Sexual Functioning in Adolescents With Major Depressive Disorder

Emira Deumic, BS[a]; Brandon D. Butcher, BS[b]; Anita D. Clayton, MD[d]; Lilian N. Dindo, PhD[e]; Trudy L. Burns, PhD[c]; and Chadi A. Calarge, MD[f,*]

ABSTRACT

Objective: To examine sexual functioning in adolescents with depression.

Methods: Between September 2010 and March 2014, 235 participants who were between 15 and 20 years old and were unmedicated or within 1 month of beginning antidepressant treatment completed the Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), and Changes in Sexual Functioning Questionnaire (CSFQ). They were also assessed to establish the presence of a *DSM-IV-TR* major depressive episode (MDE). The Student *t* test and χ^2 test were used to compare continuous and categorical variables, respectively, across participants with versus without MDE. Multivariable linear regression analysis examined the association between depression and sexual functioning.

Results: After the investigators controlled for age, female sex, antidepressant use, and the presence of generalized anxiety disorder, the presence of MDE was associated with a lower score on the CSFQ overall ($P < .0007$) and on its desire ($P < .09$), arousal ($P < .001$), and orgasm ($P < .007$) subscales. Antidepressants were not associated with sexual functioning either in the sample overall or in those with MDE. Beck Depression Inventory items related to affective symptoms ($P < .03$), rather than those tapping into neurovegetative or cognitive functioning, accounted for the association between depression and lower sexual functioning. Furthermore, with higher BDI scores, males exhibited a steeper decline than females in both the CSFQ total score and the desire subscale (sex × BDI score interaction effect: $P < .03$). Anxiety was not significantly associated with sexual functioning.

Conclusions: Major depressive disorder in older adolescents is associated with lower sexual functioning, particularly in males. This appears most related to affective symptoms. The potential impact of such impairment on future sexual functioning deserves further examination.

Trial Registration: ClinicalTrials.gov identifier: NCT02147184

J Clin Psychiatry 2016;77(7):957–962
dx.doi.org/10.4088/JCP.15m09840

[a]Carver College of Medicine, [b]Department of Psychiatry, and [c]College of Public Health, University of Iowa, Iowa City
[d]Department of Psychiatry and Neurobehavioral Sciences, University of Virginia, Charlottesville
[e]Menninger Department of Psychiatry and Behavioral Sciences, Baylor College of Medicine, Houston, Texas
[f]Department of Pediatrics, Baylor College of Medicine, Texas Children's Hospital, Houston
**Corresponding author:* Chadi A. Calarge, MD, Baylor College of Medicine, 1102 Bates Ave, Suite 790, Houston, TX 77030 (chadi.calarge@bcm.edu).

Sexual functioning involves different facets, ranging from desire or interest in sex to physical arousal and orgasm.[1] Consequently, one or more of these areas could be impaired, impacting the pleasure and fulfillment derived from sexual encounters. In fact, sexual dysfunction is common within the general population, affecting more than 40% of women and 30% of men.[2]

While sexual dysfunction is not a defining symptom of major depressive disorder (MDD), it is prevalent among patients with MDD, with one study estimating the rate to be double that of healthy controls.[2] The association between MDD and sexual dysfunction may well be bidirectional, as suggested by a recent meta-analysis.[3]

In general, little is known about sexual functioning in adolescents and young adults. One study estimated the prevalence of sexual problems among sexually experienced 16- to 21-year-olds to be 51%.[4] Notably, the rates were comparable for males and females (49% and 54%, respectively), in contrast to adults in whom females are more likely to endorse sexual dysfunction.[5] A separate study found that more than 50% of males and 60% of females, aged 16 to 21 years, have experienced some form of sexual difficulty.[6] Compared to males, females reported higher rates of inability to achieve orgasm, painful intercourse, and lack of sexual interest.[6]

To our knowledge, the relationship between MDD and sexual dysfunction in high school– or college-aged individuals has not been studied, even though sexual experiences during this developmental period are believed to shape one's lifelong sexual functioning.[7,8] Thus, we examined sexual functioning in older adolescents with MDD, using data from a well-characterized sample enrolled in a prospective observational study. We hypothesized that being in a major depressive episode (MDE) is associated with poorer sexual functioning.

