADHD service-seeking decisions for boys. By contrast, disruptive behavior in girls was clearly an influential factor for teachers and parents, who report greater service-seeking for girls with ADHD + ODD than girls with ADHD-only.

These results may offer some insight into differences between research samples of children with ADHD in the clinic (i.e., those receiving services) and in the community (i.e., those who meet criteria for an ADHD diagnosis but have not sought services). Gaub and Carlson (1997) found that clinic and community samples of boys with ADHD were similar on a number of comorbid mental health and behavior problems, indicating that comorbidity generally did not affect service access for boys. Similarly, we found that disruptive comorbidity did not impact parents' and teachers' help seeking for vignettes of boys with ADHD. However, Gaub and Carlson (1997) also found that relative to community samples, clinic samples of girls with ADHD were significantly more impaired on most indices of mental health problems, suggesting that the presence of comorbid disorders significantly increased their likelihood of being brought for clinical services. Our findings suggest that this gender difference may be a function of parents' and teachers' reticence to pursue help for girls with ADHD-only. Because this reservation is only overcome when girls have additional disruptive symptoms, girls who receive services are more impaired than those in the community (as found by Gaub and Carlson). Although we can only speculate on the reason for this gender difference, it may be that parents and teachers find disruptive behavior less acceptable in girls than boys (see Waschbush & King, 2006). As a result, parents and teachers may be more likely to help-seek for girls with disruptive behavior to curb this less acceptable behavior, whereas for boys, disruptive behavior does not have such an influence on their service seeking.

Comparisons between boy and girl vignettes were also revealing. Although there were no gender differences in service seeking for ADHD + ODD vignettes, for ADHD-only vignettes, both parents and teachers reported being more likely to seek or refer boys for services compared to girls. Indeed, odds ratios supported the significance of this finding, as ratings of the likelihood of help seeking resulted in 1.58:1 and 1.39:1 boy-to-girl ratios for parents and teachers, respectively. This is despite the fact that parents and teachers themselves rated the vignettes with girls' and boys' names

as equally serious and problematic, indicating that parents' and teachers' tendency to help-seek for boys more than girls with ADHD is not part of a difficulty in problem identification. In sum, consistent with previous findings from analog and naturalistic studies (e.g., Bussing et al., 1998; Bussing et al., 2003; Scuitto et al., 2004), our findings do not support the disruptive behavior hypothesis as an explanation for gender differences in service seeking for children with ADHD symptoms.

Our results supported an alternative hypothesis that parents' and teachers' beliefs in the effectiveness of treatment mediate the relationship between child gender and service seeking (Pisecco et al., 2001). However, this was not true for all three of the treatments assessed in this study (medication, learning assistance, behavior management). Although parents and teachers believed that medication and behavior management would benefit boys and girls differently, these gender-based beliefs did not explain their tendency to service-seek more for boys than girls with ADHD. Instead, teachers' and parents' perceptions that learning assistance would benefit boys more than girls almost entirely explained the gender gap in ADHD service seeking.

One obvious question is why beliefs about learning assistance played a role in differentially referring boys and girls for ADHD services. The critical importance of learning assistance in determining referrals may reflect the relatively greater importance placed on academic success for boys than girls. For example, teachers devote more attention and class time to boys than girls (AAUW, 1992; Duffy et al., 2001; Sadker & Sadker, 1994), and parents and teachers believe that boys have greater abilities in math and science than girls (e.g., Li, 1999; Tenenbaum & Leaper, 2003). As a result, it may be that parents and teachers see threats to academic success posed by ADHD symptoms as more negative, or impairing, for boys than girls. Thus, in response to poor academic performance, boys are more likely to be referred for learning assistance than girls in an effort to improve their grades. Although we found that there were no differences in parents' and teachers' perceived seriousness (disruptiveness) boys' versus girls' overall problems, this is likely because this rating was an overall rating of the child's problems, not specific to academic problems that may be expected to arise as a result of the behavior problems. We suspect that, if we had asked a more specific question about disruption to academic matters, we would have obtained a gender difference on that rating.

