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Does Attention Deficit Hyperactivity Disorder increase the risk of suicide attempts?

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Abstract

Objective—To determine if Attention Deficit Hyperactivity Disorder (ADHD) is a risk factor for suicide attempts.

Methods—Data were drawn from the National Comorbidity Replication Survey (NCS-R), a nationally representative sample of adults (N = 8098).

Results—Of the 365 adults with current ADHD, 16% attempted suicide. After controlling for the presence of comorbid disorders, logistic regression analyses revealed that the ADHD was not a not a strong predictor of suicide attempts; having one or more comorbid disorders was associated with fourfold to twelvefold elevated risk.

Limitations—The small sample size of respondents with ADHD who attempted suicide significantly reduced the probability of determining which specific comorbid disorders were correlated with parasuicide.

Conclusions—Early treatment of ADHD and comorbidity may reduce the risk of suicide attempts and improve its prognosis.

Keywords

Attention Deficit Hyperactivity Disorder; Suicide attempts; Comorbid disorders

In 2006 suicide was the eleventh leading cause of death in the United States. Despite increased public health prevention efforts aimed at reducing stigma for seeking mental health treatment, the provision of early treatment interventions and suicide prevention strategies, suicide rates have not decreased in many industrialized nations (Mann et al., 2005).

In the recent general population surveys conducted in the United States, lifetime parasuicide rates have ranged from 4.0% (Briere and Gil, 1998) to 4.6% (Kessler et al., 1999). Welch (2001), in a literature review, found the following risk factors: female gender, previous suicide attempts, divorced or single marital status, low socioeconomic status, and being younger. With respect to mental disorders, epidemiological studies have consistently found that mood disorders, substance use disorders, anxiety disorders, and nonaffective psychoses substantially increase the risk of suicide attempts (Kessler et al., 1999; [Bernal et al., 2007], [Borges et al., 2006] and Mann et al., 2005 J.J. Mann, A. Apter, J. Bertolote, A. Beautrais, D. Currier, A. Haas, U. Hegerl, J. Lonnqvist, K. Malone, A. Marusic, L. Mehlum, G. Patton, M. Phillips, W. Rutz, Z. Rihmer, A. Schmidtke, D. Shaffer, M. Silverman, Y. Takahashi, A.

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Conflict of interest
The authors have no conflict of interest.

Varnik, D. Wasserman, P. Yip and H. Hendin, Suicide prevention strategies: a systematic review, Jama 294 (2005), pp. 2064–2074. Full Text via CrossRef | View Record in Scopus | Cited By in Scopus (435)[Mann et al., 2005]).

Though a substantial proportion of the US population, 8.1%, have lifetime Attention-Deficit/Hyperactivity Disorder (Kessler et al., 2005a), and 4.4% of the adult population ADHD in the past year (Kessler et al., 2006), the relationship between ADHD and parasuicide has not been examined in large national community samples.

1. Prevalence of comorbidity in ADHD

Elevated rates of co-occurring mental disorders have been found among populations with ADHD in the general community. Studies conducted in the United States, have found that between 20% and 30% of children with ADHD have had an episode of major depression ([Anderson et al., 1987] and [Bird et al., 1988]). Among children and adolescents, Bird et al. (1993) noted the following rates of comorbid disorders: depression (26.8%), anxiety disorders (50.8%) and conduct/oppositional disorders (93%). In a general community study of 186 boys, Mannuzza et al. (1993) found that hyperkinetic boys were significantly more likely than normal controls to develop a wide variety of major psychiatric disorders by adulthood.

2. Consequences of comorbidity

The presence of comorbidity in ADHD is correlated with poorer prognosis. Biederman et al. (1996), in a prospective four-year follow-up study of clinically referred boys with ADHD, found that those with comorbid anxiety disorders, mood disorders, conduct disorder or oppositional disorder had poorer psychosocial outcomes compared to subjects without comorbid disorders. Among adult outpatients with ADHD, those with conduct disorder and bipolar disorders had an earlier onset of substance use disorders (Wilens et al., 1997).

In cross-national community studies of adults with ADHD, investigators found elevated rates of work disability and impairments in social functioning, even after controlling for co-occurring mental disorders and socio-demographic variables (Fayyad et al., 2007).

