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Gender differences in depression literacy and stigma following a randomized controlled evaluation of a universal depression education program

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Abstract

Purpose: Depression is a debilitating illness with frequent onset during adolescence. Depression affects females more often than males; males are more likely to complete suicide and less likely to seek treatment. The Adolescent Depression Awareness Program (ADAP) is a school-based depression intervention that educates adolescents about depression symptoms and addresses accompanying stigma. Study aims examined gender differences in ADAP's impact on depression literacy and stigma.

Methods: Data came from a randomized trial (2012-2015). 6,679 students from 54 schools in several states were matched into pairs and randomized to the intervention or waitlist control. Teachers delivered ADAP as part of the health curriculum. Depression literacy and stigma outcomes were measured pre-intervention, 6 weeks later, and at 4 months. Multilevel models evaluated whether gender moderated the effect of ADAP on depression literacy and stigma.

Disclosures

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Results: At 4-months, there was a main effect of ADAP on depression literacy (OR=3.3, $p=.001$) with intervention students achieving depression literacy at higher rates than controls. Gender exhibited a main effect, with females showing greater rates of depression literacy than males (OR=1.51, $p=.001$). There was no significant Intervention x Gender interaction. ADAP did not exhibit a significant main effect on stigma. There was a main effect for gender, with females demonstrating less stigma than males (OR=0.65, $p=.001$). There was no significant interaction between the intervention and gender on stigma.

Conclusions: ADAP demonstrates effectiveness for increasing rates of depression literacy among high school students. In this study, gender was not associated with ADAP's effectiveness.

Keywords

adolescence; depression; stigma; universal depression education; school-based interventions

Depression is a widespread, debilitating illness,^{1,2} usually occurring in adolescence or early adulthood,^{1,2} an important developmental period in the lives of young people. Depression interferes with key developmental milestones that form critical foundations for later adult functioning, such as academic performance, education, employment, and relationship formation³.

Sex differences in the trajectory and outcome of depressive illnesses remain understudied. Depressive illness affects women and girls disproportionately.^{4,5} Females may be biologically at higher risk for depression than men;⁶ furthermore, aspects of the female life course such as childbearing may increase women's risk of depression.⁷ The disparity in rates at which boys and girls are affected by depression appears in early adolescence.⁸ Although adolescent males are diagnosed with depression less frequently than females,⁵ they are over four times more likely to die by suicide than females.⁹

Sex Differences in Depressive Symptoms

Developmental studies suggest that males and females experience different constellations of risk factors throughout childhood and adolescence that may explain sex differences in depression rates as well as differences in symptom expression in adulthood.^{10,11} Gender differences in the experience of depression have been documented among adults¹² and adolescents¹³, with females at both developmental stages endorsing more typical depression symptoms such as withdrawal and sadness. Compared to their male counterparts, women demonstrate increased appetite disturbances including weight gain; greater sleep disturbances, particularly fatigue and hypersomnia; greater somatic anxiety and hypochondriasis; more frequent psychomotor retardation; a higher prevalence of atypical symptoms as well as more crying, guilt, and body image dissatisfaction.¹⁴ Females also report more severe symptoms, a greater number of symptoms, and higher symptom frequency than males.^{11,14} In comparison, depressed adult males more frequently report work problems, health concerns, insomnia, and agitation.¹¹ Adolescent males typically manifest less quintessential depression symptoms, such as anger and acting out.¹³ When asked to create vignettes of "typical" depressed adolescent males and females, they noted that the prototypical depressed male would be "mad", suggesting that anger represents the

experience of depression for boys more so than for girls.¹³ This is consistent with findings from the adult literature indicating that “anger attacks” play more prominent roles in depression symptom presentation for men than for women.¹² Gender differences in the experience of depression thus may play an important role in individual recognition of symptoms as part of a depressive illness.