METHODS

Participants

The parent study (ClinicalTrials.gov identifier: NCT02147184) is a longitudinal examination of the skeletal effects of selective serotonin reuptake inhibitors (SSRIs).[9] Participants were 15 to 20 years old, enrolled within a month of beginning SSRI treatment. Simultaneous use of other psychotropics was not allowed, with the exception of benzodiazepines (n = 5, 2 of them only as needed), trazodone (n = 3), α_2-agonists (n = 1), and psychostimulants (n = 3). A group of unmedicated volunteers was also recruited. Exclusionary criteria included substance dependence, eating disorders, pregnancy, significant medical or surgical history, chronic use of medications potentially affecting bone metabolism

(eg, corticosteroids), and plans to move out of state in the following year.

The study was approved by the University of Iowa Institutional Review Board. Adult participants and the parent/guardian of minor participants provided written informed consent to the study, and the minor participants provided written assent and consent.

Procedures

The assessment battery included the collection of demographic and anthropometric data. Participants were queried about their socioeconomic status, cigarette and alcohol use, and the use of any medication, including hormonal contraception for females. The participants also completed the Beck Depression Inventory (BDI)[10,11] and Beck Anxiety Inventory (BAI).[12] Psychiatric diagnoses, following the *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition, Text Revision (*DSM-IV-TR*),[13] incorporated information from a review of the medical records, a number of self- and researcher-completed symptom rating scales, the National Institute of Mental Health (NIMH) Diagnostic Interview Schedule for Children IV (DISC-IV),[14] and an unstructured interview by a child psychiatrist (C.A.C.).

Sexual functioning was assessed using the 14-item Changes in Sexual Functioning Questionnaire (CSFQ).[15] This self-completed questionnaire uses a 5-point Likert scale to measure the 5 dimensions of sexual functioning (ie, pleasure, desire-frequency, desire-interest, arousal, and orgasm) and the 3 phases of the sexual response cycle (ie, desire, arousal, and orgasm). Higher scores correspond to better sexual functioning.[15]

Data Analysis

Participants were divided into 2 groups, based on the presence of a current major depressive episode (MDE group; n = 138) or its absence (No-MDE; n = 97). Specifically, the MDE group included 92 participants experiencing a full MDE at study entry and 46 in partial remission. The No-MDE group included 71 participants with no history of MDD and 26 with a history of MDD that had been in full remission for a mean ± SD time of 3.2 ± 2.6 years by study entry.

Because normative data for sexual functioning in this age group are not available, we used the thresholds established in adults for the 14-item CSFQ in order to estimate the prevalence of sexual dysfunction in the sample (ie, a score of ≤ 47 for males and ≤ 41 for females).[15]

Student *t* test and χ^2 test were used to compare continuous and categorical variables across the 2 MDE groups. Next, multivariable linear regression analysis was used to examine the association between depression and sexual functioning, while adjusting for potential confounders. Because SSRIs cause sexual dysfunction,[16] the analyses adjusted for SSRI treatment status, dose, or duration of exposure. We also repeated the analyses after excluding SSRI-treated participants. Because MDD is highly comorbid with generalized anxiety disorder (GAD) and because little information is available about the potential impact of GAD on sexual functioning, we aimed to disentangle the effect of MDE and GAD by considering both diagnoses (or BDI and BAI scores in "dimensional" models) in the regression models. The effect of social phobia and its interaction with sex were also examined, given that males may have more anxiety about sexual performance than females.[17] Cohen *d* effect size was determined by dividing the difference in MDE group-specific least squares means by the residual from the relevant multivariable linear regression model. For the "dimensional" models that included the BDI, the effect size was computed for a 15.7-unit increase, equating to about 1.5 standard deviations.

We also aimed to examine whether clusters of depressive symptoms (ie, affective, cognitive, or neurovegetative symptoms) were differentially associated with sexual functioning. Thus, the 20 items of the BDI (excluding the sexual interest item to avoid inflating any potential association) were factor-analyzed using Principal Component Analysis with PROMAX oblique component rotation, yielding 2 factors that accounted for 55% of the variance in the BDI. The first, "neurovegetative-cognitive," factor included the following BDI items: concentration difficulty, indecisiveness, agitation, irritability, loss of energy, fatigue, changes in sleeping patterns, and appetite change. It had an eigenvalue of 9.4 and accounted for 47% of the variance in the BDI. The second, "affective," factor included sadness, worthlessness, self-dislike, past failure, self-criticalness, guilty feelings, punishment feelings, pessimism, and suicidal thoughts. It had an eigenvalue of 1.5 and accounted for 8% of the variance in the BDI.

All analyses were conducted using SAS version 9.3 (SAS Institute Inc, Cary, North Carolina) with a significance level of $P \leq .05$.

