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Gender differences in the developmental course of depression

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Abstract

Background—There is ample evidence for female preponderance of major depressive disorder (MDD) in adolescence and adulthood. This study examined gender differences in the developmental course (i.e., incidence, duration, number of depressive episodes, and recovery rates) of MDD in non-referred adolescents and young adults.

Methods—Data from the Oregon Adolescent Depression Project were used to examine gender differences in the developmental course of MDD. Gender differences in the onset, duration, number of depressive episode and rate of recovery from MDD were examined in a population-based sample of the same individuals (participants: N = 773) during adolescence (age 14 to 17) and at age 30.

Results—Compared to males, females have higher incidence rates of MDD and had a more chronic course. Difference in duration of depressive episodes is marginally significant between male and female, with females having longer episodes. Lower onset age correlates significantly with more number of episodes in both genders; however, lower onset age predicts a worse course of depression only in females.

Limitations—The sample was from a single region of the country and consisted mostly of White adolescents.

Conclusions—Childhood depression may be a more serious risk factor for girls than for boys.

Keywords

Depression; gender differences; course and outcome; recovered; chronic

1. Introduction

One of the most consistent findings across studies is the female preponderance of major depressive disorder (MDD) and its emergence in adolescence. Studies of adolescents have reported gender differences consistent with adult populations, about twice as many girls as

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boys meet the criteria for MDD at some time in their lives (Anderson et al., 1987; Cohen et al., 1993; Essau et al., 2000; Fleming et al., 1989; Kashani et al., 1987; Lewinsohn et al., 1993; Reinherz et al., 1993). The change in the sex ratio usually emerges around puberty (Cohen et al., 1993; Essau et al., 2000; Hankin et al., 1998; Harrington et al., 1990; Petersen et al., 1991), with the greatest increase in gender difference occurring between ages 15 and 18 (Essau et al., 2000; Hankin et al., 1998). Mechanisms underlying this shift in prevalence are still unclear, however, it may reflect the interplay of gender socialization, social and hormonal mechanisms, and stressful events associated with adolescence (Cyranowski et al., 2000).

Although informative, the empirical literature on gender differences in MDD is problematic because of their reliance on cross-sectional studies. Cross-sectional studies do not provide a clear picture of the emergence of gender differences in depression as would a longitudinal study. However, longitudinal studies that followed the same group of individuals in the community and which assess MDD at multiple developmental age stages are rare. Therefore, it is not clear whether the gender difference in depression is due to girls experiencing more first onsets or more recurrence of depression.

Studies among adults (Eaton et al., 1997; Keller, & Shapiro, 1981; Kessler et al., 1993) and adolescents (Hankin et al., 1998; Kovacs, 2001) have reported greater number of first onsets of depression in females than in males. Results on gender differences in the duration or recurrence of depression are somewhat inconsistent. For example, an early study by Amenson and Lewinsohn (1981) has shown that women compared to men with a history of depression were more likely to develop a subsequent depressive episode; no gender differences were found for new incidence of depression among those without a history of depression. In a study with older adults, Lewinsohn and his colleagues (1989) found that the probability of depression recurrence was greater for females. In one of the publications of the Oregon Adolescent Depression Project data (OADP), Lewinsohn et al. (2003) reported that girls with MDD were more likely than boys to experience recurrence in childhood or adolescence. Overall, these results suggest that females have more recurrences of depression than males. However, a study by Hankin et al. (1998) failed to find a gender difference in recurrence of depression. Kovacs (2001) similarly found no gender differences in risk of recurrent depressive episodes among the 11-17 year-olds with MDD. These findings seem to fit those found in the National Comorbidity Study (Kessler et al., 1993), in that adult gender difference was due to a greater number of first onsets of depression in women than men, and not to gender differences in the duration or recurrence of depression.