3. ADHD association with death by suicide

In a literature review paper James et al. (2004) concluded that ADHD alone was not associated with an increased probability of attempting suicide, but when combined with other psychiatric conditions, ADHD was a risk factor. Hence, we analyzed a large general population survey database to empirically test this conclusion.

4. Methods

4.1. Sample

The National Comorbidity Survey Replication (NCS-R) is a nationally representative survey of English-speaking household residents ages 18 and older carried out between February 2001 and April 2003. Face to face interviews were completed with 9282 respondents. The response rate was 70.9%. Consent was verbal. The Human Subjects Committee of Harvard Medical School and the University of Michigan both approved recruitment and consent procedures. The interview was administered in two parts. Part l was administered to all respondents and included a core diagnostic assessment. Part II was administered to a probability sub-sample of 5692 Part I respondents (100% of those with any Part l disorder and a probability sub-sample of others), and included questions about correlates and additional disorders. ADHD was evaluated in Part II and further restricted to respondents in

the age range 18–44 (n = 3197) based on concern that older subjects would be less reliable in recalling childhood behaviors. The ADHD sub-sample was weighted to be representative of the United States population.

Subjects in the ADHD sub-group were split into four sampling strata based on their responses to the main NCS-R interview: those who denied ever having symptoms of childhood ADHD; those who reported too few childhood symptoms to meet criteria for childhood ADHD; those who reported adequate symptoms to be retrospectively classified childhood cases, but who denied adult symptoms, and childhood cases who reported adult symptoms.

An attempt was made to contact by telephone and administer a semi-structured adult ADHD clinical inter to 30 respondents in each of the first three strata and 60 in the fourth. The final sample of 154 respondents was slightly larger than the target because more pre-designated respondents kept their interview appointments than expected. Clinical reappraisal sample respondents were weighted to be representative of the United States population in the age range of the sample.

5. ADHD diagnosis

The NCS-R assessment of childhood ADHD was based on the Diagnostic Interview Schedule for DSM-IV (Robins and Helzer, 1985). The clinical reappraisal interviews, in comparison, included comprehensive evaluations of ADHD based on the Adult ADHD Clinic Diagnostic Scale (ACDS) V 1.2 ([Adler and Cohen, 2004] and [Adler and Spence, 2004]), a semi-structured interview that includes the ADHD Rating Scale (ADHD-RS) (DuPaul et al., 1998) to evaluate current adult ADHD. The ACDS has been used in several clinical trials of adult ADHD ([Michelson et al., 2003] and [Spencer et al., 2001]). Four experienced clinical interviewers (all Ph.D. clinical psychologists) carried out the ACHS reappraisal interviews. Clinical interviewers received 40 h of training from two board certified psychiatrists who specialize in adult ADHD and successfully completed five practice interviews. All interviews were tape recorded and reviewed by a clinical supervisor. Weekly meetings were used to prevent diagnostic drift. A clinical diagnosis of adult ADHD required symptoms of either inattention during the six months before the interview (DSM-IV Criteria A), at least two Criterion A symptoms before age seven (Criterion B), some impairment in at least two areas of living during the past six months (Criterion C), and clinically significant impairment in at least one of these areas (Criterion D). No attempt was made to operationalize DSM-IV diagnostic hierarchy rules (Criterion B). Inter-rater reliability for these diagnoses, as assessed by the intra-class correlation, was .78.

6. Comorbid diagnosis

Comorbid DSM-IV disorders were retrospectively assessed using Version 3.0 of the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI) (Kessler and Ustun, 2004), a fully structured lay-administered diagnostic interview that assesses the lifetime prevalence and age-of-onset of anxiety disorders (panic disorder, generalized anxiety disorder, specific phobia, social phobia, agoraphobia, obsessive–compulsive disorder, post-traumatic stress disorder, separation anxiety disorder), mood disorders (major depression, dysthymia, bipolar I, and II disorders), impulse control disorders (oppositional-defiant disorder, conduct disorder, intermittent explosive disorder), and substance use disorders (nicotine dependent, alcohol and drug abuse/dependence). OCD was assessed only in a random one-third of the Part II sample, while other comorbid disorders were assessed among all people who were used in making diagnoses. As detailed elsewhere (Kessler and Merikangas, 2004), good concordance was found between CIDI diagnoses and diagnoses based on the (First et al., 2002) in a probability sample of NCS-R respondents. Area under

the receiver operator characteristic curve (AUC) was in the range .65–.88 for substance disorders, and .76 for any anxiety, mood or substance disorder. No validation was made of the impulse-control disorders, as these are not assessed in the Structured Clinical Interview.