Clinical Points

- Impairment of sexual function in depressed adolescents and young adults has not been evaluated despite its potential to contribute to personal distress and to affect future sexual functioning.
- Major depressive disorder in older adolescents appears to impact the different facets of sexual functioning, particularly in males as severity increases.
- In adolescents, the association of MDD and sexual functioning seems most potent with affective symptoms severity, as opposed to neurovegetative and cognitive symptoms.

RESULTS

Between September 2010 and March 2014, 235 participants (60% females) provided complete data and constitute the sample included in this analysis. Their mean ± SD age was 19.0 ± 1.5 years. Fifty-three percent were taking an SSRI (fluoxetine, n = 41; citalopram, n = 39; sertraline, n = 32; escitalopram, n = 9; and paroxetine, n = 4). Table 1 summarizes the demographic and clinical

characteristics of the participants, divided on the basis of the presence of MDE.

Fifty-four percent of the females reported using hormonal contraceptives (Table 1). As these may influence sexual functioning,[18,19] we compared the CSFQ rating in females using hormonal contraceptives versus not. The former had higher scores on the CSFQ total scale ($P<.0001$), as well as on the desire ($P<.0001$), arousal ($P<.0001$), and orgasm ($P<.0009$) subscales, indicating better sexual functioning.

Depression and Sexual Functioning

Given that sexual functioning is strongly influenced by sex and that the MDE group comprised more females, separate analyses were conducted for males and females (Table 2). The presence of MDE was associated with poorer sexual functioning, regardless of sex.

Next, multivariable linear regression analysis was used to examine the association between depression-related variables and sexual functioning. After we adjusted for age ($P<.0001$), sex ($P<.0001$), SSRI use ($\beta=0.5$; 95% confidence interval [CI], −2.3 to 3.4; $P>.70$; Cohen $d=0.06$), and the presence of GAD ($P>.90$), the total CSFQ score was significantly lower in participants with MDE compared to their No-MDE counterparts ($\beta=-5.1$; 95% CI, −8.0 to −2.2; $P<.0007$; Cohen $d=0.61$). Furthermore, after accounting for the same covariates, participants with MDE had significantly lower scores on the arousal ($\beta=-1.4$; 95% CI, −0.6 to −2.2; $P<.001$; Cohen $d=0.57$) and orgasm subscales ($\beta=-1.4$; 95% CI, −0.4 to −2.4; $P<.007$; Cohen $d=0.47$), and marginally significantly lower scores on the desire subscale ($\beta=-1.1$; 95% CI, 0.2 to −2.4; $P<.09$; Cohen $d=0.30$).

Neither the main effect of having social phobia ($P>.10$) nor its interaction effect with sex was statistically significant ($P>.40$).

The BDI score was then incorporated in the regression models, instead of categorically defined MDE, to capture depression severity. After we adjusted for age ($P<.0001$), sex ($P<.0001$), SSRI use ($\beta=-0.02$; 95% CI, −2.53 to 2.51; $P>.90$; Cohen $d=0.00$), and the BAI score ($P>.80$), higher BDI scores were associated with lower CSFQ total scores ($\beta=-0.29$; 95% CI, −0.44 to −0.14; $P<.0002$; Cohen $d=0.55$), as well as lower scores on the desire ($\beta=-0.10$; 95% CI, −0.16 to −0.03; $P<.004$; Cohen $d=0.43$), arousal ($\beta=-0.07$; 95% CI, −0.11 to −0.23; $P<.004$; Cohen $d=0.43$), and orgasm ($\beta=-0.06$; 95% CI, −0.11 to −0.01; $P<.03$; Cohen $d=0.33$) subscales.

Furthermore, the sex × BDI score interaction effect was significant ($P<.04$). As Figure 1 illustrates, when the BDI score is within the normal range, males have higher CSFQ total scores compared to females. However, as the BDI score increases (reflecting greater severity of depression), the CSFQ total score decreases in both sexes, albeit following a steeper slope in males. As a result, the CSFQ total score converges in both sexes when the BDI score is high enough to suggest severe MDE. Comparable results were found for the desire subscale, with a significant sex × BDI score interaction effect ($P<.03$). In contrast, the BDI score × hormonal contraception interaction effect was not significant ($P>.60$), suggesting that the use of hormonal contraceptives was associated with a higher CSFQ score regardless of depression severity.

