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Review Article

Gender Differences in Juvenile Attention-Deficit/Hyperactivity Disorder

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Abstract

Attention-Deficit/Hyperactivity Disorder (ADHD), a disorder characterized by significant problems with attention, impulsiveness and excessive activity, is one of the most prevalent childhood psychiatric disorders and one of the most common reasons why juveniles with behavior problems are referred to health service providers.

INTRODUCTION

Attention-Deficit/Hyperactivity Disorder (ADHD), a disorder characterized by significant problems with attention, impulsiveness and excessive activity, is one of the most prevalent childhood psychiatric disorders and one of the most common reasons why juveniles with behavior problems are referred to health service providers [1]. Although ADHD was believed to only be a male disorder for much of the 20th century, it is now clearly accepted that females can have the disorder [2]. For example, in the United States approximately 6.2% of girls (14.1% boys) between the ages of 5-17 have been diagnosed with ADHD according to parental report. With this recognition has come a consideration of what, if any, are the gender differences in ADHD. This short communication will address this issue by summarizing the findings on gender differences in juveniles in the categories that have received the most research attention: prevalence, symptoms, outcomes, and treatment.

Prevalence

Gender differences in prevalence can be considered in terms of overall prevalence rate and prevalence rate in subtypes. Regarding overall prevalence, a highly reliable finding is that in childhood males outnumber females by approximately 3:1 in the general population, and by ratios as high as 9:1 in clinic populations, with this difference diminishing in adults [2,3]. It is thought that the most likely reason for the much higher clinic ratio is that boys with ADHD are more likely than girls to develop disruptive behavior problems which motivate parents and teachers to seek help [2,3]. Although the reason (s) for the greater male prevalence in the general population are not completely known, two plausible explanations are the slower brain development in boys and the greater male vulnerability to a host of pre- and peri-natal problems such as preterm birth which have been linked to the development of ADHD [2,4,5]. The attenuation of the sex difference in adulthood may be due to two factors [2]. Regarding general population prevalence, the difference may attenuate because delayed maturation, which can be a cause of ADHD and which is more common in males, is lessened. Regarding prevalence in clinical populations, since referral is self-motivated (not parental motivated as in childhood) and women are more likely to seek help for a variety of problems (including those that are ADHD-related), women are as likely, if not more likely, to self-refer.

Regarding subtype prevalence, again a distinction needs to be made between general and clinical populations. Although the findings are less clear than those of overall prevalence, it appears that there is gender equivalence in subtype rates in the general population. However, in clinic populations, boys are more likely to present with the combined subtype than the inattentive subtype, whereas girls are more likely to present with the inattentive subtype [2,6]. Again, the most likely reason for this difference is that boys with the predominantly hyperactive/impulsive type of presentation of ADHD are also more likely to be have comorbid disruptive behavior problems precipitated, in part, by their hyperactive/impulsive symptoms thereby prompting parents and teachers to seek help.

Symptoms

Once it became recognized that girls can have ADHD, questions were raised regarding whether there were differences in the ways the genders expressed the symptoms of ADHD. Overall, ADHD rating scales are psychometrically equivalent for boys and girls, and there is little evidence for sex-specific expression of ADHD symptoms [2,6]. However, boys make exhibit more severe ADHD symptoms [7]. In addition, girls may tend to be more hyper verbal than boys and a girl's impulsivity may also be more verbal than behavioral [2,6]. For example, a highly impulsive girl may be

less likely than a boy to run out into traffic but more likely to pick the first answer on a multiple choice test [6].

Outcomes

In marked contrast to the paucity of search on sex-specific ADHD symptoms (which accounts for the brevity of the prior discussion), there is a rather ample amount of research on the outcomes of ADHD. This research can be classified into three domains: persistence of symptoms and diagnostic status, comorbidity, and functional outcomes.

Persistence of Symptoms and Diagnostic Status

Although ADHD was once believed to be a transient childhood problem, it is now widely recognized that many cases persist into adolescence and adulthood. Thus, research has found that of all children with ADHD, 45%-85% continue to show symptoms into adolescence while 50%-60% continue to show symptoms into adulthood with the most recent findings coming from the Multimodal Treat Study of ADHD (MTA). This study 579 children (465 males) diagnosed with combined type ADHD at ages 7-9 is the largest longitudinal study to date with the most representative, generalizable clinical sample of children with ADHD in the United States [8]. In the most recent follow-up of 453 of the participants at a mean age of 25 years 50% of the participants had persistent ADHD based upon *DSM*-5 criteria as assessed by self-report [9]. There were no gender differences in rates of persistence. This finding coheres with the overall finding of few known gender differences in the developmental progression of ADHD from childhood to adulthood [2].