Knowledge on a developmental course for gender difference in depression holds important implications because theories on the development and maintenance of depression should be able to explain when these gender differences begin to emerge and how these differences progress over time. Therefore, the main aim of this study was to try to solve the contradictory findings in the literature on the role of gender on the developmental course of depression. Specifically, we examined gender differences in the number and duration of major depressive episodes, as well as the onset and recovery rates of MDD. We also examined the rates of chronic, new and recovered cases of depression over the 16-year span. To our knowledge, this study is the first to examine gender differences in the course, onset, recovery, and incidence rate of MDD prospectively from adolescence to young adulthood. We used the OADP data on MDD, which has collected this information in a population-based sample of the same individuals at multiple ages from age 14 to age 30.

2. Method

2.1. Participants and Procedures

Participants were randomly selected in three cohorts from nine senior high schools representative of urban and rural districts in western Oregon. Data collection has been completed at 4 points. A detailed description of the OADP has been reported in numerous papers (Lewinsohn et al., 2003; Pettite et al., 2006; Rohde et al., 2007) and therefore we will only make a brief summary of the OADP (Table 1). First, a total of 1,709 adolescents (aged 14–19 years; mean=16.6; SD=1.2) completed the T1 interview and questionnaires between 1987 and1989; the overall participation rate was 61%. About half of the T1 sample (53%) was female, with an average age of 16.6 years (SD = 1.2). A total of 9% were nonwhite or Hispanic, and 53% were living with two biological parents.

About one year later (M = 13.8 months, SD = 2.3), all T1 participants were invited to complete a second (T2) assessment. A total of 1,507 participants (88%) returned for a re-administration of the questionnaire and interview assessments. Between 1994 and 1999, as participants reached their 24th birthday, a third wave of questionnaires and interviews (T3) was obtained from 941 participants (85%) with a history of psychopathology at T2 (n=555; 315 with depression, 240 with other psychopathology) and a randomly selected subset of participants with no history of mental disorder (n=386) (Lewinsohn et al., 2003). Finally, as participants reached their 30th birthday, a fourth wave of questionnaire and interview assessments (T4) was conducted with all participants who completed T3. Of the 816 participants (87% of the 941 at T3) who complied to take part in the study at T4, 480 (59%) were women. Most participants were White (89%); others were African American (1%), Hispanic (3%), American Indian (3%), Asian (3%), and “other” (2%). Slightly more than half (53%) were married, and 41% had a bachelor's degree or higher. Participants' mean age was 30.6 years (SD = 0.6). Two hundred and seventy one (33%) had a history of depression, 199 (24%) had a history of other psychopathology, and 346 (42%) were free of condition up to T3. Written informed consent was obtained from participants (and guardians, if applicable). For the purposes of the present study, the subsequent report focuses on the longitudinal results obtained from T1 and T4 data sets.

2.2. Diagnostic Interviews

T1 participants were interviewed with a version of the Schedule for Affective Disorders and Schizophrenia for School-Age Children (K-SADS; Orvaschel et al., 1982) that included items for most disorders, as per DSM–III–R criteria (American Psychiatric Association; APA, 1987). Interrater reliability of diagnoses at T1 has been reported to be very good to excellent (Lewinsohn et al., 1993).

The T4 interview was expanded to assess DSM-IV (APA, 1994) disorders by a joint administration of the Longitudinal Interval Follow-Up Evaluation (LIFE; Keller et al., 1987) and the Structured Clinical Interview for DSM–IV, Non-Patient Version (SCID-NP; Spitzer et al., 1990). These measures were used to provide information regarding the onset and course of disorders since the previous interview, and to probe for new or continuing psychiatric episodes.

Diagnostic interviewers were carefully selected, trained, and supervised. Interviewers had advanced degrees in a mental health discipline and completed a 70-hr course in diagnostic interviewing for the SCID-NP and LIFE procedures at T4. Interviewers were required to demonstrate a minimum kappa of .80 across all symptoms for at least two consecutive training interviews and on one videotaped interview of a participant with evidence of psychopathology before conducting interviews. Interviewer performance was carefully monitored to minimize drift and to maintain reliability.