Table 1. Clinical and Demographic Characteristics of the Sample According to the Presence of a Major Depressive Episode (MDE)[a]

	MDE[b] (n = 138)	No-MDE[c] (n = 97)	Statistic	*P* Value
Age, y	18.9 ± 1.6	19.1 ± 1.4	$t=0.75$	> .40
Female sex, n (%)	95 (69)	45 (46)	$\chi^2=11.92$	< .0007
White, n (%)	120 (87)	90 (93)	$\chi^2=7.67$	> .10
Family income, n (%)[d]				
< $51,058	49 (40)	16 (18)	$\chi^2=11.93$	< .004
$51,058–$75,000	14 (12)	15 (17)		
> $75,000	59 (48)	58 (65)		
Cigarette use, n (%)	26 (19)	15 (15)	$\chi^2=0.49$	> .50
Cigarette use, no. per day	3.0 ± 4.5	1.9 ± 2.1	$t=-1.01$	> .30
Cigarette use, y	2.5 ± 1.8	1.9 ± 0.8	$t=-1.17$	> .30
Alcohol use, n (%)	98 (71)	71 (73)	$\chi^2=0.08$	> .80
Alcohol use, days per week	0.9 ± 0.9	1.1 ± 0.9	$t=1.42$	> .20
Alcohol use, drinks per sitting	4.9 ± 2.9	5.4 ± 2.7	$t=1.11$	> .30
Hormonal contraception, n (% of females)	49 (52)	27 (60)	$\chi^2=0.87$	> .30
Generalized anxiety disorder, n (%)	56 (41)	28 (29)	$\chi^2=3.40$	< .08
Social phobia, n (%)	59 (43)	12 (12)	$\chi^2=24.94$	< .0001
SSRI[e]				
Treatment, n (%)	109 (79)	16 (16)	$\chi^2=89.34$	< .0001
Treatment duration, d	24.6 ± 8.8	24.2 ± 7.6	$t=-0.19$	> .80
Dose, unit/d	1.0 ± 0.4	1.0 ± 0.3	$t=0.74$	> .40

[a]Values are mean ± SD, unless otherwise noted.
[b]MDE = participants were experiencing a full depressive episode at study entry or were in partial remission.
[c]No-MDE = participants with no history of MDD or with a history of MDD that had been in remission for 3.2 ± 2.6 years by study entry.
[d]Ns for family income: MDE, n = 122; No-MDE, n = 89.
[e]One SSRI unit was equivalent to 10 mg of escitalopram; 20 mg of fluoxetine, citalopram, or paroxetine; or 50 mg of sertraline.
Abbreviation: SSRI = selective serotonin reuptake inhibitor.

Next, the 2 factors generated from the BDI (ie, neurovegetative-cognitive and affective) were concurrently incorporated in the regression models to examine whether particular facets of depression are differentially and independently associated with sexual functioning. After we adjusted for age, sex, SSRI treatment status, and the BAI score, the score on the affective factor, but not on the neurovegetative-cognitive factor, was significantly associated with the CSFQ total score ($\beta=-0.38$; 95% CI, −0.69 to −0.07; $P<.03$), as well as the desire subscale score ($\beta=-0.17$; 95% CI, −0.31 to −0.03; $P<.03$).

Effect of SSRI Use

To further examine the possible effect of SSRI treatment on sexual functioning, we restricted the analyses to participants with MDE. Again, there was no significant difference in the CSFQ total score or on any of its subscales between those taking an SSRI versus not (all $P>.20$).

Next, we restricted the analyses to participants not taking an SSRI. After we adjusted for sex (all $P\leq.0005$), age (all $P<.02$), and the presence of GAD (all $P>.20$), participants with MDE continued to exhibit a lower total CSFQ score ($P<.02$) and lower scores on the arousal

Table 2. Sexual Functioning, Anxiety, and Depression Scores Across Males and Females in a Major Depressive Episode (MDE) Versus Not[a]

