

# Mental Health, Educational, and Social Role Outcomes of Adolescents With Depression

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**Background:** This study used longitudinal data to examine the extent to which young people with depression in mid adolescence (ages 14-16) were at increased risk of adverse psychosocial outcomes in later adolescence and young adulthood (ages 16-21).

**Methods:** Data were gathered during a 21-year longitudinal study of a birth cohort of 1265 children. Measures included assessments of *DSM-III-R* major depression (at age 14-16); psychiatric disorders, educational achievement, and social functioning (at age 16-21); social, familial, and individual factors; and comorbid disorders.

**Results:** Thirteen percent of the cohort developed depression between ages 14 and 16. Young people with depression in adolescence were at significantly ( $P < .05$ ) increased risk of later major depression, anxiety disorders, nicotine dependence, alcohol abuse or dependence, suicide attempt, educational underachievement, unemploy-

ment, and early parenthood. These associations were similar for girls and boys. The results suggested the presence of 2 major pathways linking early depression to later outcomes. First, there was a direct linkage between early depression and increased risk of later major depression or anxiety disorders. Second, the associations between early depression and other outcomes were explained by the presence of confounding social, familial, and individual factors.

**Conclusions:** Young people having early depression were at increased risk of later adverse psychosocial outcomes. There was a direct linkage in which early depression was associated with increased risk of later major depression and anxiety disorders. Linkages between early depression and other outcomes appeared to reflect the effects of confounding factors.

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**I**N RECENT DECADES, there has been a growing awareness of depression in childhood and adolescence.<sup>1-3</sup> Although before the 1970s it was believed that depression did not occur in young people, recent prevalence studies<sup>1,4-7</sup> have suggested that 2% to 8% of young people experience their first episode of major depression by age 16. For example, Hankin et al<sup>3</sup> found that almost 6% of young people in the Dunedin study cohort met *DSM-III*<sup>8</sup> diagnostic criteria for depression on at least one occasion by age 15. A similar rate was reported by Fergusson et al,<sup>4</sup> who found that almost 7% of 15-year-olds met *DSM-III-R* diagnostic criteria for depression.

Increased recognition of the presence of depression in young people has led to a growing interest in the etiology, comorbidities, and consequences of early-onset depression. For example, there is emerging evidence to suggest that young people showing early-onset depression or

depressive tendencies are at risk for several adverse outcomes, including a further depressive episode,<sup>9-11</sup> impaired social functioning,<sup>9,12-16</sup> low academic achievement,<sup>9,10,12,15,17,18</sup> and a range of other mental health problems, such as anxiety disorders, substance abuse, and suicidal behaviors.<sup>12,15,19-21</sup> These linkages between early depression and later outcomes are thought to reflect the effects of early-onset depression on normal development and the continuities of depressed mood across time.<sup>9</sup>

Although the linkages between later depression and later outcomes have been well documented, less is known about the pathways linking early depression to later outcomes. In general, there are 3 pathways that may explain linkages between early depression and later outcomes. First, there may be a direct effect of depression on later outcomes. Therefore, for example, depression may lead to impaired educational achievement and reduced life

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## SUBJECTS AND METHODS

### SUBJECTS

The data reported herein were collected as part of the Christchurch Health & Development Study, a longitudinal study of a birth cohort of 1265 children born in the Christchurch, New Zealand, urban region during mid 1977. These young people had been studied at birth, 4 months, 1 year, annual intervals to age 16 years, and again at ages 18 and 21 years. The analyses reported in this article were based on a sample of 964 young people for whom complete data were available on the measures of adolescent depression and later outcomes. This sample represented 76.2% of the initial birth cohort. Losses to follow-up arose because of out-migration from New Zealand (50%), failure to trace respondent (3%), subject refusal (37%), and mortality (10%).