7. Suicidal behavior

Respondents who acknowledged having ever attempted suicide were classified as parasuicides, regardless of lethality of intention. For the purposes of this study, we did not define suicide attempt by distinguishing gestures from serious intention to die.

8. Analysis

All analyses were conducted using Statistical Analysis Software (SAS) version 9.1 and employed the appropriate NCS-R statistical weights to ensure the sample was representative of the general US population.

First, we used univariate associations to compare the sociodemographic and clinical characteristics of adults with ADHD who did or did not attempt suicide. Second, we used multivariate logistic regression techniques to evaluate the relationship between ADHD and parasuicide, controlling for relevant variables such as race, sex, education, and marital status.

9. Results

9.1. Bivariate associations

Attempters were less likely to have completed high school, be married, but more likely to have conduct disorder, oppositional defiant disorder, bipolar disorders, substance use disorders, and anxiety disorders. Surprisingly major depression and dysthymia were not found to be risk factors (Table 1).

View Within Article—Given the small number of suicide attempts (N = 59) among persons with ADHD and the large number of diagnostic categories, we lacked sufficient statistical power to determine which specific comorbid disorders were possibly linked to parasuicide. Thus we created a dichotomous variable which assessed the presence or absence of any comorbid diagnoses found to be associated with parasuicide in the univariate analyses; i.e. anxiety disorders, bipolar disorders, conduct disorder and oppositional defiant disorder. We modeled the odds of parasuicide as a function of socio-demographic variables, number of comorbid disorders and its interaction with ADHD. The interaction was not statistically significant so the model only included the main effects of ADHD, comorbidity and sociodemographics. ADHD increased the risk of parasuicide 1.5 fold (OR = 1.5, 95% CI = 1.1, 2.1, p = .05). Having one comorbid disorder was associated with an approximate fourfold risk of attempting suicide (OR = 4.3, 95% CI = 3.3, 5.5, p = <.01), having two or more comorbid disorders further increased the likelihood (OR = 12.4, 95% CI = 9.0, 16.9, p = <.001) of parasuicide. As expected, females had an increased risk of parasuicide (OR = 1.9, 95% CI = 1.5, 2.3, p = <.01). Compared to married respondents, divorced/separated (OR = 1.7, 95% CI = 1.3, 3.2, p = .01) and single respondents (OR = 1.4, 1.0, 1.8, p = .01) had an elevated rates of parasuicide. Compared to respondents > 50 years old, respondents between 18 and 30 (OR = 1.7, 95% CI = 1.2, 2.4, p = .004) and respondents between 41 and 50 (OR = 1.8, 95% CI = 1.3, 2.5, p = <.001) were more likely to have attempted suicide. Relative to persons with bachelor degrees, respondents who did not complete high school had a twofold greater risk of parasuicide (OR = 2.3, 95% CI = 1.6, 3.3, p = <.001).

10. Discussion

This study confirmed James et al. (2004) conclusion, based upon a literature review, that ADHD alone was not strongly associated with an increased probability of attempting suicide. The presence of comorbid conditions was a much more powerful predictor of parasuicide. Compared to ADHD alone, having one or more mental disorders conferred a fourfold to twelvefold greater risk of parasuicide. These data highlight the importance of controlling for other psychiatric disorders when exploring associations between ADHD and parasuicide.

The failure to detect a statistically significant interaction between ADHD and the number of comorbid disorders was unexpected. We suspect that this was due to the unreliability of retrospective self-reports regarding past psychopathology, which has been observed in cross-sectional epidemiological surveys ([Andrews et al., 1999], [Merikangas et al., 2007], [Patten, 2003] and [Patten, 2009]). Also, the small sample size reduced the probability of detecting significant interactions. The finding that ADHD was a predictor of parasuicide, after controlling for the effects of other psychiatric disorders and sociodemographic variables, was surprising. However, the magnitude of the risk was relatively small. We suspect this was a chance finding, which needs to be replicated to confirm its validity.

These results are generally consistent with studies of general populations and clinical samples demonstrating a robust association between suicidal behavior and disruptive disorders ([Brent et al., 1999] and [Renaud et al., 1999]), anxiety disorders ([Algulander, 2000] and [Cougle et al., 2009]) and mood disorders ([Baldessarini et al., 2006] and [Hawton et al., 2005]).