2.3. Statistical Analyses

In examining gender differences on the developmental course of MDD, the following variables were used in the current study: the number of lifetime major depressive episodes, age of onset, course (i.e., recovery, recurrence, and new cases during the 16-year span), and maximum duration of a single depressive episode. For the current study, we used data of 1709 (Male=818, Female=891) from the original data at T1 according to the target variables. Seven hundred and seventy three (Male=313, Female=460) out of the 816 who agreed to participate in the T4 evaluation had complete data. No significant differences were found between the 773 participants who completed the evaluation and 43 who failed to do so. Polyserial correlation was calculated using Mplus ver. 2.02, and all other analyses were done using SPSS 11.0.

3. Results

3.1. Number of Episodes

The number of lifetime major depressive episodes was evaluated for 2 time periods: up to adolescence (T1 data; N=1709, Male=818, Female=891, participants' age ranged from 14-18), and through adulthood (T4 data; N=773, Male=313, Female=460, participants were followed up to age 30). The results are shown in Table 2. Significant gender differences were obtained for both T1 (chi-square (3) = 54.00, $p < 0.001$) and T4 data (chi-square (5) = 77.96, $p < 0.001$). Residual analysis for T1 data showed that more boys reported no episode, and more girls reported 1 or 2 episodes. Likewise, for T4 data, more males reported no episode, and more females reported 1 to ≥ 5 episodes. Thus, it can be concluded that females had more lifetime major depressive episodes throughout adolescence and adulthood.

3.2. Age of Onset

Age of onset was defined as the time when the first major depressive episode occurred. Of the original 1709 participants at T1, 629 (Male=209, Female=420) were identified to have developed MDD by the time of T4 data collection. The mean onset age for males and females were 220.39 months (SD=56.09) and 214.35 months (SD=62.30), respectively. However, no significant differences emerged between the two genders ($F(1, 628)=1.40$, n.s., partial eta squared=0.002).

3.3. Course of Depression

Seven hundred and seventy three participants (Male=313, Female=460) were followed from T1 to T4 and completed all the required assessment procedures. Four hundred and sixty participants (Male=130, Female=330) had lifetime episode of depression during this time period. These participants were grouped into 4 categories according to the course their depression took: no episode (i.e., no history of depressive episode throughout the study), recovered (i.e., a history of lifetime episode at T1 but no new episodes between T1 and T4), new cases (i.e., no history of depressive episode at T1 but at least one depressive episode between T1 and T4), and recurrent (i.e., a history of lifetime episode at T1, and new episodes between T1 and T4). As a result, significant gender differences emerged (chi-square (3) = 79.58, $p < 0.001$). Residual analysis showed that the percentage of no episode was higher for males, and the percentage of new and recurrent cases was higher for females. The percentages are shown in Table 3. No significant differences were found between genders for the percentage of recovered cases. The present results suggest that incidence and recurrence rates of depression are higher for females.

3.4. Maximum Duration of Depressive Episode

Of the 773 participants (Male=313, Female=460) that were followed from T1 to T4 and completed all required assessment procedures, 460 (Male=130, Female=330) had a lifetime episode of depression. The majority of these participants had more than one episode within the research period. Therefore, we compared between genders the duration of the longest depressive episode. Results of ANOVA showed marginal significance ($F(1, 459)=3.40$, $p=0.066$, partial eta squared=0.007), indicating a trend for females to have longer depressive episodes than males. The mean length of longest episode for males and females were 34.57 weeks (SD=7.14) and 50.12 weeks (SD=4.48), respectively. Since there was a considerable difference in male and female sample size, definitive conclusions cannot be drawn; however, females seem to be at higher risk of suffering from longer periods of depressive episodes.

3.5. Gender Difference in the Relationship between Number of Major Depressive Episodes, Onset Age, Course, and Maximum Duration

Table 4 depicts the polyserial correlation (i.e., correlation between categorical and continuous variables) between the number of major depressive episodes, onset age, course, and maximum duration separately for males and females. These figures were calculated from the 130 male and from the 330 females which have been extracted from the 460 participants with depression with complete data up to T4.

