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Attention deficit hyperactivity disorder and its influence on adolescent pregnancy

Keri Haars
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ATTENTION DEFICIT HYPERACTIVITY DISORDER AND ITS INFLUENCE ON ADOLESCENT PREGNANCY

A Thesis

Presented to

the Faculty of the Department of Psychology

San Jose State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

by

Keri Haars

December, 1997

APPROVED FOR THE DEPARTMENT OF PSYCHOLOGY

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ABSTRACT

ATTENTION DEFICIT HYPERACTIVITY DISORDER AND ITS INFLUENCE ON ADOLESCENT PREGNANCY

by Keri Haars

The present study investigated the relationship between adolescent pregnancy and attention deficit hyperactivity disorder (ADHD). Impulsivity is a characteristic of ADHD. Adolescents with ADHD may display impulsive sexual behavior, which could interfere with the use of birth control. This study assessed a sample of 15-19 year old adolescent birth mothers for ADHD and compared this rate to a control sample of non-pregnant adolescents. Participants took the short form of the Connor Rating Scale Revised (CASS:S) and the Gordon Diagnostic System (GDS) to test for ADHD and impulsivity. Analyses revealed that the control group showed more signs of ADHD on CASS:S, and the pregnant group showed more signs of ADHD on the GDS. This study suggested there is a conflict between ADHD measures, and intermeasure reliability should be further assessed.

ACKNOWLEDGMENTS

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Requests for reprints should be sent to Keri Haars, Department of Psychology, San Jose State University, San Jose, California 95192.

Abstract

The present study investigated the relationship between adolescent pregnancy and attention deficit hyperactivity disorder (ADHD). Impulsivity is a characteristic of ADHD. Adolescents with ADHD may display impulsive sexual behavior, which could interfere with the use of birth control. This study assessed a sample of 15-19 year old adolescent birth mothers for ADHD and compared this rate to a control sample of non-pregnant adolescents. Participants took the short form of the Connor Rating Scale Revised (CASS:S) and the Gordon Diagnostic System (GDS) to test for ADHD and impulsivity. Analyses revealed that the control group showed more signs of ADHD on CASS:S, and the pregnant group showed more signs of ADHD on the GDS. This study suggested there is a conflict between ADHD measures, and intermeasure reliability should be further assessed.

Attention Deficit Hyperactivity Disorder and Its Influence on Adolescent Pregnancy

Adolescent pregnancy can be emotionally and economically devastating. One would hope that adolescents who engage in sexual behavior would be responsible enough to use birth control. Many adolescents take the necessary precautions, but there are a substantial number who do not. Extensive research has been conducted to determine which factors contribute to adolescent pregnancy. Zelnik and Kantner (1979) found that in some cases, adolescent pregnancy can be attributed to the unexpectedness of having intercourse. Sexual intercourse for adolescents can be sporadic and infrequent. Zelnik and Kantner suggested adolescents are unprepared for intercourse and therefore lack the proper birth control methods.

Scott (1983) found that 89% of Caucasian pregnant adolescents and 80% of African American pregnant adolescents reported "being in love" with their sexual partner. Approximately 75% of those adolescents had aspirations of marrying the father of their child in the near future. Scott suggested that adolescents are more willing to put themselves at risk for pregnancy because they are "in love" and hope to marry their partner in the future.

Other studies have found an external locus of control to be a characteristic of pregnant adolescents. External locus of control is marked by the belief that personal outcomes are dependent on luck, fate, or the actions of others than one's own ability or effort (Shaffer, 1994). Perhaps an external locus of control renders sexually active adolescents less likely to use birth control due to the lack of taking personal responsibility for their actions (McIntyer, Saudargas, & Howard, 1991). McIntyre et al. (1991) found that adolescents who experienced pregnancy manifested more external

attributional orientations than peers who had never been pregnant.