### Limitations

As with any study, there are limitations. Although the vignette methodology was critical in order to equate

vignettes on all factors other than gender (e.g., symptom type, severity, number, and comorbidity), it limits ecological validity. That said, studies that have examined the relationship between parents' responses to vignettes and their behavior suggest good overlap (Johnston & Freeman, 1997). A second limitation of our study is that although the children described in the vignettes met *DSM-IV-TR* symptom criteria for ADHD and ODD, they did not meet full diagnostic criteria (i.e., age of onset and length of time of the behavior problems were not described). In addition, the majority of our participants were of European Caucasian descent, which may not be representative of populations in other countries. Future research into how ethnicity (of both participant and child) influences gender gaps in service access is needed.

Another potential limitation of our study is that our sample was predominantly female. Although we reanalyzed the data including only women and obtained the same results, analyzing gender differences for males only was not possible given the limited number of male participants. Thus, the degree to which these results can be extended to fathers or male elementary school teachers is not known. The potential relevance of this issue is highlighted by past research showing that male teachers may underreport boys' externalizing behavior and overreport girls' internalizing behavior (a finding that might extend to parents; Kavanagh & Hops, 1994). These reporting biases could influence referral rates, such as by decreasing male teachers' (or perhaps fathers') gender gap in seeking services for ADHD. That said, it is important to note that our sample is representative of the general population of primary caregivers (most of whom are mothers) and elementary school teachers (most of whom are female).

### Implications for Policy, Research, and Practice

Our results provide direct evidence for why a consistent and significant gender gap has been found in service seeking for ADHD, namely, parents and teachers access services for boys more than girls with ADHD because they perceive greater benefits of learning assistance for boys. Given that education programs targeted at reducing negative beliefs about populations with mental illness have been effective (e.g., Corrigan et al., 2001), one possible avenue for reducing the gender gap may be to educate teachers and parents about the effectiveness of treatments for ADHD for both boys and girls. This should emphasize the importance of academic success for both genders, thereby reducing perceptions that boys with ADHD are more in need of learning assistance than girls with equivalent symptoms. Our findings may also provide a path for understanding gender gaps in service use for other child mental health

disorders. Generally, mental health disorders in youth have detrimental academic consequences (Mash & Wolfe, 2006). Thus, to the extent that more importance is placed on academics for boys than girls in general, not just for those with ADHD, parents and teachers may view mental health symptoms as more detrimental for boys than girls, and access services accordingly.

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## APPENDIX

*Example of a Vignette of a Child with ADHD Only (Daniel/Danielle)*

Daniel is a 9-year-old boy. Daniel's teacher describes him as always moving, from squirming in his seat to wandering around the classroom, chattering endlessly instead of doing his work. His teacher says that Daniel doesn't do what is asked of him, such as cleaning out his desk, despite constant instructions. He starts work late because he often misplaces what he needs and he then gets sidetracked. While doing his work, he often rushes or starts to do something else, and then turns in his work without checking. According to his parents, Daniel never seems to focus on what they say or ask of him, even when they repeat themselves several times. His behavior with other children his age is similar. He often intrudes on what they are doing and doesn't wait for his turn, or doesn't seem to concentrate on what is happening in their games.

*Example of a Vignette of a Child with ADHD + ODD (Andrew/Andrea)*

Andrew is a 9-year-old boy. Andrew's parents say that getting him to do homework or chores is tough because he either avoids them or becomes sidetracked. When his parents remind him, Andrew argues with them and gets mad and stays that way for a while. His teacher says that Andrew's schoolwork is poor because he either rushes to complete it or doesn't follow instructions. His teacher also says Andrew is constantly talking and doesn't listen to what she says. He often answers questions before thinking, or is argumentative. Andrew consistently loses his workbooks and belongings and often accuses other students of taking them. Andrew is hardly ever still; if he is not banging on the desk with his pencils, he is wandering around the room trying to talk to students. Peers avoid Andrew because he pesters them to hurry or tries to take their turn, and will bother them on purpose.