To examine the effects of sample losses on the representativeness of the sample, comparisons were made between the 964 young people included in the analyses and the excluded 301 cohort members on a range of social background measures collected at birth. This analysis suggested that losses to follow-up were not associated with maternal age, family size, or sex of the child. However, there were small but statistically detectable ( $P < .05$ ) tendencies for this sample to underrepresent children from Maori, New Zealand, and from families with single parents or of lower socioeconomic status. Although these results suggest some bias in the sample, it is unlikely that this bias materially affects the results reported herein, because previous efforts to correct for nonrandom sample loss in the cohort have shown these effects to be negligible.<sup>22,23</sup>

### ADOLESCENT DEPRESSION (AT AGE 14-16)

At ages 15 and 16, sample members and their parents were separately interviewed about the extent to which a young person showed symptoms of depression during the previous year. Fifteen was the earliest age at which depression was assessed in the cohort. Self-reported depression was assessed between ages 14 to 15 and 15 to 16 using the *Diagnostic Interview Schedule for Children*,<sup>24</sup> supplemented by additional items based on DSM-III-R diagnostic criteria.<sup>25</sup> Parent-reported depression was assessed for the same age intervals using the parent version of the *Diagnostic Interview Schedule for Children* and items from the *Diagnostic Interview Schedule*.<sup>26</sup> Sample members were classified as having experienced a depressive disorder between ages 14 and 16 if, on the basis of parent- or self-report, they met DSM-III-R criteria for major depression during either of the age intervals assessed.

### PSYCHIATRIC, EDUCATIONAL, AND SOCIAL OUTCOMES (AT AGE 16-21)

At ages 18 and 21, sample members were interviewed on a range of measures of personal and social functioning. On the basis of these 2 assessments, the following outcome measures were developed.

#### Psychiatric Outcomes

At ages 18 and 21, sample members were interviewed about their mental health and any substance abuse since the

previous assessment using a questionnaire based on the *Composite International Diagnostic Interview*,<sup>27</sup> supplemented by custom-written survey items. All interviews were conducted by trained lay interviewers. On the basis of this information, DSM-IV<sup>28</sup> symptom criteria were used to construct a series of psychiatric and substance abuse diagnoses for each sample member.

Symptoms of major depression were assessed using *Composite International Diagnostic Interview* items. At age 18, subjects were asked to report on symptoms occurring during the age intervals 16 to 17 and 17 to 18, and at age 21 for the age intervals 18 to 20 and 20 to 21. At all interviews, subjects were also asked to report on the extent of impairment caused by their symptoms. Subjects were classified as having major depression if they met DSM-IV criteria for major depression at any time between ages 16 and 21. Overall, 33.5% of subjects met DSM-IV criteria for major depression. This prevalence is similar to the prevalence rate reported in the Dunedin Health and Development Study.<sup>5</sup>

Anxiety disorder symptoms were assessed using the *Composite International Diagnostic Interview* at ages 18 and 21. Subjects were asked to report whether they had experienced a range of anxiety disorder symptoms since the last assessment. Anxiety disorders assessed included generalized anxiety, panic disorders, agoraphobia, social phobia, and specific phobia. Subjects were classified as having an anxiety disorder if they met DSM-IV criteria for an anxiety disorder at either of the 2 assessments.

Symptoms of nicotine dependence were assessed using custom-written items designed to reflect DSM-IV diagnostic criteria for nicotine dependence. These items were assessed for the age intervals 17 to 18 and 20 to 21.

Alcohol abuse or dependence was assessed for annual intervals between ages 16 and 21 using items from the *Composite International Diagnostic Interview*. Subjects were classified as showing alcohol dependence if they reported experiencing at least 3 of the following: increased tolerance for alcohol, withdrawal symptoms when alcohol consumption was ceased, heavy drinking and overuse of alcohol, unsuccessful attempts to quit or limit drinking, spending large amounts of time in alcohol-related activities, restriction of social and other activities as a result of drinking, and psychological problems caused by heavy and prolonged drinking. Subjects were classified as showing alcohol abuse if they did not meet criteria for alcohol dependence but reported at least one of the following: alcohol misuse leading to successive difficulties at school or neglect of schoolwork; difficulties at work or failure to attend work; alcohol use that placed them at physical hazard from drunk driving, crashes, falls, or other unintentional injury as a result of drinking; being arrested or stopped by police for alcohol-related offenses on at least 2 occasions; continued alcohol use despite objections from family or friends; and alcohol use causing legal, financial, or personal problems.