Furthermore, Byer, Shainberg, and Jones (1985, chap. 15) have suggested a lack of sexual and contraceptive education, as well as peer pressure and the media, as contributing factors to adolescent pregnancy. However, one factor has been overlooked. Attention Deficit Hyperactivity Disorder (ADHD) may play a role in adolescent's failure to use birth control and resulting pregnancy. A characteristic of ADHD is impulsivity. If an adolescent, either male or female, has ADHD they may be unable to stop and think of the responsibility and consequences of their sexual activity, and this failure to examine the consequences may lead to an unwanted pregnancy.

Rosenthal, Muram, Tolley, Peeler, and Pitts (1992) found a relationship between impulsivity and adolescent sexual behavior. In a sample of African American adolescent girls, those who had rated themselves as having high to moderate number of sexual experiences scored higher on the impulsivity and anxiety scales of the Eysenck Personality Questionnaire (EPQ) than girls who rated themselves as having no or low sexual experiences. Rosenthal et al. (1992) suggested that girls who are more impulsive may engage in more sexual activity than girls who are less impulsive.

There are very few options open to pregnant adolescents. They can either have an abortion, keep the child, or give the child up for adoption. If ADHD is a factor in adolescent pregnancy, and a portion of these children are put up for adoption, then there may be a higher representation of adopted children having ADHD. Deutsch et al. (1982) found an over representation of adopted children in a sample of children diagnosed with Attention Deficit Disorder (ADD). They suggested that there may be a genetic link between the ADD of the child and the biological parent. Dalby, Fox, and Haslam (1982)

looked at a more representative pediatric sample from an Alberta Children's Hospital. The children diagnosed with ADHD were more likely to be adopted.

There is evidence that ADHD has a genetic component. Heffron, Martin, and Welsh (1984) found all of three monozygotic (MZ) twin pairs to have ADD, while only 17% of the dizygotic (DZ) twins had concordance for ADD. Stevenson (1992), using a larger sample of MZ and DZ twins, reported evidence for heritability of hyperactivity. Investigations of family histories have shown a higher frequency of ADHD among first degree relatives.

Biederman, Faraone, Keenan, Knee, and Tsuang (1990) found 25.1% of the relatives of individuals with ADD also had ADD. Cook et al. (1995) found a significant association between ADHD and a dopamine transporter locus (DAT1) in the children, as well as parents of the children having ADHD. This dopamine transporter gene has recently been linked to ADHD. LaHoste et al. (1996) found a more frequent occurrence of the 7 fold repeat form of the dopamine D4 receptor gene in children with ADHD.

There is evidence for a higher rate of psychiatric disorders in families of children with ADHD. Parents and first and second degree relatives of children with ADHD have been found to have higher frequencies of alcoholism, drug abuse, mood disorders, delinquency, learning disabilities, and antisocial disorders (Biederman et al., 1990; Roizen et al., 1996). Similarly, in an earlier study, Horn, Green, Carney, and Erickson (1975) found unwed mothers to have significant elevation in psychopathology scales of the MMPI, in comparison to married pregnant women and 18-year-old women.

Since it is likely that many adoptees are the children of unwed mothers, and as discussed above these mothers may be particularly susceptible to genetically-influenced problems such as ADHD, then such children given up

for adoption may be expected to have more psychiatric disorders than children from adult wedded mothers. In other words, adoptees with ADHD may be the offspring of teenage parents who also have ADHD. If this situation is true, we will need to take a different approach in the way we attempt to prevent adolescent pregnancy, such as developing intervention programs that address special needs of adolescents with ADHD. The purpose of this study was to investigate the possibility of a relationship between adolescent pregnancy and the impulsivity component of ADHD. It was predicted that adolescent mothers would score higher on clinical scales that measure ADHD and impulsivity compared to adolescents who are not pregnant or have not had children.