Sex Differences in the Impact of Depression

Just as males and females differ in the clinical manifestation of depression, they also experience unique, sex-based consequences of depressive illness. Depression in adolescent females is associated with high-risk sexual behavior and unplanned pregnancy,¹⁵ and low academic performance.¹⁶ The mean length of depressive episodes in girls has been reported to be approximately 5 months, equivalent to two-thirds of a school year. Adolescence is a time of heightened risk for suicide attempts among depressed girls, who demonstrate higher rates of suicide attempts than adolescent males or adult women.¹

Although males are diagnosed with depression at lower rates than females, depression remains a significant morbidity and mortality risk for men. Depressed adult males experience greater absenteeism from work and higher rates of comorbid alcohol and substance abuse than adult females.¹⁷ Among adolescent males, depression is associated with exacerbations in delinquent behavior.¹⁸ Of great concern, completed suicide affects men disproportionately. Suicide attempts are strongly associated with major depression;¹⁹ the methods by which males and females attempt suicide differ and bear associations with gender-related differences in completion rates. Whereas females consider attempting suicide more than males, males are nearly four times more likely to die from a suicide attempt.⁹ Firearms, one of the most immediately lethal suicide methods, are the most commonly used method of suicide attempt among males.⁹

Sex Differences in Service Use

Existing literature suggests that gender differences in the clinical manifestation of depression as well as the social implications of a depression diagnosis for males may lead males to seek treatment less frequently than females. Although females experience higher rates of depression than males, low rates of male treatment-seeking present an important concern,²⁰ because males consistently demonstrate lower rates of help seeking compared to females.²¹ Illustrative of this pattern, a study of 715 Australian adolescents found that, of the 27% of the sample who were moderately or severely distressed, 23% did not seek any kind of help, 60% sought informal help exclusively (e.g., family, friends), and 17% sought professional help.²² Among this sample, boys were less likely than girls to seek help, a difference that remained even after controlling for girls' higher levels of psychological distress. The finding that sex influences help seeking has been found in samples of adolescents worldwide—including Australia, France, Canada, and the United States—as well as for rates of help seeking from professional and non-professional sources – including the internet and social networks.^{21,23,24} A systematic review incorporating studies using both adolescent and adult samples suggests that traditional gender norms may influence not

only depressive symptom expression, but also males' attitudes toward help-seeking and the types of interventions sought.²⁵

The literature on depression suggests that this illness has a widespread, devastating impact on youth and adults; moreover, sex differences in the manifestation of depression, its consequences, and treatment-seeking are well-documented. One way to minimize the public health impact of depression is to provide early, school-based education to facilitate early detection and treatment. Our study used the Adolescent Depression Awareness Program (ADAP), an established, universal depression education program to examine whether sex moderates depression literacy and stigma outcomes among participating youth. A randomized controlled trial evaluating the effects of ADAP on students' depression literacy, stigma beliefs, and treatment-seeking indicated that the intervention was associated with significant increases in depression literacy and treatment-seeking, but had no impact on stigma.²⁶ The study reported here was designed in response to the National Institute of Mental Health strategic plan for women's health research, which focuses on gender differences in the occurrence and trajectory of illness. Depression represents an illness that demonstrates significant gender differences in prevalence, symptom presentation, and outcome. This study evaluated gender-based interaction effects related to the impact of the intervention on male and female students, which could be an important next step in tailoring depression education to account for sex-based differences in symptoms and willingness to seek treatment.

ADAP is a school-based, universal intervention that provides education about the symptoms of depression in adolescents, emphasizes the importance of telling an adult if youth are concerned about depression or suicidal thoughts in themselves or peers, and attempts to ameliorate stigmatizing attitudes toward people with depression. High school teachers are trained to administer the program according to a standardized protocol.²⁷ Additionally, ADAP includes components to educate school counselors, guidance staff, and parents about depression. Together, these elements of ADAP aim to increase awareness about depression and bipolar disorder, stressing the need for evaluation and treatment while decreasing the stigma associated with mood disorders. ADAP proposes that educating adults and peers who surround youth in the school setting will increase the likelihood that depressed youth will be identified and offered opportunities to seek treatment.

Our study evaluated the following questions: 1) Does gender moderate the ADAP intervention's effect on rates of depression literacy? 2) Does gender moderate the ADAP intervention's effect on stigmatizing mental health beliefs?

Methods

Participants

All study procedures received institutional review board approval. The study used an informed consent waiver to facilitate data collection in the school setting. 6,679 high school students participated from 54 high schools in Maryland, Delaware, Pennsylvania, Michigan, and Oklahoma during the years 2012-2015. School systems that agreed to the terms of the project, including randomization and data collection, were eligible to participate. All 20 high

schools within the Archdiocese of Baltimore were invited to participate, as well as 30 in New Castle County, Delaware; 5 in Adair County, Oklahoma; 8 in Washtenaw County, Michigan; and 28 in York County, Pennsylvania. Not all schools approached agreed to participate. Overall, 66 of 91 (75%) schools approached agreed to participate and 13 of the 66 schools dropped out of the study during the trial and did not provide data. Sixteen schools were parochial and the remainder were public.