In addition to these measures, sample members were also interviewed about any suicidal behavior between ages 16 and 21. On the basis of answers to this questioning, a measure of whether a respondent had attempted suicide during this interval was obtained.

opportunities. Second, it is possible that the associations between early depression and later outcomes are

noncausal and reflect the presence of antecedent factors that are associated with increased risk of depression and

## Educational and Social Role Outcomes

To describe the subjects' educational achievement up to age 21 years, the following 3 measures were used. First, a measure of whether respondents had left school without formal qualifications was created using information provided by them concerning their school-leaving age and performance on the national school certificate examination. The second and third measures were concerned with sample members' involvement in tertiary education and were based on assessments of young people's educational and occupational histories between ages 16 and 21 years. These measures included whether an individual had enrolled in a trade- or skill-based tertiary or other technical training course and whether he or she had enrolled in a university-level or equivalent program by age 21 years.

Two measures of social role functioning were identified. First, a measure of young people's exposure to multiple ( $\geq 2$ ) periods of prolonged ( $> 3$  months') unemployment was created. This measure was based on subjects' reports of the frequency and duration of all periods of unemployment between ages 16 and 21. Second, a measure of the subjects' parenting status was created based on their reports of any births between ages 16 and 21. The youngest subject to become a parent was 16.

## CONFOUNDING FACTORS

To assess the extent to which associations between adolescent depression and later outcomes could be explained by the effects of confounding factors, the following variables were included as covariates in the analysis.

Two measures of family social background were considered. First, maternal educational achievement at the time of a subject's birth was coded on a 3-point scale, ranging from no formal educational qualifications (1 point) to tertiary-level qualifications (3 points). Second, family socioeconomic status at birth was assessed using the Elley and Irving<sup>29</sup> scale of socioeconomic status for New Zealand. This scale categorizes families into 6 classes on the basis of paternal occupation.

Two measures of family functioning were included. First, a measure of young people's exposure to sexual abuse was based on subjects' reports of their experience of childhood sexual abuse before age 16.<sup>30</sup> Subjects were classified into 4 groups, ranging from no childhood sexual abuse reported (group 1) to childhood sexual abuse involving completed or attempted oral, anal, or vaginal intercourse (group 4). The second measure assessed the extent to which young people were exposed to parental change as a result of parental separation or divorce, death, remarriage, and reconciliation<sup>31</sup> between birth and age 14.

Three measures of individual functioning were included in the analysis. At age 14, neuroticism was assessed using a short form of the Eysenck Personality Inventory.<sup>32</sup> The reliability of this scale, assessed using coefficient  $\alpha$ , was .80. Second, at age 9, as part of a comprehensive school-based evaluation, the subject's intellectual ability was assessed using the Wechsler Intelligence Scale for Children—Revised.<sup>33</sup> The reliability of this scale, assessed using split-half methods, was .93. Finally, at ages 15 and 16, young people were questioned about the extent to which they associated with delinquent or substance-abusing peers. Specifically, young people were asked to report the involvement of their best friend and other friends in a range

of behaviors, including the use of tobacco, alcohol, or other substances and criminal offenses and related behaviors. These items were then summed to provide an overall measure of the extent to which each subject affiliated with delinquent or substance-abusing peers between ages 14 and 16.<sup>34</sup> The reliability of this scale, assessed using coefficient  $\alpha$ , was .76.

## COMORBID PSYCHIATRIC DISORDERS AND BEHAVIOR

Four measures of young people's psychiatric adjustment and behavior between ages 14 and 16 were also included in the analysis. Specifically, at ages 15 and 16, young people and their parents were interviewed separately using items from the Diagnostic Interview Schedule for Children,<sup>24</sup> Early Self-Report Delinquency Inventory,<sup>35</sup> Rutgers Alcohol Problems Index,<sup>36</sup> and other custom-written items based on *DSM-III-R* criteria. Using this information, young people were classified as meeting criteria for anxiety disorders, conduct disorders, or alcohol abuse if they met *DSM-III-R* diagnostic criteria for these disorders on the basis of parent- or self-report. In addition to these measures, a measure of early cigarette smoking was obtained at age 15. Early cigarette smoking was defined as having smoked a cigarette on at least one occasion during the past year.