Method

Participants

Participants ranged in age from 15 to 19 years and were chosen from continuing education programs for adolescent mothers and from female high school students in the same school district throughout the San Francisco Bay Area. The pregnant group consisted of 35 adolescent mothers that were either pregnant or had already given birth. The control group consisted of 34 non-pregnant female high school students that matched the pregnant group's age and school district. Written consent from the adolescent's parents was obtained in order to participate in the study. Participation was compensated by breakfast or a pizza party for all participants.

Materials

The Connor Rating Scale Revised (CASS:S) short form for adolescents and the Gordon Diagnostic System (GDS) were the measures used to assess ADHD and impulsivity (Conners & Wells, 1997; Gordon, 1983). Data were collected from nine different subscales. The CASS:S contained four of the nine

subscales and was completed by both the pregnant and control adolescent groups. The CASS:S is a self report, 27 item test that measures the following four clinical subscales: Conduct Problems, Cognitive Problems, Hyperactivity, and Conners' ADHD index.

The Gordon Diagnostic System was used to further assess ADHD and included a measure of impulsivity. The GDS is a microprocessor-based, portable unit that administers a series of game-like tasks. The Gordon Diagnostic System has two tasks: performance on the Delay Task, which is evaluated with three subscales (the Efficiency Ratio, Total Number of Responses, and Total Number of Correct), and performance on the Adult Vigilance Task which is evaluated with two subscales (Total Commissions and Total Correct). Both tasks were completed by the two groups. The Delay Task assessed impulsivity by testing the adolescent's ability to refrain from responding in a self-paced setting (Gordon, 1983). The Adult Vigilance Task tests for the ability to focus and maintain attention and self control over a period of time (Gordon, 1983).

It was hypothesized that if ADHD was a factor in adolescent pregnancy, the pregnant group would score higher on ADHD and Hyperactivity Subscales than the non-pregnant control group, but no differences would be seen on the Conduct Problems and Cognitive Problems subscales. A significant main effect for the Group and for Subscale Factor would be consistent with this hypothesis, but it would be more directly supported if there was a significant Group by Subscale interaction. If the interaction were significant, then the specific hypotheses would be tested by planned comparisons on each subscale contrasting the performance of the pregnant and control groups.

Procedure

Participants were each given the CASS:S and answered all 27 questions in their classroom setting. The CASS:S took 15 minutes to complete. The GDS was completed one participant at a time in a separate, quiet room. It took 30 minutes to complete both tasks of the GDS.

Results

The means and standard deviations of the nine scaled scores for each group are presented in Table 1. There were 10 cases of missing data from the GDS, and these were evenly distributed between the two groups. A high score of 66 or above on the T score rating of the CASS:S subscales indicates an abnormal range. There were five cases of adolescents scoring in the abnormal range (3 pregnant, 2 control) on the Conduct Problem subscale, three cases (2 pregnant, 1 control) on the Cognitive Problem subscale, two cases (1 pregnant, 1 control) on the Hyperactivity subscale, five cases (1 pregnant, 4 control) on the Conners' ADHD index, and four cases (1 pregnant, 3 control) on the GDS Delay task.

A Multivariate Analysis of Variance (MANOVA) was used to assess differences between group status (pregnant and control) on the nine measures and revealed a significant difference between group status [$F(1,56) = 9.41$, $p < .003$]. To explore the nature of these differences, a two-way mixed model Analysis of Variance (ANOVA) was used to analyze differences between groups and differences between measures. Group status (pregnant and control) was the between subject factor and was a quasi-independent variable. The Clinical Subscales on the CASS:S (Conduct Problems, Cognitive Problems,

Table 1

Descriptive Statistics of the CASS:S and the GDS

	Pregnant Group		Control Group	
ADHD Measures	Mean	Standard Deviation	Mean	Standard Deviation
Conduct Problems	52	8	52	7
Cognitive Problems	47	9	50	11
Hyperactivity	43	8	45	8
Conners' ADHD index	49	10	52	9
Delay Task Efficiency Ratio	0.89	0.11	0.87	0.10
Delay Task Total Number of Responses	54	15	63	11
Delay Task Total Number of Correct	48	9	53	9
Adult Vigilance Task Total Commission	0	1	0	1
Adult Vigilance Task Total Correct	29	2	30	3

Hyperactivity, and Conners' ADHD index) and the Delay Task and Adult Vigilance Task on the GDS were the within subject factors. The ANOVA revealed a significant difference on the between subject factor [E (1,56) = 9.41, $p < .003$], and a significant difference on the within subject factor [E (8,448) = 953.19, $p < .001$].