	Females			Males		
	MDE[b] (n = 95)	No-MDE[c] (n = 45)	*P* Value	MDE[b] (n = 43)	No-MDE[c] (n = 52)	*P* Value
BAI	12.9 ± 9.3	4.4 ± 4.9	< .0001	10.7 ± 8.5	5.1 ± 6.2	< .0006
BDI						
Total score	17.6 ± 10.3	4.8 ± 5.0	< .0001	16.8 ± 10.3	4.6 ± 4.5	< .0001
Factor 1[d]	8.1 ± 5.0	3.0 ± 2.8	< .0001	6.8 ± 4.5	2.7 ± 2.6	< .0001
Factor 2[e]	7.1 ± 5.1	1.4 ± 2.2	< .0001	7.7 ± 4.8	1.4 ± 1.9	< .0001
CSFQ						
Total score	41.8 ± 9.5	46.1 ± 9.5	< .02	48.1 ± 8.2	54.4 ± 7.5	< .0003
Desire subscale	13.1 ± 3.7	13.6 ± 3.8	> .40	14.5 ± 4.0	16.7 ± 4.0	< .02
Arousal subscale	8.9 ± 2.8	10.0 ± 2.7	< .04	10.7 ± 2.5	12.0 ± 2.2	< .006
Orgasm subscale	8.3 ± 3.6	9.7 ± 3.3	< .04	10.6 ± 2.3	12.2 ± 2.4	< .003
Sexual dysfunction,[f] n (%)	39 (41)	13 (29)	> .20	18 (42)	10 (19)	< .03

[a]Values are mean ± SD, unless otherwise noted.
[b]MDE = participants were experiencing a full depressive episode at study entry or were in partial remission.
[c]No-MDE = participants with no history of MDD or with a history of MDD that had been in remission for 3.2 ± 2.6 years by study entry.
[d]Factor 1 (neurovegetative-cognitive) loaded items: concentration difficulty, indecisiveness, agitation, irritability, loss of energy, fatigue, changes in sleeping patterns, and appetite change.
[e]Factor 2 (affective) loaded items: sadness, worthlessness, self-dislike, past failure, self-criticalness, guilty feelings, punishment feelings, pessimism, and suicidal thoughts.
[f]Sexual dysfunction was defined as a CSFQ total score ≤ 47 for males and ≤ 41 for females.
Abbreviations: BAI = Beck Anxiety Inventory, BDI = Beck Depression Inventory, CSFQ = Changes in Sexual Functioning Questionnaire.

(*P* < .02) and orgasm subscales (*P* < .07), compared to their No-MDE counterparts. Similarly, after we adjusted for sex (all *P* ≤ .0005), age (all *P* < .01), and the BAI score (all *P* > .40), the BDI score continued to be inversely associated with the total CSFQ (*P* < .03) and arousal subscale score (*P* < .04).

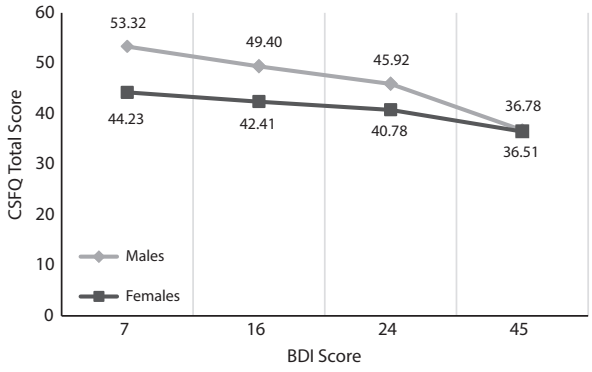
DISCUSSION

To our knowledge, this is the first study to examine the independent association between depression and impairment in the sexual response cycle in late adolescence. Specifically, we found that MDE was associated with poorer sexual functioning across the entire sexual response cycle. Furthermore, the affective symptoms appear to account for this association. In addition, some sex differences emerged, with males showing a steeper decline in sexual functioning, particularly in desire, as the severity of depressive symptoms increased.

Little information on sexual functioning in older adolescents with MDD exists. In contrast, studies in adults consistently show higher rates of sexual dysfunction in depressed patients.[20,21] Our study extends these findings into adolescence, where we found that the presence of MDE was similarly associated with poorer sexual functioning.

With regard to the specific phases of the sexual response cycle affected by MDD in adults, desire appears most commonly impacted in both men and women.[20,22,23] In our sample, the results varied slightly depending on how depression was defined. The presence of MDE, determined by *DSM-IV-TR* criteria, was least strongly associated with the desire subscale of the CSFQ compared to the arousal or orgasm subscales (Cohen *d* = 0.45 vs 0.85 and 0.70, respectively). In contrast, when dimensional rating was used, the BDI score was most strongly associated with the desire subscale compared to the 2 others (Cohen *d* = 0.43 vs 0.42 and 0.27, respectively). This difference may be accounted for by the fact that the BDI is a continuous measure that assesses the level of specific depressive symptoms over the 2 weeks prior to administration. Therefore, it may capture symptom severity more accurately than a categorical diagnosis of MDD, by being more sensitive to change over time. Furthermore, both the BDI and CSFQ are self-rated.