Some important gender differences emerged. The correlation between number of episodes and onset age was more pronounced in the female data (r = -0.40 as compared to r = -0.28 in the male data), indicating that in females more so than in males, the younger they develop depression, the greater risk they are at in developing more episodes later in their lives. Similarly, onset age and the course of depression had almost no correlation in the male data (r = 0.00), but a moderate correlation in the female data (r = -0.27). This again shows that the influence of early onset has a larger impact for females in predicting the course of depression; the earlier they develop depression, more chronic the course in females, but not in males. In sum, females with a younger onset of depression had a more chronic course, demonstrating that the threat of girls' adolescent depression to adult mental health is stronger than in boys.

3.6 The Influence of other Psychopathologies on the Course of Depression

Of the 460 participants (Male=130, Female=330) that had a lifetime episode of depression, 104 (23%; Male=27, Female=77) had a history of other psychopathology by T3. Those who had other diagnosis and those only with depression at T3 were compared to see if extra diagnosis was predictive of the developmental course.

A 2-way ANOVA of gender × diagnosis (other diagnosis versus depression only) for the number of lifetime episodes was completed. The only component that was significant was the main effect of gender ($F(1, 456) =3.97$, $p < 0.05$, partial eta squared=0.009). These results suggested that comorbid mental disorders do not increase the risk for number of major depressive episodes. For age of onset, both the main effect and the interaction were not significant.

The only striking results that emerged were for maximum duration. Both the main effect of diagnosis ($F(1, 456) =6.52$, $p < 0.05$, partial eta squared=0.014) and gender × diagnosis interaction ($F(1, 456) =5.94$, $p < 0.05$, partial eta squared= 0.013) was significant. Mean maximum duration for females with and without an additional diagnosis was 51.03 (SD=9.22) and 49.85 (SD= 5.08) weeks respectively, whereas in males, the values were

74.93 (SD=15.56) and 23.99 (SD=7.97). When there is a comorbid disorder, the maximum duration of MDD episodes become longer especially in the male sample.

4. Discussion

A major strength of the present study is its prospective, longitudinal design in which the participants were followed-up for a period of 16 years. This study adds to the literature by demonstrating gender differences in the developmental course of MDD from adolescence to young adulthood using a large sample derived from the general population. Four major findings were obtained.

First, in line with findings of several previous studies (e.g., Hankin et al., 1998; Galambos et al., 2004), females have higher incidence rates of MDD at T4 when compared to males. As mentioned at the onset of this paper, previous studies have produced inconsistent findings in terms of gender differences and recurrence rates of depression. Some early adult studies (e.g., Amenson & Lewinsohn, 1981; Lewinsohn et al., 1989) have reported higher recurrence rates of depression among women than men, but not in other studies (Eaton et al., 1997; Kessler et al., 1993). Among adolescents and young adults, Hankin and his colleagues (1998) failed to find gender differences in the recurrence of depression. However, because the participants in Hankin et al.'s study (1998) are still young, it is possible that greater female recurrence may emerge at a later age.

Second, females compared to males reported significantly higher number of major depressive episodes throughout adolescence and adulthood. The duration of the depressive episodes showed trend towards lengthier in females. However, due to unequal sample size, definitive conclusion cannot be drawn regarding the validity of the statistical trend towards significance. Our findings are consistent with those reported by Birmaher et al. (2004), who found female sex to be associated with worse longitudinal course (i.e., have a longer duration of the depression). While it is beyond the scope of this paper to examine factors associated with the onset of MDD, previous studies have reported female's higher prevalence or onsets of MDD, compared to males, to be associated with numerous biological, social and psychological factors. Some examples of these factors include: changes in gonadal hormones (DeRose et al., 2006), higher rates of physical and sexual abuse (see Weiss et al., 1999 for a review), greater tendency to ruminate (Nolen-Hoeksema, 2001), presence of childhood adversity (Daley et al., 2000), and the experience of more interpersonal stressors (e.g., Shih et al., 2006). Recently, Hyde, Mezulis, and Abramson (2008) have proposed the ABC model for explaining the emergence of gender difference in depression in adolescence. According to this model, affective (emotional reactivity), biological (genetic vulnerability, pubertal hormones, pubertal timing and development) and cognitive (cognitive style, objectified body consciousness, rumination) factors confer vulnerability to depression. These factors interact with negative life events or stress, leading to significantly more girls than boys having depression in adolescence. Why males and females differ in most of these factors, and which in turn has contributed to gender differences in depression is still unclear and should be the agenda for future research.