The between group effect for each of the subscales was further examined using the Univariate tests within the MANOVA. The Univariate test revealed a significant difference between groups on Conners' ADHD index subscale [E (1,56) = 4.60, $p < .036$] of the CASS:S. The mean scores were higher for the control group than the pregnant group.

The Univariate tests for the GDS revealed a significant difference between groups on the Delay Task's Total Responses [E (1,56) = 5.40, $p < .024$], with the mean score higher for the control group (63) than the pregnant group (54). A significant difference between groups on the Total Correct also was found [E (1,56) = 4.04, $p < .049$], with the mean score higher for the control group (53) than the pregnant group (48). The Total Correct score, per individual, is divided by the Total Response Score to get the Efficiency Ratio. The Efficiency Ratio is the main score used to determine ADHD characteristics. No difference was found between groups on the Efficiency Ratio [E (1,56) = .55].

A 2x2 (pregnant vs. control) x (abnormal vs. normal) Chi Square was used to assess if there were more abnormal cases for the control group on the CASS:S subscales and the GDS Delay Task when compared to the pregnant group. Data were collected from 69 participants on the CASS:S and 59 for the GDS. The Chi Square analysis revealed that pregnant and control group adolescents did not differ in terms of their likelihood to score in the abnormal range of the subscales.

A Pearson Correlation was used to assess if the subscales on the CASS:S and the GDS were interrelated. All the subscales on the CASS:S (Conduct Problems, Cognitive Problems, Hyperactivity, and Conners' ADHD index) were significantly related to each other (see Table 2). The Delay Task Efficiency Ratio and the Adult Vigilance Task, however, were not interrelated. There was only a marginal correlation [r=.24, p=.065] between the Efficiency Ratio of the Delay Task to the Total Commissions on the Adult Vigilance Task (see Table 3). Relationships between the CASS:S and the GDS included the Cognitive Problems subscale of the CASS:S that was significantly related to Delay Task's Total Number of Responses and the Total Number of Correct (see Table 4). However, the Hyperactivity subscale was not related to the Total Number of Correct on the Delay Task, and the ADHD subscale was not related to either the Total Number of Responses or Total Number of Correct on the Delay Task. None of the CASS:S subscales were related to the Adult Vigilance Task of the GDS.

Discussion

This study demonstrated that there were conflicting group differences with higher scores indicating ADHD characteristics in the high school control group, as scored on the CASS:S and higher scores indicating ADHD and impulsivity characteristics in the pregnant adolescent group, as scored on the GDS. However, when the number of abnormal cases were compared to the number of normal cases as indexed by the CASS:S and the GDS, there was no difference between the two groups. It was expected that any single group would have similar scores on the CASS:S and the GDS, since the measures were

Table 2

Within CASS:S Correlations

	CASS:S Subscales		
CASS:S Subscales	2	3	4
1. Conduct Problems	.36**	.41***	.60***
2. Cognitive Problems		.41***	.75***
3. Hyperactivity			.69***
4. Conners' ADHD index			

* $p \leq .05$ ** $p \leq .01$ *** $p \leq .001$ df=68

Table 3

Within GDS Correlations

	GDS Subscales			
GDS Subscales	2	3	4	5
1. Delay Task Efficiency Ratio	-.61*** df=60	.05 df=60	.24 df=58	-.09 df=58
2. Delay Task Total Number of Responses		.65*** df=60	-.35** df=58	.13 df=58
3. Delay Task Total Number of Correct			-.24 df=58	.13 df=58
4. Adult Vigilance Task Total Commissions				-.36** df=58
5. Adult Vigilance Task Total Correct				