Figure 1. Association Between Scores on the Beck Depression Inventory (BDI) and the Changes in Sexual Functioning Questionnaire (CSFQ) for Males and Females[a,b,c]



[a]Vertical lines denote separation between adjacent categories of depression severity within the BDI.
[b]The sex × BDI score interaction effect was significant (*P* < .04), after adjusting for age, sex, SSRI use, and Beck Anxiety Inventory score.
[c]Least squares mean CSFQ scores were estimated separately for males and females for BDI score values of 7, 16, 24, and 45, representing median values of each depression severity category range.
Abbreviation: SSRI = selective serotonin reuptake inhibitor.

It may have been predictable that affective symptoms would be associated with reduced sexual desire in our participants; however, it was somewhat surprising that the presence of neurovegetative symptoms was not associated with difficulties in arousal or orgasm. Disrupted sleep, appetite, and energy might reflect impaired signaling in any number of neurotransmitter systems, such as serotonergic, dopaminergic, or adrenergic pathways, all of which are implicated in normal sexual functioning.[24]

Our data in adolescents suggest that depression is more common among females who also report lower sexual functioning scores compared to males—a well-established disparity in adults.[25,26] Two observations are worth noting. First, the presence of MDE did not impact the score on the desire subscale of the CSFQ in females (Table 2), unlike in males, suggesting that perhaps sexual desire in adolescent females is less affected by the emergence of MDE. Further, while nondepressed adolescent males have a higher total CSFQ score than their female counterparts, sexual functioning in males appears to be impacted to a greater degree than in females by increasing depression severity. This pattern was also true for the desire subscale. These findings are consistent with other reports showing that sexual desire is the phase most commonly affected by depression in men and women and extend the current literature by suggesting that, while depression affects sexual functioning in both sexes during adolescence, males tend to be impacted more as depression severity worsens.[27,28]

The association between SSRI use and sexual dysfunction is well-established.[2,29] In our study, however, SSRI treatment failed to significantly impact sexual functioning, perhaps due to the brief period of SSRI exposure at study entry (25 days, Table 1). Restricting the analysis to unmedicated participants did not alter the results, nor did adjusting for SSRI dose or duration of SSRI exposure (results available upon request). Importantly, during MDE, it is the resolution of depressive symptoms, as opposed to optimal sexual functioning, that may initially be the primary focus of attention, particularly in this younger age group where the opportunity to engage in sexual activity regularly may not be available. Perhaps it is not until significant symptom improvement or even remission is achieved that individuals shift their attention to other aspects of their lives, including sexual activity. Another possible explanation is that the SSRI dose taken was relatively modest (Table 1), albeit therapeutic, failing to significantly impact sexual functioning.[30] When the longitudinal data from this study become available, we will be better positioned to clarify this point. One limitation of this study was failure to explicitly ask the participants about sexual activity with a long-term partner versus casual sex, which can also influence sexual functioning.[31]

Of note, neither GAD nor social phobia was independently associated with sexual function in our participants. Both depression and anxiety are characterized by high negative affect. However, depression is associated with anhedonia, whereas anxiety is associated with somatic arousal.[32] Anxious arousal may at times increase sexual functioning and decrease it at others. In light of the high comorbidity between the 2 disorders, it is necessary to examine the independent impact of each on sexual functioning, as we have done.

Hormonal contraceptives in our adolescent sample were associated with higher sexual functioning overall as well as within the sexual areas of desire, arousal, and orgasm. This finding differs from an adult study in which those using a hormonal contraceptive experienced less frequent sexual activity, arousal, pleasure, and orgasm.[33] It may be that our findings merely reflect the fact that, even prior to MDE onset, adolescents and young adults using hormonal contraception derive more pleasure from their sexual encounters, which prompts them to both be more sexually active and use contraception. The latter might alleviate anxiety about becoming pregnant, further promoting their ability to enjoy their sexual encounters.[34] In addition, sexual activity with a new partner is generally exciting, which may be more common among the study population than in older adults.