Third, in both genders, lower or an earlier onset of depression was significantly correlated with more number of depressive episodes. Interestingly, lower onset age predicts a worse course of depression in females, but not in males. The finding that an earlier age of onset increased the chances of experiencing depressive episodes can be interpreted as supporting previous findings that an early onset MDD is more severe than those with a later onset (Lewinsohn et al., 1994). The finding that an earlier onset is associated with a worse course in females only could have important theoretical implications. Our finding seemed to suggest that depressive episodes tend to leave “scars” or residual effects (Rohde et al.,

1994), on an individual which may serve to increase the likelihood of future depressive episodes. This effect is more likely to be experienced by females because of their greater tendency to ruminate in response to their depressed moods (Nolen-Hoeksema, 2000) which in turn may activate and strengthen associative networks of negative cognitions (Teasdale, 1988), greater genetic effects on MDD (Eley & Stevenson, 1999; Jansson et al., 2004; Kendler et al., 2006), and their interpersonal orientation that overvalue relationships as sources of self-worth (e.g., Joiner & Coyne, 1998). Another line of argument may be biologically-oriented. As argued by Post (1992; Post & Weiss, 1995), depression may increase biological reactivity to stress by sensitizing the neurotransmitter and neuroendocrine systems linked to depression. This in turn lowers the threshold for new depressive episodes, such that even mild stressors can trigger a new episode. It could be further argued that females are more reactive to stress than males. Support of this hypothesis come from a recent study by Shih et al. (2006) which showed that adolescent girls compared to boys were also more reactive (more likely to become depressed) to both total and interpersonal episodic stress.

Fourth, in the presence of a comorbid disorder, the maximum duration of MDD episodes become significantly longer in males than in females. The exact reason for this gender difference is unclear, however, it could be that among males, major depression is secondary to other conditions such as substance use disorders which males are more prone to have (Merikangas & Gelernter, 1990; Perkonigg, Lieb, & Wittchen, 1998; Swendsen & Merikangas, 2000). Studies have also indicated that protracted substance abuse was associated with more severe depression and health problems in males than in females (Kinnier et al., 1994).

In evaluating our findings, several limitations should be considered. First, although the OADP sample is representative of youth in Oregon, it is not nationally representative. That is, 89% of the samples are European American and by young adulthood, most of them had obtained a high school diploma or General Educational Development (GED) . As such the findings may not generalize to studies of young adults from other racial or ethnic backgrounds or to youth who do not complete high school. Second, we over-sampled young adults with disorders because we are interested in the course and outcome of disorders. As such it is not meant to provide prevalence rates for young adults (Lewinsohn et al., 1999). Third, there has been some concerns about the accuracy of retrospective symptom recall and in reporting the number and duration of episodes between the assessment periods (Wells & Horwood, 2004). However, high interrater reliabilities for individual symptoms, found in the OADP data, seem to diminish this concern.

These caveats aside, females have more negative course of depression (i.e., longer duration, more depressive episodes). Studies are needed to elucidate the social, psychological, and physiological processes that underlie the gender differences in the developmental course of depression. More importantly, it would be useful to understand how these variables interact with one another over time to explain for gender differences in the course of depression. A better understanding of these processes will likely play a crucial role in designing effective prevention and intervention programs for depression for adolescent girls.

References

Amenson CS, Lewinsohn PM. An investigation into the observed sex difference in prevalence of unipolar depression. Journal of Abnormal Psychology. 1981; 90:1–13. [PubMed: 6973575]

American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 3rd, rev. Washington DC: Author; 1987.

Anderson JC, Williams S, McGee R, Silva PA. DSM-III disorders in preadolescent children. Prevalence in a large sample from the general population. Archives of General Psychiatry. 1987; 44:69–76. [PubMed: 2432848]

Barnett RC, Brennan RT, Marshall NL. Gender and relationship between parent role quality and psychological distress. A study of men and women in dual-earner couples. Journal of Family Issues. 1994; 15:229–252.