## STATISTICAL METHODS

The analysis was conducted in 4 stages. In the first stage, bivariate associations were estimated describing the linkages between adolescent depression and later outcomes (**Table 1**). In all cases, data were stratified by sex, and tests of sex by adolescent depression interactions were conducted using logistic regression analysis. In the second stage of the analysis, associations between adolescent depression and social, familial, and individual factors assessed up to age 16 were estimated (**Table 2**). Associations were described by the odds ratios (ORs) and 95% confidence intervals (CIs). In the third stage of the analysis, associations between adolescent depression and later outcomes were adjusted for confounding, social, familial, and individual factors. The model fitted was:  $\text{Logit}(Y_i) = B_0 + B_1 X_1 + \sum B_j Z_j$ , where  $\text{Logit}(Y_i)$  indicates the log odds of the  $i$ th outcome measure;  $X_1$ , the measure of adolescent depression; and  $Z_j$ , the set of confounding, social, familial, and individual factors. In fitting this model, all confounding factors were entered into the initial model, and the model was successively refined to identify significant ( $P < .05$ ) covariates. From this model, estimates of the ORs between  $X_1$  and  $Y_i$ , adjusted for the confounding factors  $Z_j$ , were obtained (**Table 3**). Finally, the logistic regression model was extended to consider factors that were comorbid with depression in addition to the confounding factors  $Z_j$ . The model fitted was:  $\text{Logit}(Y_i) = B_0 + B_1 X_1 + \sum B_j Z_j + \sum B_k W_k$ , where  $W_k$  indicates the set of measures of disorders that were comorbid with adolescent depression. In fitting this model, the significant covariate factors identified in the third-stage analysis were retained in the model, and all measures of comorbid disorders were included in the analysis. This baseline model was then successively refined to identify significant covariates. From this model, estimates of the ORs between  $X_1$  and  $Y_i$ , adjusted for confounding factors  $Z_j$  and comorbid disorders  $W_k$ , were obtained.

other adverse outcomes. For example, early exposure to child abuse may be associated with increased risk of de-

pression and other adverse outcomes. Finally, it is possible that the linkages between early depression and later

**Table 1. Psychiatric, Educational, and Social Role Outcomes Associated With Major Depression During Early Adolescence (Ages 14-16 y)\***

| Measure  | Major Depression |                 |                |                 |                 |                |                 |                  |                | Effect of Depression<br>P Value† | Effect of Sex<br>P Value‡ | Sex by Depression Interaction<br>P Value‡ |
|--|------------------|-----------------|----------------|-----------------|-----------------|----------------|-----------------|------------------|----------------|----------------------------------|---------------------------|---|
|  | Girls            |                 |                | Boys            |                 |                | Total Sample    |                  |                |                                  |                           |   |
|  | No<br>(n = 400)  | Yes<br>(n = 88) | OR<br>(95% CI) | No<br>(n = 440) | Yes<br>(n = 36) | OR<br>(95% CI) | No<br>(N = 840) | Yes<br>(N = 124) | OR<br>(95% CI) |                                  |                           |   |
| Psychiatric outcomes                           |                  |                 |                |                 |                 |                |                 |                  |                |                                  |                           |   |
| Major depression                               | 38.0             | 71.6            | 4.1 (2.5-6.8)  | 20.7            | 47.2            | 3.4 (1.7-6.9)  | 28.9            | 64.5             | 4.5 (3.0-6.6)  | <.001                            | <.001                     | >.60                                      |
| Anxiety disorders                              | 24.8             | 58.0            | 4.2 (2.6-6.8)  | 14.3            | 25.0            | 2.0 (0.9-4.4)  | 19.3            | 48.4             | 3.9 (2.7-5.8)  | <.001                            | <.001                     | >.10                                      |
| Nicotine dependence                            | 23.8             | 40.9            | 2.2 (1.4-3.6)  | 26.6            | 44.4            | 2.2 (1.1-4.4)  | 25.2            | 41.9             | 2.1 (1.5-3.2)  | <.001                            | >.30                      | >.90                                      |
| Alcohol abuse or dependence                    | 27.8             | 36.4            | 1.5 (0.9-2.4)  | 45.0            | 55.6            | 1.5 (0.8-3.0)  | 36.8            | 41.9             | 1.5 (1.0-2.2)  | .04                              | <.001                     | >.90                                      |
| Suicide attempt                                | 6.8              | 14.8            | 2.4 (1.2-4.9)  | 3.6             | 11.1            | 3.3 (1.1-10.5) | 5.1             | 13.8             | 2.9 (1.6-5.3)  | <.01                             | .08                       | >.60                                      |
| Educational achievement                        |                  |                 |                |                 |                 |                |                 |                  |                |                                  |                           |   |
| Left school without educational qualifications | 11.8             | 23.0            | 2.2 (1.2-4.0)  | 21.4            | 34.3            | 1.9 (0.9-4.0)  | 16.8            | 26.2             | 1.8 (1.1-2.7)  | <.01                             | <.001                     | >.70                                      |
| Entered tertiary education or other training   | 55.8             | 40.0            | 0.5 (0.3-0.9)  | 47.6            | 32.4            | 0.5 (0.3-1.1)  | 51.6            | 37.8             | 0.6 (0.4-0.8)  | <.01                             | <.02                      | >.90                                      |
| Entered university                             | 34.1             | 24.1            | 0.6 (0.4-1.0)  | 29.9            | 17.1            | 0.5 (0.2-1.2)  | 31.9            | 22.1             | 0.6 (0.4-0.9)  | <.02                             | >.10                      | >.60                                      |
| Social role outcomes                           |                  |                 |                |                 |                 |                |                 |                  |                |                                  |                           |   |
| Multiple periods of prolonged unemployment     | 17.3             | 31.3            | 2.2 (1.3-3.7)  | 26.8            | 38.2            | 1.7 (0.8-3.5)  | 22.2            | 33.3             | 1.8 (1.2-2.7)  | <.01                             | <.01                      | >.50                                      |
| Became a parent                                | 11.2             | 26.1            | 2.8 (1.6-4.9)  | 1.6             | 2.8             | 1.8 (0.2-15.1) | 6.1             | 19.4             | 3.7 (2.2-6.2)  | <.001                            | <.001                     | >.60                                      |