Several limitations of this study should be acknowledged. First, the CSFQ has been validated in adults, but not adolescents. Second, the instructions in the questionnaire define sexual activity broadly (including masturbation and fantasizing) and do not restrict it to intercourse. Nonetheless, collecting more explicit information about sexual activity would have been more useful to interpret the findings. We combined participants with no MDE and those with remitted MDE into 1 group as no differences in the CSFQ scores were apparent. This reassuring finding suggests no lasting effects of MDD, once remitted, on sexual functioning. Our planned longitudinal analysis will be better designed to examine this question prospectively. Reflecting the local population, our sample consisted primarily of whites. The extent to which MDD impacts sexual functioning in more diverse populations should also be investigated as should the impact of different depression subtypes. Only 6 participants were deemed to have atypical depression, precluding the conduct of in-depth analyses. Finally, psychostimulants, benzodiazepines, and α_2-agonists were allowed at study entry. These medications may affect sexual function in opposing ways. However, only a few participants took them, rendering their potential effect on the findings negligible.

In sum, using adult cutoff scores, our results suggest that sexual dysfunction is relatively common in both male and female adolescents and that depression further impairs sexual functioning in both sexes, albeit to a larger extent in males. Notably, the affective symptoms of depression appear most strongly associated with poorer sexual functioning. These symptoms are often the first to emerge and last to resolve during a depressive episode. Thus, our findings suggest the need for further research on sexual functioning in older adolescents, the impact of MDD and its treatment, and the long-term outcomes after the remission of depressive symptoms.

Submitted: January 29, 2015; accepted June 9, 2015.

Drug names: citalopram (Celexa and others), escitalopram (Lexapro and others), fluoxetine (Prozac and others), paroxetine (Paxil, Pexeva, and others), sertraline (Zoloft and others).

Potential conflicts of interest: **Dr Clayton** has received grant support from Forest Research Institute, Pfizer, Takeda, Trimel, Auspex, and Palatin Technologies; has served on the advisory board of or as a consultant for: Arbor Scientia, Euthymics, Forest, Lundbeck, Palatin Technologies, Roche, S1 Biopharmaceuticals, Sprou, Naurex, Otsuka, and Takeda; receives royalties from Ballantine Books/Random House, Changes in Sexual Functioning Questionnaire, Guilford Publications; and owns shares/stock in Euthymics and S1 Biopharmaceuticals. **Drs Dindo**, **Burns**, and **Calarge**; **Ms Deumic**; and **Mr Butcher** have no conflicts of interest to report.

Funding/support: This work was funded by the National Institute of Mental Health (R01MH090072), the National Center for Research Resources (2UL1TR000442-06), and a medical student summer scholarship from the Carver College of Medicine.

Role of the sponsor: The funding agencies had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; or preparation, review, and approval of the manuscript.

Disclaimer: The content is solely the responsibility of the authors and does not necessarily represent the official views of the funding agencies.

Acknowledgments: The authors are grateful for the contributions of the participants and their families as well as those of the research team.