Birmaher B, Williamson DE, Dahl DE, Axelson DA, Kaufman J, Dorn LD, Ryan NR. Clinical Presentation and Course of Depression in Youth: Does Onset in Childhood Differ From Onset in Adolescence? Journal of American Academy of Child and Adolescent Psychiatry. 2004; 43:63–70.

Cohen P, Cohen J, Kasen S, Velez CN, Hartmark C, Johnson J, Rojas M, Brook J, Streuning EL. An epidemiological study of disorders in late childhood and adolescence - I: Age- and gender-specific prevalence. Journal Child Psychology and Psychiatry. 1993; 34:851–866.

Cyranowski JM, Frank E, Young E, Shear K. Adolescent onset of the gender difference in lifetime rates of major depression. Archives of General Psychiatry. 2000; 57:21–27. [PubMed: 10632229]

Daley SE, Hammen C, Rao U. Predictors of first onset and recurrence of major depression in young women during the 5 years following high school graduation. Journal of Abnormal Psychology. 2000; 109:525–533. [PubMed: 11016122]

DeRose, LM.; Wright, AJ.; Brooks-Gunn, J. Does puberty account for the gender differential in depression?. In: Keyes, CLM.; Goodman, SH., editors. Women and depression. New York: Cambridge University Press; 2006. p. 89-128.

Eaton W, Anthony J, Gallo J, Cai G, Tien A, Romanoski A, et al. Natural history of Diagnostic Interview Schedule/DSM-IV Major Depression. Archives of General Psychiatry. 1997; 54:993–999. [PubMed: 9366655]

Eley TC, Stevenson J. Exploring the covariation between anxiety and depression symptoms: A genetic analysis of the effects of age and sex. Journal of Child Psychology and Psychiatry. 1999; 40:1273–1284. [PubMed: 10604405]

Essau CA, Conradt J, Petermann F. Frequency, comorbidity, and psychosocial impairment of depressive disorders in adolescents. Journal of Adolescent Research. 2000; 15:470–481.

Fleming JE, Offord DR, Boyle MH. Prevalence of childhood and adolescent depression in the community: Ontario Child Health Study. British Journal of Psychiatry. 1989; 155:647–654. [PubMed: 2611594]

Hankin BL, Abramson LY, Moffitt TE, McGee R, Silva P, Angell KE. Development of depression from preadolescence to young adulthood: Emerging gender differences in a 10-year longitudinal study. Journal of Abnormal Psychology. 1998; 107:128–14. [PubMed: 9505045]

Harrington R, Fudge H, Rutter M, Pickles A, Hill J. Adult outcomes of childhood and adolescent depression: I. Psychiatric status. Archives of General Psychiatry. 1990; 47:465–473. [PubMed: 2184797]

Hyde JS, Mezulis AH, Abramson LY. The ABCs of depression: Integrating affective, biological, and cognitive models to explain the emergence of the gender difference in depression. Psychological Review. 2008; 115:291–313. [PubMed: 18426291]

Jansson M, Gatz M, Berg S, Johansson B, Malberg B, McClearn GE, Schalling M, Pedersen N. Gender differences in the heritability of depressive symptoms in the elderly. Psychological Medicine. 2004; 34:471–479. [PubMed: 15259832]

Joiner, T.; Coyne, JC. The interactional nature of depression: Advances in interpersonal approaches. Washington, DC: American Psychological Association; 1999.

Kashani JH, Carlson GA, Beck NC, Hoeper EW, Corcoran CM, McAllister JA, Fallahi C, Rosenberg TK, Reid JC. Depression, depressive symptoms, and depressed mood among a community sample of adolescents. American Journal of Psychiatry. 1987; 144:931–934. [PubMed: 3605407]

Keller MB, Lavori PW, Friedman B, Nielsen E, Endicott J, McDonald-Scott PA. The Longitudinal Interval Follow-up Examination: a comprehensive method for assessing outcome in retrospective longitudinal studies. Archives of General Psychiatry. 1987; 44:540–548. [PubMed: 3579500]

Keller M, Shapiro R. Major depressive disorder: initial results from a one-year prospective naturalistic follow-up study. Journal of Nervous Mental Disorders. 1981; 169:761–768.