\*Data are given as percentages unless otherwise indicated. Measures reflect outcomes at age 16 to 21 years. OR indicates odds ratio; CI, confidence interval.

†P value based on log likelihood ratio  $\chi^2$  test from a logistic regression model including main effects for early depression and sex.

‡P value based on the residual model  $\chi^2$  after the main effects of depression and sex had been considered.

outcomes are mediated by the presence of comorbid disorders. Therefore, the associations between early depression and later substance abuse may reflect the effects of conduct disorder that is comorbid with early depression. To understand the role of early depression in later disorders and adjustment, it is important to assess the various pathways that link early depression to later outcomes.

In this article, we use data gathered during a 21-year longitudinal study of a birth cohort of New Zealand children to examine the following questions: (1) To what extent are young people who develop depression in mid adolescence (age 14-16) at increased risk of subsequent mental disorders, academic underachievement, and reduced life opportunities? and (2) What are the pathways that may link adolescent depression to later outcomes?

More generally, the aims of the study were to examine the continuities between adolescent depression and later outcomes and to explore the possible routes by which these continuities may arise.

## RESULTS

### RELATIONSHIPS BETWEEN ADOLESCENT DEPRESSION AND LATER OUTCOMES

Adolescents with depression were at increased risk of a range of subsequent outcomes between ages 16 and 21 (Table 1). These outcomes included later depression (OR, 4.5; 95% CI, 3.0-6.6), anxiety disorders (OR, 3.9; 95% CI, 2.7-5.8), nicotine dependence (OR, 2.1; 95% CI, 1.5-3.2), alcohol abuse or dependence (OR, 1.5; 95% CI, 1.0-2.2), suicidal behavior (OR, 2.9; 95% CI, 1.6-5.3), school

failure (OR, 1.8; 95% CI, 1.1-2.7), and a reduced likelihood of entering a university (OR, 0.6; 95% CI, 0.4-0.8) or pursuing another form of tertiary education (OR, 0.6; 95% CI, 0.4-0.9). In addition, at age 21, adolescents with depression were characterized by higher rates of recurrent unemployment (OR, 1.8; 95% CI, 1.2-2.7) and early parenthood (OR, 3.7; 95% CI, 2.2-6.2).

Furthermore, the relationship between adolescent depression and later outcomes was similar for girls and boys. The similarity of these associations was confirmed by tests of sex by adolescent depression interactions, which showed that, across all outcomes, no significant interactions between depression and sex were found. However, for most outcomes, there was a significant ( $P < .05$ ) main effect of sex, reflecting the fact that rates of subsequent psychiatric, educational, and social role outcomes varied in sex-specific ways.