REFERENCES

1. Murray JB. Physiological mechanisms of sexual dysfunction side effects associated with antidepressant medication. *J Psychol*. 1998;132(4):407–416.
2. Kennedy SH, Rizvi S. Sexual dysfunction, depression, and the impact of antidepressants. *J Clin Psychopharmacol*. 2009;29(2):157–164.
3. Atlantis E, Sullivan T. Bidirectional association between depression and sexual dysfunction: a systematic review and meta-analysis. *J Sex Med*. 2012;9(6):1497–1507.
4. O'Sullivan LF, Brotto LA, Byers ES, et al. Prevalence and characteristics of sexual functioning among sexually experienced middle to late adolescents. *J Sex Med*. 2014;11(3):630–641.
5. Laumann EO, Paik A, Rosen RC. Sexual dysfunction in the United States: prevalence and predictors. *JAMA*. 1999;281(6):537–544.
6. O'Sullivan LF, Majerovich JA. Difficulties with sexual functioning in a sample of male and female late adolescent and young adult university students. *Can J Hum Sex*. 2008;17:109–121.
7. Sandfort TG, Orr M, Hirsch JS, et al. Long-term health correlates of timing of sexual debut: results from a national US study. *Am J Public Health*. 2008;98(1):155–161.
8. Else-Quest NM, Hyde JS, Delamater JD. Context counts: long-term sequelae of premarital intercourse or abstinence. *J Sex Res*. 2005;42(2):102–112.
9. Calarge CA, Butcher BD, Burns TL, et al. Major depressive disorder and bone mass in adolescents and young adults. *J Bone Miner Res*. 2014;29(10):2230–2237.
10. Beck AT. *Depression: Clinical, Experimental, and Theoretical Aspects*. New York, NY: Harper & Row; 1967.
11. Strober M, Green J, Carlson G. Utility of the Beck Depression Inventory with psychiatrically hospitalized adolescents. *J Consult Clin Psychol*. 1981;49(3):482–483.
12. Steer RA, Beck AT. *Beck Anxiety Inventory: Evaluating Stress: A Book of Resources*. Lanham, MD: Scarecrow Education; 1997.
13. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. Fourth Edition, Text Revision. Washington, DC: American Psychiatric Association; 2000.
14. Keller MB, Lavori PW, Friedman B, et al. The Longitudinal Interval Follow-Up Evaluation: a comprehensive method for assessing outcome in prospective longitudinal studies. *Arch Gen Psychiatry*. 1987;44(6):540–548.
15. Keller A, McGarvey EL, Clayton AH. Reliability and construct validity of the Changes in Sexual Functioning Questionnaire short-form (CSFQ-14). *J Sex Marital Ther*. 2006;32(1):43–52.
16. Serretti A, Chiesa A. Treatment-emergent sexual dysfunction related to antidepressants: a meta-analysis. *J Clin Psychopharmacol*. 2009;29(3):259–266.
17. McCabe MP, Connaughton C. Psychosocial factors associated with male sexual difficulties. *J Sex Res*. 2014;51(1):31–42.
18. Shah MB, Hoffstetter S. Contraception and sexuality. *Minerva Ginecol*. 2010;62(4):331–347.
19. Davis AR, Castaño PM. Oral contraceptives and libido in women. *Annu Rev Sex Res*. 2004;15:297–320.
20. Casper RC, Redmond DE Jr, Katz MM, et al. Somatic symptoms in primary affective disorder: presence and relationship to the classification of depression. *Arch Gen Psychiatry*. 1985;42(11):1098–1104.
21. Mathew RJ, Weinman ML. Sexual dysfunctions in depression. *Arch Sex Behav*. 1982;11(4):323–328.
22. Hartmann U. Depression and sexual dysfunction. *J Mens Health Gend*. 2007;4(1):18–25.
23. Johnson SD, Phelps DL, Cottler LB. The association of sexual dysfunction and substance use among a community epidemiological sample. *Arch Sex Behav*. 2004;33(1):55–63.
24. Keltner NL, McAfee KM, Taylor CL. Mechanisms and treatments of SSRI-induced sexual dysfunction. *Perspect Psychiatr Care*. 2002;38(3):111–116.
25. Angst J, Gamma A, Gastpar M, et al; Depression Research in European Society Study. Gender differences in depression: epidemiological findings from the European DEPRES I and II studies. *Eur Arch Psychiatry Clin Neurosci*. 2002;252(5):201–209.
26. Boyd JH, Weissman MM. *Epidemiology of Major Affective Disorders*. *Psychiatry: Social, Epidemiological, and Legal Psychiatry*. New York, NY: Basic Books; 1986.
27. Fabre LF, Clayton AH, Smith LC, et al. Association of major depression with sexual dysfunction in men. *J Neuropsychiatry Clin Neurosci*. 2013;25(4):308–318.
28. Fabre LF, Smith LC. The effect of major depression on sexual function in women. *J Sex Med*. 2012;9(1):231–239.
29. Scharko AM. Selective serotonin reuptake inhibitor-induced sexual dysfunction in adolescents: a review. *J Am Acad Child Adolesc Psychiatry*. 2004;43(9):1071–1079.
30. Rosen RC, Lane RM, Menza M. Effects of SSRIs on sexual function: a critical review. *J Clin Psychopharmacol*. 1999;19(1):67–85.
31. Grello CM, Welsh DP, Harper MS, et al. Dating and sexual relationship trajectories and adolescent functioning. *Adolesc Fam Health*. 2003;3:103–112.
32. Watson D, Weber K, Assenheimer JS, et al. Testing a tripartite model: I: evaluating the convergent and discriminant validity of anxiety and depression symptom scales. *J Abnorm Psychol*. 1995;104(1):3–14.
33. Smith NK, Jozkowski KN, Sanders SA. Hormonal contraception and female pain, orgasm and sexual pleasure. *J Sex Med*. 2014;11(2):462–470.
34. Bancroft J, Sherwin BB, Alexander GM, et al. Oral contraceptives, androgens, and the sexuality of young women: II: the role of androgens. *Arch Sex Behav*. 1991;20(2):121–135.

Editor's Note: We encourage authors to submit papers for consideration as a part of our Focus on Childhood and Adolescent Mental Health section. Please contact Karen D. Wagner, MD, PhD, at kwagner@psychiatrist.com.