Measures

As part of the trial, students received the Adolescent Depression Knowledge Questionnaire (ADKQ) as a pre-test immediately before participating in the ADAP program and as a post-test at both 6 weeks and 4 months after the intervention. The ADKQ is an assessment of knowledge and attitudes about adolescent depression.²⁷ Thirteen yes-no questions and four multiple-choice vignettes evaluate factual knowledge about depression. For example, students select “yes” or “no” in response to the following statement: “A change in behavior is a symptom of depression.” Students were considered “depression literate” if they responded correctly to 14 out of 17 items (82% correct). The ADKQ has demonstrated adequate psychometric properties as well as measurement invariance across sexes.²⁸

Mental health stigma was measured by the adolescent version of the Reported and Intended Behaviours Scale (RIBS). The RIBS is an 8-item scale that measures individuals’ experiences and views in relation to people with mental health problems as well as their future intentions to associate with them.²⁹ The first four items are used to assess current and past experiences with people who have mental disorders and do not contribute to the stigma score. The last four items measure future behavioral intentions and are scored on a 5-point, Likert-type scale, with lower scores reflecting less stigma toward individuals with mental disorders. The RIBS exhibits strong psychometric properties across multiple samples.²⁹ Students completed this measure at the same time points as the ADKQ.

Statistical Analyses

Multilevel models were used to evaluate the impact of ADAP and to accommodate the nested structure of the data (students nested within schools).³⁰⁻³² School level characteristics (number of 9th graders, percent male, percent African American, percent Hispanic) used for randomization were also included. Statistical analyses were completed in 2018. As with any school based longitudinal study, some loss to follow-up is expected. With respect to the control arm of the intervention, we had a sample size of $n=2,998$ at baseline, $n=2,532$ at the post-assessment, and $n=1,329$ at the 4-month follow-up assessment. No significant differences were found in terms of gender from those who participated in the post-assessment and those who did not ($X^2=.516$, $df=1$, $p=.472$). Similarly, no significant differences were found in terms of gender from those who participated in the 4-month follow-up and those who did not ($X^2=1.298$, $df=1$, $p=.255$). For a more detailed discussion of missing data please see Swartz, et al.²⁶ In order to handle missing data, inverse probability weights were calculated. Inverse probability weighting provides a methodology for handling missing data when imputation is not preferred and list-wise deletion could introduce bias; it reweights the respondents to resemble the original full sample based on baseline characteristics (gender in this case). It is particularly useful for simple missing data

patterns such as the attrition in this study sample. Intervention status, pre-assessments, school level variables, state, and school were included in the equation used to create the inverse probability weights.

Results

The final dataset for this study included 2,949 males and 3,076 females, for a total of 6,025 students. An additional 654 students did not report their gender. The majority of the schools were regular, public high schools. Given that parental consent was waived for the trial, no additional demographic information was collected. Table 1 presents depression literacy frequencies for males and females according to their pre- and post-test depression knowledge scores. Females demonstrated significantly greater rates of depression literacy at pre-test than males ($X^2=109.54$, $p<.001$) and maintained this advantage at post-test ($X^2=84.97$, $p<.001$). Females demonstrated significantly lower mental health stigma scores than males at pre-test ($t=12.68$, $p<.001$). This was maintained at post-test ($t=12.76$, $p<.001$).

Sex as Moderator of Depression Literacy Outcomes

Model One examined whether interaction effects existed between sex and intervention group with respect to rates of depression literacy. In other words, did the ADAP intervention have greater or less effectiveness for increasing depression literacy for males versus females? Table 2 provides results for Model One and indicates a significant main effect for Intervention Group (Est.=1.15, OR=3.2, S.E.=0.21, $p=0.001$). Results suggest that those participating in the ADAP intervention achieved greater rates of depression literacy than wait-list controls. Furthermore, sex demonstrated a significant main effect with females having greater rates of depression literacy than males before and after the intervention regardless of intervention group (Est.=0.41, OR=1.51, S.E.=0.65, $p=0.001$). Lastly, there was no significant interaction between sex and intervention group (Est.=−0.11, S.E.=0.13, $p=0.40$), indicating that sex did not moderate the effects of the intervention on rates of depression literacy. Sex-specific models were also run. In the female only model, intervention status was a significant predictor of depression literacy at the post assessment (Est.=1.05, OR=2.86, S.E.=0.19, $p=0.001$). Similarly, in the male only model, intervention was a significant predictor of depression literacy at the post assessment (Est.=1.06, OR=2.89, S.E.=0.24, $p=0.001$).