* $p \leq .05$ ** $p \leq .01$ *** $p \leq .001$

Table 4

Between CASS:S and GDS Correlations

	GDS Subscales				
CASS:S Subscales	Delay Task Efficiency Ratio	Delay Task Total Number of Responses	Delay Task Total Number of Correct	Adult Vigilance Task Total Commission	Adult Vigilance Task Total Correct
Conduct Problems	.04 df=60	.19 df=60	.25 df=60	-.20 df=58	-.09 df=58
Cognitive Problems	-.16 df=60	.40*** df=60	.35** df=60	-.01 df=58	.03 df=58
Hyper-activity	-.09 df=60	.26* df=60	.21 df=60	-.05 df=58	.02 df=58
Conners' ADHD index	-.10 df=60	.24 df=60	.17 df=60	-.03 df=58	-.07 df=58

* $p \leq .05$ ** $p \leq .01$ *** $p \leq .001$

assessing comparable areas. However, this was not the case. The control group scored higher on the ADHD index of CASS:S, but the pregnant group showed more signs of ADHD on the GDS.

There were some unexpected results involving the measures used to assess ADHD and impulsivity. These results may have contributed to the conflicting outcomes and non significant findings. The Delay Task of the GDS, which measures the ability to refrain from responding, and the Vigilance Task, which measures the ability to maintain self-control and sustained attention, were not significantly related. Yet these two tasks both measure ADHD characteristics. Possible reasons for this result could be that the measures are not accurately assessing ADHD, or that the tasks were too easy for this particular age group and another impulsivity measure would more accurately assess ADHD characteristics.

The Cognitive Problem subscale on the CASS:S was related to the Delay Task's Total Number of Responses and Total Number of Correct subscales. This suggests that participants' scores on the Cognitive Problem subscale were related to their ability to refrain from responding. If a participant showed signs of cognitive problems then they were more likely to show signs of impulsivity and the inability to refrain from responding.

There were some CASS:S subscales that were expected to be related to the subscales on the GDS, but were in fact, not related. The Hyperactivity subscale was not related to the Delay Task's Total Number of Correct. It was assumed that a participant, who displayed hyperactivity, would display more difficulty delaying their responses on the Delay Task long enough to achieve a correct response. However, this was not the case. Furthermore, the ADHD index subscale was not related to the Delay Task's Total Number of Responses or the

Total Number of Correct subscales. Both of these measures assess ADHD characteristics, but they were not correlated. The CASS:S, as well, was not related to the Vigilance task of the GDS. The lack of a relationship between the CASS:S and the GDS may have affected the outcome of the study. It is hard to answer the question if adolescent pregnancy is related to ADHD if the measures themselves lack intermeasure reliability.

Several other possibilities exist which may explain the findings. Perhaps there is no connection between ADHD and adolescent pregnancy, and overrepresentation of adopted children having ADHD could be related to factors such as biological or environmental causes. For example, adolescent mothers have been reported to have more complications during birth, such as delivering infants of low birth weight. The overrepresentation of adoptive children having ADHD could be related to birth complications. This could contribute to developmental difficulties such as ADHD. Another possibility for the overrepresentation of adopted children having ADHD is the adoptive parents and their possible contributions to the etiology of ADHD. Although this is not consistent with the genetic data, it may be that the development of ADHD is related to the way an adoptive parent interacts with the adopted child.

A third possibility is that the sample size was inadequate in representing the intended population. It would have been beneficial if this study could have sampled a larger group. Another sample that should be examined would be adolescent mothers who relinquish their children. Although this group can be difficult to obtain, it would be a better representation of the intended population.

There could have been a bias in the sample of adolescent mothers used for this study. The mothers were obtained through a continuing education

program. Adolescent mothers that have ADHD may have dropped out of school. The stress of raising a child and trying to obtain a diploma may be too overwhelming for the young mother to handle, thus education would suffer.