Kendler KS, Gatz M, Gardner CO, Pedersen NL. A Swedish National Twin Study of lifetime major depression. American Journal of Psychiatry. 2006; 163:109–114. [PubMed: 16390897]

Kessler RC, McGonagle KA, Swartz M, Blazer DG, Nelson CB. Sex and depression in the National Comorbidity Survey: I. Lifetime prevalence, chronicity and recurrence. Journal of Affective Disorders. 1993; 29:85–96. [PubMed: 8300981]

Kinnier RT, Metha AT, Okey JL, Keim J. Adolescent substance abuse and psychological health. Journal of Alcohol and Drug Education. 1994; 40:51–56.

Kovacs M. Gender and the course of major depressive disorder through adolescence in clinically referred youngsters. Journal of the American Academy of Child & Adolescent Psychiatry. 2001; 40:1079–1085. [PubMed: 11556632]

Lewinsohn PM, Pettit JW, Joiner TE Jr, Seeley JR. The symptomatic expression of major depressive disorder in adolescents and young adults. Journal of Abnormal Psychology. 2003; 112:244–52. [PubMed: 12784834]

Lewinsohn PM, Zeiss AM, Duncan EM. Probability of relapse after recovery from an episode of depression. Journal of Abnormal Psychology. 1989; 98:107–116. [PubMed: 2708651]

Lewinsohn PM, Hops H, Roberts RE, Seeley JR, Andrews JA. Adolescent psychopathology: I. Prevalence and incidence of depression and other DSM-III-R disorders in high school students. Journal of Abnormal Psychology. 1993; 102:133–144. [PubMed: 8436689]

Lewinsohn PM, Rohde P, Klein DN, Seeley JR. Natural course of adolescent major depressive disorder: I. Continuity into young adulthood. Journal of the American Academy of Child and Adolescent Psychiatry. 1999; 38:56–63. [PubMed: 9893417]

Lewinsohn PM, Pettit JW, Joiner TE Jr. The phenomenology of major depression in adolescents and young adults. Journal of Abnormal Psychology. 2003; 112:244–252. [PubMed: 12784834]

Merikangas K, Gelernter C. Comorbidity for alcoholism and depression. Psychiatric Clinics of North America. 1990; 13:613–632. [PubMed: 2281009]

Nolen-Hoeksema S. Gender differences in depression. Current Directions. Psychological Science. 2001; 10:173–176.

Nolen-Hoeksema S. The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. Journal of Abnormal Psychology. 2000; 109:504–511. [PubMed: 11016119]

Orvaschel H, Puig-Antich J, Chambers WJ, Tabrizi MA, Johnson R. Retrospective assessment of prepubertal major depression with the Kiddie-SADS-E. Journal of the American Academy of Child and Adolescent Psychiatry. 1982; 21:392–397.

Perkonigg A, Lieb R, Wittchen HU. dependence of illicit drugs among adolescents and young adults in a community sample. European Addiction Research. 1998; 4:58–66. [PubMed: 9740818]

Petersen AC, Sarigiani PA, Kennedy RE. Adolescent depression: Why more girls? Journal of Youth and Adolescence. 1991; 20:247–271.

Pettit JW, Lewinsohn PM, Joiner TE. Propagation of major depressive disorder: Relationship between first episode symptoms and recurrence. Psychiatry Research. 2006; 141:271–278. [PubMed: 16497387]

Post, RM.; Weiss, SRB. The neurobiology of treatment-resistant mood disorders. In: Bloom, FE.; Kupfer, DJ., editors. Psychopharmacology: The fourth generation of progress. New York: Raven Press; 1995. p. 1155-1170.