Sex as Moderator of Mental Health Stigma Outcomes

Model Two examined whether there were interaction effects between sex and intervention group when considering degree of mental health stigma. Said differently, did the ADAP intervention reduce mental health stigma differentially for males versus females? Table 3 provides results for Model Two and shows that there was no main effect of the ADAP intervention on stigma scores (Est.=−0.18, OR=0.84, S.E.=0.10, $p=0.08$). Model Two indicates a significant main effect of sex on mental health stigma (Est.=−0.43, OR=0.65, S.E.=0.08, $p<0.001$) with females demonstrating lower stigma scores before and after the intervention. There was no statistically significant interaction between sex and intervention group related to stigma outcomes (Est.=0.11, S.E.=0.15, $p=0.47$).

Discussion

In our study, females exhibited greater knowledge regarding depression than males. Although both sexes learned from the intervention, females started and ended with greater knowledge about depression than males. These findings prompt the question of how females acquire depression knowledge. One explanation may lie in how female children are socialized. One experimental study of maternal emotional validation and invalidation examined the degree to which mothers validate male and female children and which emotions they validate. Mothers in that study tended to validate daughters more than sons and to validate sad emotions over expressions of anger; emotional validation was the strongest predictor of children's own emotional awareness³³ and girls were more emotionally aware than boys. However, many of the items on the ADKQ are behaviorally anchored (for example, "the abuse of alcohol and drugs can be a sign of depression"); as such, the ability to recognize sad feelings as a core component of depression does not fully explain females' advantage in depression knowledge in our study.

Another explanation may be that females are more likely to talk about depressive symptoms than males. In a study of late adolescents, qualitative findings regarding social support suggest that females use social groups to develop greater awareness about their problems, including depressive symptoms, than males. In contrast, males tend to use their social connections to help them distract from depression in order to gain control over symptoms.³⁴ If these findings are representative of how depressed males and females use their social networks, then the symptoms of depression may be more frequently discussed between females than males.

Gender stereotypes may play a role in the ability to recognize depression. Respondents from a community sample presented with case vignettes were more likely to rate females as suffering from a mental disorder than males; the most likely disorder assigned to females was depression. In contrast, men were less likely than women to rate a male vignette character as suffering from a mental disorder.³⁵ A common finding in the literature is the reluctance of men to apply the concept of depression to themselves given the social implications of a depression diagnosis, as having depression is perceived to be a threat to masculinity.²⁵ The idea that "depression can be controlled through willpower" (an ADKQ item for which the correct answer is false) is consistent with the social expectation that boys need to maintain a masculine persona in the face of depression and that treatment-seeking is a feminine behavior.³⁶

Findings from our study indicate that females demonstrate lower levels of mental health stigma than males. This is consistent with epidemiological stigma findings in adults, wherein men tend to endorse more mental illness stigma than women.³⁷ In addition, sex did not moderate the effect of the ADAP intervention on stigma; in fact, there was no significant intervention effect on stigma. This finding fits with prior literature suggesting that some stigma processes may be difficult to reverse with brief interventions.³⁸ Encouragingly, some aspects of stigma, such as the unwillingness to associate with people diagnosed with depression, may be more malleable.³⁸ Additionally, the consent waiver did not allow us to collect a variety of demographic and clinical variables from students. Future studies that

examine a wider array of variables are needed to understand stigma mechanisms among young people, especially for males.

It is important to note that although females demonstrated greater pre- and post-test depression knowledge than males, depression knowledge in males improved significantly following the ADAP intervention. This suggests that despite their relative disadvantage compared to females in depression knowledge, males are able to improve their depression knowledge significantly as a result of the intervention. The lack of a sex moderation effect is an important finding that supports the existing ADAP intervention because it suggests that both females and males benefit equally from the intervention.