Another possible explanation for the present findings could be that adolescent fathers have higher rates of ADHD than adolescent mother. Perhaps adolescent fathers may be the ones that contribute to the overrepresentation of adopted children having ADHD. This study did not include fathers because they were difficult to obtain.

The question of whether adolescent mothers have higher incidence of ADHD remains unanswered. This study showed conflicting results with one measure indicating higher rates of ADHD characteristics for the control group, and the other measure indicating higher rates of ADHD characteristics for the pregnant group. Nevertheless, the mean scores for both groups of adolescents on these measures were in the normal range. Further research is needed to determine if there is a relationship between adolescent pregnancy and ADHD.

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Appendix A

Human Subjects Approval Form

SJSU SAN JOSE STATE UNIVERSITY

A campus of The California State University

College of Social Sciences • Department of Psychology
One Washington Square • San José, California 95192-0120 • 408/924-5600 • FAX 408/924-5605

Agreement to Participate in Research

Responsible Investigator: Keri E. Haars

Title of Protocol: ATTENTION DEFICIT HYPERACTIVITY DISORDER AND ITS INFLUENCE ON ADOLESCENT PREGNANCY

Your child has been asked to participate in a research study investigating the possible relationship between adolescent pregnancy and Attention Deficit Hyperactivity Disorder (ADHD). Your child will be asked to complete a Connor Rating Scale Revised which is a 27 item test that measures ADHD. Your child will also be asked to complete the Gordon Diagnostic System which assesses ADHD and impulsivity. These measures pose no foreseeable risks or harm towards your child. The benefits from this study will be a better understanding of possible contributors to adolescent pregnancy. The results from this study may be published, but no information that could identify your child will be included. Participation in this study will be rewarded by breakfast or a pizza party for your child's classroom.

If there are any questions or concerns feel free to contact Keri Haars at (408) 223-2283. Questions or complaints about the study, participants rights, or research-related injury may be presented to Serena Stanford, Ph.D., Associate Academic Vice President for Graduate Studies and Research, at (408) 924-2480. If you choose not to have your child participate no services of any kind, to which your child is otherwise entitled, will be lost or jeopardized. Participation is voluntary. You may choose not to have your child participate in the study or in any part of the study. Your child can feel free to withdrawal at any time without prejudice to your child's relations with his or her High School or school district. If you agree to have your child participate in the study please return the consent form signed and dated. Please keep a copy for yourself.

Appendix B

Experiment Consent Form

San José State
UNIVERSITY

Office of the Academic Vice President

Associate Vice President Graduate Studies and Research

One Washington Square
San Jose, CA 95192-0025
Voice: 408-924-2480
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E-mail: gstudies@wahoo.sjsu.edu
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TO: Keri E. Haars
2868 Aborn Rd.
San Jose, CA 95135

FROM: Serena W. Stanford
AAVP, Graduate Studies & Research

DATE: April 18, 1997

The Human Subjects-Institutional Review Board has approved your request to use human subjects in the study entitled:

"Attention Deficit Hyperactivity Disorder and its Influence on Adolescent Pregnancy"

This approval is contingent upon the subjects participating in your research project being appropriately protected from risk. This includes the protection of the anonymity of the subjects' identity when they participate in your research project, and with regard to any and all data that may be collected from the subjects. The Board's approval includes continued monitoring of your research by the Board to assure that the subjects are being adequately and properly protected from such risks. If at any time a subject becomes injured or complains of injury, you must notify Serena Stanford, Ph.D., immediately. Injury includes but is not limited to bodily harm, psychological trauma and release of potentially damaging personal information.

Please also be advised that all subjects need to be fully informed and aware that their participation in your research project is voluntary, and that he or she may withdraw from the project at any time. Further, a subject's participation, refusal to participate, or withdrawal will not affect any services the subject is receiving or will receive at the institution in which the research is being conducted.

If you have any questions, please contact me at (408) 924-2480.