Comorbidity

Comorbidity has been examined most extensively in the externalizing domain, e.g. conduct disorder (CD), and the internalizing domain, e.g., anxiety. Adolescent and adulthood outcomes in the externalizing domain have been well researched and the major finding is that ADHD is a risk factor for externalizing problems at all ages for both genders [2]. For example, meta-analyses have reported odds ratios for comorbid CD for children with ADHD compared to those without ADHD of 10.7 for boys and 9.4 for girls, with boys however more likely than females to develop more severe externalizing problems such as physical aggression in childhood, and violence and substance abuse in adolescence [10-12]. Despite comparable levels of greatly increased relative risk for boys and girls compared to their non-ADHD peers, it is not likely that this increased risk results in equivalent rates of comorbid externalizing problems for boys and girls with childhood ADHD since boys in general have higher rates for externalizing problems, regardless of ADHD status [5]. However, since data based upon parental report yields equivalent rates of externalizing problems in contrast to the much lower female rate reported in a study using objective observational data, somewhat surprisingly, the "jury is still out" on this issue[2]. Lastly, conduct problems, the most often identified predictor of problematic adult outcome in boys with ADHD, also predict overall worse functioning in adulthood for females [13].

Regarding the risk ADHD poses for problems in the internalizing domain, although the evidence is less robust than it is for externalizing problems, it does appear that childhood ADHD increases risk for internalizing problems in adolescence for both sexes, with the risk being somewhat stronger for girls than boys [2]. Most recently, the increased risk for internalizing problems is perhaps most strikingly evident for non-suicidal self-injury as indicated by the findings in the Berkeley Girls with ADHD Longitudinal Study [14]. At an average age of 19.6 the rates for engaging in non-suicidal self-injury for girls with childhood ADHD were 51% (ADHD-combined presentation), 29% (ADHD-predominantly inattentive presentation), and 19% (comparison group). In addition, it should be noted girls generally have higher rates of internalizing problems than boys, regardless of ADHD status [2]. Lastly, despite the high rate of comorbid anxiety disorders (37.7%) compared to the lower rate of comorbid conduct disorder (12.8%) for girls with ADHD, the relative odds of having these comorbidities when compared to girls without ADHD are much higher for conduct disorder (9.4) than for an anxiety disorder (3.2) [2]. This large difference in relative odds also occurs in boys with ADHD compared to their non-ADHD peers (10.7, conduct disorder; 3.0, anxiety) [10]. This finding of a large odds ratio difference between conduct problems and anxiety problems for girls is especially important since girls who are clinic referred for ADHD, in contrast to boys who are clinic referred for ADHD, are often only treated for their internalizing symptoms, even when externalizing symptoms are obviously present [12].

Functional Outcomes

Children with ADHD compared to their non-ADHD peers are more likely to develop impairments in virtually every domain that has been measured, e.g., academic, occupational, social, driving [2,15]. Overall, boys and girls experience the same level of risk of impairment in the various domains, with perhaps boys having more trouble in school than girls, especially with behavior as opposed to academic achievement [2].

TREATMENT

The literature is quite clear in finding that boys and girls have an equivalent response to treatment for ADHD [2]. The clearest evidence comes from The Multimodal Treat Study of ADHD (MTA) of 579 children (465 males) diagnosed with combined type ADHD at ages 7-9 as it is the largest study to date with the most representative, generalizable clinical sample of children with ADHD (McGough, 2016). The goal of the study was to investigate the relative success of four treatment strategies to which the children were randomly assigned: behavioral treatment, medication management, treatment combining behavior and medication management, and typical community as-usual treatment (most of whom were treated with medication (MTA, 1999, Connor). At the 14-month outcome, both the medication management and combined management showed significant improvement in ADHD symptoms, and both were superior to behavior management alone and community treatment as usual ((MTA, 1999, Connor). Overall, there were no significant gender differences in the response to treatment (Owens 2003). Similarly, and most recently, a study of behavioral treatments of children with ADHD- inattentive type (58% boys) found that the treatments worked equally well for boys and girls. The authors also noted that this result was consistent with findings from prior studies of medical and behavioral treatments for ADHD (Owens

2016). In short, the literature has consistently failed to find and gender differences in treatment response for either the combined type or predominantly-inattentive type of ADHD.

CONCLUSION

Now that the reality of female ADHD has finally been clearly recognized, the big picture conclusion is that girls generally do not show unique symptoms, correlates, or outcomes. In short, ADHD is a serious, debilitating, persistent disorder for both genders with the similarities far outweighing the differences. Although girls with ADHD may be at higher risk for internalizing disorders than boys with ADHD, who may show a higher risk for externalizing disorders, these gender differences are the same as those seen in the general population and therefore are not specific to ADHD. The overall conclusion of a lack of gender differences in juvenile ADHD notwithstanding, two important findings related to externalizing and internalizing problems should not be overlooked. First, girls with ADHD compared to their non-ADHD peers are at much higher relative risk for having a conduct disorder than an anxiety disorder. Second, in the internalizing domain, special attention should be given to evaluating for non-suicidal self-injury in girls with ADHD.

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