A limitation of this study is its narrow geographical representation of U.S. public high schools. Schools that participated in the study came mainly from Maryland, Pennsylvania, and Delaware, with a small number of schools from Michigan and Oklahoma. Thus, we cannot say that our findings are representative of all U.S. high schools. Additionally, the failure to find a significant interaction effect between sex and depression knowledge outcomes could be attributed to sample size and a lack of power to adequately test whether sex moderates the ADAP intervention effect. Randomized controlled trials such as the one explored in this analysis are typically only powered to assess the main effects of the intervention; as such, future work should explore these moderation effects within an adequately powered sample to confirm the relationships explored in the present analysis. Loss to follow-up represents another study limitation; 3,563 participants (59%) completed the follow-up assessment. Attrition during the study period occurred when students were present for the pre-test but absent on the day the post-test was administered. However, data analyses demonstrated that attrition was not significantly related to sex. Missing data procedures implemented in this study aimed to reduce any potential bias that could have resulted from the attrition. A major strength of the study is its randomized controlled design that allows evaluation of the ADAP intervention effect on depression literacy and stigma and the examination of sex as a potential moderator of these effects.

Depression knowledge is a critical component of preventing the negative sequelae associated with this psychiatric illness that often appears initially in adolescence. This study suggests that both males and females can improve their knowledge about depression through a universal, school-based intervention. Future efforts should address potentially more intransigent effects of stigma. Stigma not only represents a formidable barrier to treatment-seeking; it also poses an independent threat to health and well-being through the harmful biological effects of stress and loss of critical social and occupational opportunities.³⁹ Significant public health efforts are being made to neutralize the idea that depression is incompatible with masculinity. One such project is the National Institute of Mental Health's "Real Men, Real Depression" campaign, which focuses on reducing gender-based stigma associated with depressive illness.⁴⁰ Such campaigns, in conjunction with early education regarding symptoms of depression, its consequences, and available treatments, are essential for eliminating barriers to treating one of the most devastating, yet treatable, public health problem facing our nation's youth.

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Implications and Contribution

ADAP is a classroom-based intervention associated with significant increases in depression literacy for males and females. The absence of differential depression literacy benefit supports its co-educational use. There was no differential benefit for stigma based on gender. Mental illness stigma is a critical target for advocacy and intervention for males.

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CONSORT TABLE

Fig. 1. Consolidated Standards of Reporting Trials (Consort) flow diagram displaying the progress of participants through the trial

Table 1

Univariate Statistics for Depression Literacy and Mental Health Stigma Outcomes

Depression Literacy (n/%)	Intervention Group	Control Group
Males		
Pre-test	21.2%	19.0%
Post-test	47.1%	26.5%
Females		
Pre-test	33.5%	30.0%
Post-test	59.2%	39.6%

Mental Health Stigma [Mean(SD)]	Intervention Group	Control Group
Males		
Pre-test	9.47(3.4)	9.71(3.5)
Post-test	9.05(3.4)	9.34(3.6)
Females		
Pre-test	8.5(3.3)	8.6(3.2)
Post-test	8.0(3.2)	8.1(3.2)

Table 2

Gender as Moderator of ADAP Intervention Effect on Depression Literacy

	Est.	Odds Ratio	SE	p-value
Intervention	1.15	3.2	.21	.001
Sex	.41	1.51	.65	.001
Intervention x Sex	-.11	0.89	.13	.40
Male-only Model				
	Est.	Odds Ratio	SE	p-value
Intervention	1.06	2.89	.24	.001
Female-only Model				
	Est.	Odds Ratio	SE	p-value
Intervention	1.05	2.86	.19	.001

Note: Pre-test depression literacy was included as a control variable in all models.

Table 3

Gender as Moderator of ADAP Intervention Effect on Mental Health Stigma

	Est.	SE	p-value	
Intervention	-.18	.10	.08	
Sex	-.43	.08	.001	
Intervention x Sex	.11	.15	.47	
Male-only Model				
	Est.	Odds Ratio	SE	p-value
Intervention	-0.23	0.79	0.14	0.14
Female-only Model				
	Est.	Odds Ratio	SE	p-value
Intervention	-0.11	0.90	0.11	0.33

Note: Pre-test mental health stigma was included as a control variable in all models.