As noted by Kessler et al. (2005a), there are several limitations regarding the assessment of ADHD in the NCS-R. The criteria for ADHD were developed for children and may not be applicable to adults. This is of potential concern because reports show that symptoms are more heterogeneous in adults than in children (DeQuiros and Kinsbourne, 2001). Two, even though the clinical interview has been used in previous studies, no standard clinical validation of adult ADHD exists.

Despite the evidence supporting the link between major depression disorder ([Kessler et al., 1999], [Kessler et al., 2005b] and [Sokero et al., 2005]) and suicide behavior, we failed to find this association in our study of ADHD. Similarly, we did not find an association between substance use disorders and suicide behavior reported by other investigators (Welch, 2001; [Hughes, 2008] and [Kessler et al., 1999]). We suspect that our sample of persons with ADHD was too small to adequately test the strength of these specific comorbidities.

These results should alert healthcare providers that the presence of comorbid disorders among persons with ADHD is a risk factor for parasuicide. The early identification and treatment of ADHD and comorbid conditions may reduce the likelihood of self-harm.

Further epidemiological studies are needed, using large samples of adults with ADHD to determine what specific comorbid conditions best predict suicide behavior.

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Table 1

Sociodemographic Correlates of Respondents with Lifetime Attention Deficit Hyperactivity Disorder who Attempted Suicide.

	ADD		ADD		Odds ratio	95% confidence interval
	Suicide attempts		No suicide attempts			
Sociodemographic variable (N)	N = 59		N = 306			
	%	SE	%	SE		
Sex						
Males (N = 186)	52.9	8.2	58.3	3.3	.81	.40, 1.6
Race						
White (N = 293)	85.4	4.7	84.2	2.2	1.0	.44, 2.5
African-American/Hispanic (N = 44)	10.5	3.9	9.4	1.7	1.1	.43, 2.8
Other (N = 19)	4.1	2.8	2.9	.81	1.4	.31, 6.3
Age						
18–24 (N = 88)	24.1	7.2	26.6	3.1	1.2	.11, 12.1
25–40 (N = 207)	47.0	8.2	56.0	3.3	1.1	.11, 10.5
41–66 (N = 65)	29.0	7.2	17.4	2.3	2.2	.22, 22.4
Employment						
Working (N = 269)	68.8	8.0	74.9	3.0	.77	.42, 1.4
Marital status						
Married (N = 135)	19.8	5.6	40.4	3.4	.42	.22,.82**
Separated/divorced (N = 82)	33.0	8.0	19.8	2.9	5.3	2.7, 10.6**
Single (N = 148)	47.2	8.2	39.8	3.3	1.4	.78,.24
Education						
College graduate (N = 47)	6.1	3.3	14.8	2.6	.41	.14, 1.2
Some college (N = 118)	23.6	6.1	30.9	3.0	1.9	.51, 6.8
High school (N = 127)	31.9	8.1	38.2	3.5	2.0	.53, 7.9
Less than HS (N = 73)	38.5	8.1	16.0	2.3	5.8	1.6, 21.9**
Lifetime diagnosis						
Conduct disorder (N = 103)	50.8	8.2	24.5	2.9	3.2	1.6, 6.5**

	ADD		ADD		Odds ratio	95% confidence interval
	Suicide attempts		No suicide attempts			
Sociodemographic variable (N)	N = 59		N = 306			
	%	SE	%	SE		
Oppositional defiant disorder (N = 156)	64.3	7.8	41.2	3.4	2.6	1.3, 5.3**
Major depression disorder (N = 119)	35.5	8.2	30.5	3.0	1.2	.59, 2.7
Dysthymic disorder (N = 22)	12.6	6.1	5.1	1.3	2.7	.80, 9.0
Bipolar disorders (N = 56)	9.9	1.7	1.3	.13	1.3	1.1, 1.6**
Intermittent explosive disorder (N = 99)	31.6	6.9	24.7	2.8	1.4	.71, 2.8
Substance use disorders# (N = 182)	40.1	3.1	10.4	2.0	1.8	.87, 3.7
Anxiety disorders (N = 241)	79.4	5.8	57.6	3.5	2.8	1.3, 6.0**

Full-size table

Boldface type indicates significance.

** p < =.01.