Post RM. Transduction of psychosocial stress into the neurobiology of recurrent affective disorder. American Journal of Psychiatry. 1992; 149:999–1010. [PubMed: 1353322]

Reinherz HZ, Giaconia RM, Lefkowitz ES, Pakiz B, Frost AK. Prevalence of psychiatric disorders in a community population of older adolescents. Journal of the American Academy of Child and Adolescent Psychiatry. 1993; 32:369–377. [PubMed: 8444767]

Rohde P, Lewinsohn PM, Seeley JR. Are adolescents changed by an episode of major depression? Journal of the American Academy of Child and Adolescent Psychiatry. 1994; 33:1289–1298. [PubMed: 7995795]

Rohde P, Lewinsohn PM, Seeley JR, Klein DN, Andrews JA, Small JW. Psychosocial Functioning of Adults Who Experienced Substance Use Disorders as Adolescents. Psychology of Addictive Behaviors. 2007; 21:155–164. [PubMed: 17563135]

Shih JH, Eberhart NK, Hammen CL, Brennan PA. Differential exposure and reactivity to interpersonal stress predict sex differences in adolescent depression. Journal of Clinical Child & Adolescent Psychology. 2006; 35:103–15. [PubMed: 16390306]

Spitzer, RL.; Williams, JBW.; Gibbon, M.; First, MB. User's guide for the Structured Clinical Interview for DSM–III–R: SCID. Washington, DC: American Psychiatric Association; 1990.

Swendsen JD, Merikangas KR. The comorbidity of depression and substance use disorders. Clinical Psychology Review. 2000; 20:173–189. [PubMed: 10721496]

Teasdale J. Cognitive vulnerability to persistent depression. Cognition and Emotion. 1988; 2:247–274.

Weiss EL, Longhurst JG, Mazure CM. Childhood sexual abuse as a risk factor for depression in women: Psychosocial and neurobiological correlates. American Journal of Psychiatry. 1999; 156:816–828. [PubMed: 10360118]

Wells JE, Horwood LJ. How accurate is recall of key symptoms of depression? A comparison of recall and longitudinal reports. Psychological Medicine. 2004; 34:1001–1111. [PubMed: 15554571]

Table 1
Sampling and Demographics of the Subjects

	T1	T2[1]	T3	T4
Sample size	1,709	1,507	941	816
Age (years)	14-19 (mean=16.6 years)	15-21 (mean 17.7=years)	24	30
Gender				
Male	818	697	402	336
Female	891	809	539	480
History of Psychopathology				
MDD	317	362	315	271
Other	315	282	240	199
None	1077	863	386	346

Note: One participant at T2 had a missing data on gender.

MDD = Major depressive disorders

Table 2
Gender Differences in the Number of Major Depressive Episodes at T1 and at T4

	Male	Female
No. of major depressive episode at T1		
0	724 (88.5%)	670 (75.2%)
1	87 (10.5%)	183 (20.5%)
2	6 (0.7%)	33 (3.7%)
3	1 (0.1%)	5 (0.6%)
No. of major depressive episode at T4		
0	183 (58.5%)	130 (28.3%)
1	68 (21.7%)	137 (29.8%)
2	36 (11.5%)	82 (17.8%)
3	11 (3.5%)	50 (10.9%)
4	10 (3.2%)	36 (7.8%)
≥5	5 (1.6%)	25 (5.4%)

T1: N=1709 (Male=818, Female=891)

T4: N=773 (Male=313, Female=460)

Table 3
Gender Differences in the Course of Major Depression from T1 to T4

	No episode N (%)	Recovered N (%)	New cases N (%)	Chronics N (%)
Male	183 (58.5%)	21 (6.7%)	85 (27.2%)	24 (7.7%)
Female	130 (28.3%)	45 (9.8%)	173 (37.6%)	112 (24.3%)

Table 4

Polyserial Correlation between Gender, Number of Major Depressive Episodes, Onset Age, Course, and Maximum Duration (T4 data)

	Episodes	Onset age	Course
Male (n=130)			
Onset age	-0.28		
Course	0.60	0.00	
Max duration	0.14	-0.25	0.20
Female (n=330)			
Onset age	-0.40		
Course	0.76	-0.27	
Max duration	0.10	-0.27	0.14