### SOCIAL, FAMILIAL, AND INDIVIDUAL FACTORS ASSOCIATED WITH DEPRESSION IN EARLY ADOLESCENCE (AGE 14-16)

Table 2 shows the relationship between major depression in early adolescence and a range of measures of social background, familial, and individual factors. Also shown are the associations between depression and other comorbid psychiatric disorders and behaviors in adolescence. For ease of data display, all measures have been presented in dichotomous form. Results revealed that, although there was a tendency for adolescents with depression to have been reared by a mother with educational underachievement ( $P < .02$ ), adolescents with and



**Table 2. Social Background, Family Functioning, and Individual Characteristics of Young People With Major Depression During Early Adolescence (Ages 14-16 y)\***

| Measure  | Major Depression |                  | Odds Ratio<br>(95% Confidence Interval) |
|--|------------------|------------------|---|
|  | No<br>(N = 840)  | Yes<br>(N = 124) |   |
| Social background  |                  |                  |   |
| Mother lacked formal educational qualifications (at birth)         | 48.1             | 58.9             | 1.5 (1.1-2.3)                           |
| Family of semiskilled or unskilled socioeconomic status (at birth) | 24.7             | 26.6             | 1.1 (0.7-1.7)                           |
| Family functioning   |                  |                  |   |
| Contact sexual abuse (at age 0-16 y)                               | 6.2              | 20.2             | 3.8 (2.3-6.5)                           |
| Exposed to parental change (at age 0-14 y)                         | 31.9             | 53.5             | 2.4 (1.6-3.7)                           |
| Individual factors   |                  |                  |   |
| Lowest quartile of IQ distribution (at age 9 y)                    | 22.0             | 35.2             | 1.9 (1.2-3.1)                           |
| Highest quartile of neuroticism score (at age 14 y)                | 20.5             | 41.0             | 2.7 (1.8-4.0)                           |
| Highest decile of deviant peer affiliations (at age 14-16 y)       | 9.4              | 24.2             | 3.1 (1.9-4.9)                           |
| Psychiatric disorder and behavior                                  |                  |                  |   |
| Anxiety disorders (at age 14-16 y)                                 | 25.4             | 60.5             | 4.2 (3.0-6.6)                           |
| Conduct disorder (at age 14-16 y)                                  | 7.4              | 20.2             | 3.2 (1.9-5.2)                           |
| Alcohol abuse (at age 14-16 y)                                     | 8.8              | 22.6             | 3.0 (1.9-4.9)                           |
| Smoked cigarettes (at age 15 y)                                    | 29.8             | 50.4             | 2.4 (1.6-3.5)                           |

\*Data are given as percentages unless otherwise indicated.

without depression had similar socioeconomic backgrounds. In contrast, small to moderate associations were found between adolescent depression and family measures, individual factors, and comorbid psychiatric disorders, with ORs ranging from 1.9 to 4.2 (median, 3.0). Specifically, adolescents with depression were significantly ( $P < .001$ ) more likely to have been exposed to sexual abuse and parental change during childhood. They also tended to have had lower IQ scores at age 9 ( $P < .01$ ), showed tendencies to neuroticism ( $P < .001$ ), and reported higher rates of deviant peer involvement in adolescence ( $P < .001$ ). Finally, adolescents with depression had significantly higher ( $P < .001$ ) rates of comorbid anxiety disorders, conduct disorders, and alcohol abuse and were more likely to smoke cigarettes.

### RELATIONSHIPS BETWEEN DEPRESSION IN ADOLESCENCE AND LATER OUTCOMES, ADJUSTED FOR CONFOUNDING FACTORS

As explained in the "Subjects and Methods" section, a logistic regression analysis was used to examine the role of confounding factors and comorbid disorders. The results of these analyses are shown in Table 3, which gives estimates of the ORs between adolescent depression and later outcomes after adjustment for confounding factors and for confounding factors and comorbid disorders. The results suggest 2 conclusions. First, there was evidence of a clear and specific continuity from adolescent depression to later depression (OR, 3.5; 95% CI, 1.9-6.4) and anxiety (OR, 2.2; 95% CI, 1.4-3.5), even after controlling for confounding factors and comorbid disorders. Second, in all cases, the associations between adolescent depression and other outcomes, including nicotine dependence, alcohol abuse or dependence, suicide attempt, educational underachievement, unemployment, and early parenthood, were explained by confounding

**Table 3. Psychiatric, Educational, and Social Role Outcomes Associated With Major Depression During Early Adolescence After Adjustments (N = 964)\***

| Measure  | Adjusted for Confounding Factors† |                        | Adjusted for Confounding Factors† and Comorbid Disorders‡ |                        |
|--|-----------------------------------|------------------------|---|------------------------|
|  | OR (95% CI)                       | Significant Covariates | OR (95% CI)   | Significant Covariates |
| Psychiatric outcomes                           |                                   |                        |   |                        |
| Major depression                               | 3.8 (2.1-6.8)                     | 1-5                    | 3.5 (1.9-6.4)   | 1-5, 8                 |
| Anxiety disorders                              | 2.8 (1.8-4.4)                     | 1, 3, 5                | 2.2 (1.4-3.5)   | 1, 3, 5, 8             |
| Nicotine dependence                            | 1.2 (0.8-1.9)                     | 3, 6                   | 1.1 (0.7-1.7)   | 3, 6, 9                |
| Alcohol abuse or dependence                    | 1.0 (0.6-1.7)                     | 4, 6                   | 0.9 (0.6-1.6)   | 4, 6, 11               |
| Attempted suicide                              | 1.5 (0.7-3.3)                     | 2, 3, 5                | 1.4 (0.6-3.1)   | 2, 3, 5, 10            |
| Educational achievement                        |                                   |                        |   |                        |
| Left school without educational qualifications | 1.2 (0.6-2.4)                     | 1, 2, 4, 6             | 1.1 (0.6-2.3)   | 1, 2, 4, 6, 10         |
| Entered tertiary education or other training   | 1.0 (0.6-1.9)                     | 2, 4, 6, 7             | 1.0 (0.5-1.9)   | 2, 4, 6, 7, 10         |
| Entered university                             | 0.8 (0.4-1.6)                     | 4, 6, 7                | 0.8 (0.4-1.7)   | 4, 6, 7, 10            |
| Social role outcomes                           |                                   |                        |   |                        |
| Multiple periods of prolonged unemployment     | 1.3 (0.8-2.3)                     | 1, 3, 4, 6             | 1.3 (0.8-2.3)   | 1, 3, 4, 6             |
| Became a parent                                | 1.5 (0.4-2.2)                     | 1, 2, 4, 6             | 1.5 (0.4-2.2)   | 1, 2, 4, 6             |

\*OR indicates odds ratio; CI, confidence interval. Measures reflect outcomes at age 16 to 21.

†Confounding factors: 1 indicates sex; 2, parental changes (at age 0-14 y); 3, childhood sexual abuse (at age 0-16); 4, IQ score (at age 9); 5, neuroticism score (at age 14); 6, deviant peer affiliations (at age 14-16); and 7, maternal educational qualifications (at birth).

‡Comorbid disorders: 8 indicates anxiety disorder (at age 14-16); 9, cigarette smoking (at age 15); 10, conduct disorder (at age 14-16); and 11, alcohol abuse (at age 14-16).

factors (parental change, childhood sexual abuse, IQ, neuroticism, involvement with deviant peers, and maternal educational underachievement) associated with depression. Further controlling for comorbid disorders did not change these associations. These results imply that the elevated rates of these outcomes among teenagers with depression reflected the antecedent social background, familial, and personal factors that were associated with adolescent depression and increased risk of later adverse outcomes, rather than the direct effects of depression on later adjustment and life experiences.

## COMMENT

In this study, we used data gathered during a 21-year longitudinal study to examine the long-term consequences of depression in adolescence (age 14-16 years). This analysis leads to the following conclusions about the linkages between adolescent depression and later outcomes. First, in confirmation of previous studies,<sup>9,10,12,15,16,19,37</sup> young people developing depression in adolescence were an at-risk group for a range of adverse outcomes that included subsequent depression and anxiety, suicidal behaviors, nicotine dependence, academic and employment difficulties, and early parenthood. Odds ratios between adolescent depression and mental health outcomes ranged from 1.2 to 4.5, while ORs for educational and social role outcomes ranged from 0.6 to 1.8 and 1.8 to 3.7, respectively. There is little doubt from this evidence that the onset of depression in adolescence is a marker for long-term problems of adjustment in late adolescence and early adulthood.

Second, also in confirmation of previous research,<sup>2,38</sup> depression in adolescence was associated with other adverse factors. These factors included higher rates of exposure to adverse social and familial circumstances, lower IQ, higher levels of neuroticism, and higher rates of comorbid adolescent disorders, including anxiety, conduct disorders, and substance abuse.

These results raise an important question about the developmental pathways that link depression in adolescence to later outcomes. There are 3 general pathways that may explain these linkages. First, it is possible that there are direct linkages in which depression in adolescence leads directly to increased risk of later outcomes. Second, it is possible that the relationship between depression and later outcomes is spurious and reflects the presence of confounding factors that are related to early depression, but that also contribute to later outcomes. Finally, it is possible that the linkages between adolescent depression and later outcomes may be mediated by intervening variables. In this study, we used methods of logistic regression analysis to identify the likely pathways linking early depression to a range of later outcomes that include mental disorders, suicidal behaviors, educational underachievement, unemployment, and early parenthood. These analyses suggested the presence of 2 routes by which adolescent depression was associated with later social maladjustment.

First, there was evidence of a direct pathway linking depression in adolescence to increased risk of later depression and anxiety. Model estimates suggested that

young people who were depressed as adolescents had more than 3 times the risk of subsequent depression and more than twice the risk of later anxiety than their peers without depression, independent of social background, family circumstances, individual characteristics, and comorbid disorders. These results suggest the presence of a direct and specific continuity in which adolescent depression is a precursor of long-term depression and anxiety. These findings are consistent with other studies<sup>9,11,12,15</sup> that have shown that depression and anxiety are disorders that often recur over the life course.

However, for other outcomes, including substance abuse disorders (nicotine and alcohol), suicide attempt, educational underachievement, unemployment, and early parenthood, the relationship with depression appeared to be noncausal. In particular, controlling for social, familial, and personal factors (parental educational achievement, parental change, exposure to childhood sexual abuse, IQ, neuroticism, and deviant peer involvement) suggested that the linkages between depression and the other outcomes arose because adolescent depression was associated with a range of adverse social, familial, and personal factors, and because, in turn, these factors had linkages with a range of outcomes. These results suggest that, when due allowance was made for social, familial, and personal correlates of adolescent depression, there was no evidence to suggest that those subject to adolescent depression were at significantly increased risk of later substance abuse, suicide attempts, educational underachievement, unemployment, or early parenthood. Rather, the results suggested that the contextual factors that were associated with an increased risk of adolescent depression were also associated with increased risk of these later adverse outcomes.

There are 2 major clinical implications of these findings. First, the results reinforce the growing consensus of evidence that depressive disorders are frequently recurrent conditions, and it appears that this applies to disorders developing in adolescence. The present study suggests that nearly two thirds of those with depression between ages 14 and 16 will experience a further episode of depression by age 21. Similarly, those with early depression also are at increased risk of later anxiety disorders, with just under half of adolescents with depression developing an anxiety disorder by age 21.

Second, although the evidence suggests that depression in adolescence is associated with a range of later adverse outcomes, including suicidal behaviors, educational underachievement, unemployment, and early parenthood, these outcomes do not appear to be the consequences of early depression, but rather arise as a result of common social, familial, and personal factors that contribute to adolescent depression and later outcomes. These findings imply that adolescent depression in combination with problematic social, familial, and personal factors may be associated with a range of adverse outcomes. These results emphasize the importance of placing an early episode of depression within the context of a young person's life history and social and personal circumstances.

There are several limitations to the findings of this study. First, the results are based on a specific New Zea-

land cohort studied, and it remains open to examination whether similar findings will apply to other cohorts or in other social contexts. Second, the assessment of depression during adolescence and early adulthood relied on young people's retrospective reporting of depressive symptoms. In addition, it is unclear how many of those reporting depressive symptoms would have met clinical criteria for major depression. Inevitably, there is likely to be some imprecision in reporting the extent and timing of symptoms. Third, because the study is based on self-reported data, it is open to question whether the episodes of depression described by subjects would, in fact, meet clinical diagnostic criteria. This feature may explain the high rate of depression reported between ages 16 and 21 years. Finally, the analysis involves a large number of outcome variables and covariate factors. Because of this, it is possible that some regression models may have overcontrolled for the effects of confounding factors. Given this, the findings of this study should be replicated on independent samples. These limitations notwithstanding, the results of this study suggest that young people who develop depression in adolescence are an at-risk population for a range of adverse outcomes. These linkages appear to reflect the presence of specific continuities between adolescent depression and later anxiety or depression and the effects of common risk factors associated with adolescent depression and other outcomes.

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