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Stability in Depressed Mood in Adolescence: Results from a 6-Year Longitudinal Panel Study

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A 6-year longitudinal panel study investigated the absolute and relative stability in depressed mood throughout adolescence by reporting data from a sample of 538 adolescents between 13 and 19 years of age. Results revealed the following. (1) Girls had on average higher depressed mood scores than boys at all ages. (2) Among boys there were no substantial changes in depressed mood mean scores, while among girls there was a slight tendency of a curvilinear trend, with a peak level reached in midadolescence. (3) There was a tendency for adolescents to retain their relative level in depressed mood, most pronounced for a period of 4 years, from age 15 to age 19 years. (4) Depressed mood was most stable in a subgroup of adolescents who had high initial depressed mood scores. (5) By applying structural equation modeling, it was shown that the stable ("trait") component of depressed mood increased in importance with increasing age, while the temporal ("state") component decreased with increased age.

INTRODUCTION

The present study relates to absolute and relative stability in depressed mood in adolescence by reporting data from a longitudinal panel study of a community sample of 538 adolescents at ages 13, 15, 18, and 19 years. Consequently, the study confirms a trend that has been observed during the past two decades in terms of

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an increased recognition of the idea that depressed mood, depressive syndromes, and depressive disorder may represent important psychosocial problems among adolescents. In addition, it seems to be widely recognized that increased knowledge of the antecedents and processes underlying such problems in early life may contribute to an improved understanding of the nature and course of depression in later life (Petersen *et al.*, 1993; Lewinsohn *et al.*, 1997). This recently acknowledged conception of the role of depression in adolescence is in contrast to the previous consensus that children and adolescents lack the cognitive and affective mechanisms necessary to experience depression (Cytryn and McKnew, 1974). Adolescence was often conceived of as a period characterized by turmoil and intense moodiness, in which the presence of depressed mood was considered to be a normal, but rather labile manifestation (Rutter, 1976; Petersen *et al.*, 1993). The increased recognition of the prevalence and importance of depression and depressed mood as a psychosocial problem in adolescence has been paralleled by increased research related to these issues. In contrast, depressive symptoms among adolescents often remain undetected by the social surroundings of the adolescent when parents and teachers often fail to notice manifest signals (Rutter, 1976; Lange, 1991; Offer and Schanert-Reichel, 1992).

The increased recognition of the role of depression and depressive symptoms in adolescence appears to be related to a number of important empirical observations. First, many reports indicate that first episodes of depressive symptoms often occur before adulthood (Kandel and Davies, 1986). Second, early episodes of such problems seem to increase the likelihood of future episodes (Petersen *et al.*, 1993; Kandel and Davies, 1986; Rutter, 1987). Third, depressed mood is the single best predictor of referral status for psychiatric treatment (for an overview, see Compas *et al.*, 1993). Fourth, depressed mood and cognition seem to increase the likelihood of both suicidal ideation (Kandel *et al.*, 1991; Harrington, 1993) and behavior (Cole, 1989; Reinherz *et al.*, 1993; Bjerke, 1992). Moreover, depressive disorder, depressive syndromes, and depressed mood in early life seem to represent important warning signs and early symptoms of long-lasting difficulties that may have serious implications for health, psychosocial development, and interpersonal functioning (Harrington, 1993; Kandel and Davies, 1986; Meringas and Angst, 1995; Carlson and Cantwell, 1980).

Stability in Depressed Mood

Despite the fact that the occurrence and importance of depression and depressed mood in adolescence have received increased attention from researchers in recent years, the accumulation of knowledge may seem to have been hindered by some conceptual and methodological confusion. This relates partly to the fact that in many studies the researchers have not explicitly distinguished among depression, depressive symptoms/syndromes, and depressed mood (Compas *et al.*, 1993). Another weakness relates to the way most researchers have dealt with the

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conceptualization and operationalization of stability. In most studies, no explicit definition of stability has been provided. Thus, the term "stability" in the present study makes a distinction between absolute and relative consistency (Bergman *et al.*, 1989; Alsaker and Olweus, 1992).

Absolute Consistency in Depressed Mood

Absolute consistency indicates the extent to which an individual's behavior or absolute level on a certain dimension (such as depressed mood) remains the same across various situations or time periods. In the context of this study, studying absolute stability implies determining to what extent the average (mean) level of depressed mood in a specific group of adolescents (defined, for example, by sex) changes over time. A number of previous studies have addressed stability in depressed mood/depressive symptoms along these lines (Charman, 1994; Devine *et al.*, 1994; Petersen *et al.*, 1993; Nolen-Hoeksema *et al.*, 1992). The empirical results reveal that boys tend to experience about the same or slightly higher levels of depressive symptoms than girls in early adolescence (between age 11 and age 13 years) but that by age 13–14 years, girls report more depressive symptoms than do boys (Nolen-Hoeksema, 1991; Reinherz *et al.*, 1993; Kandel and Davies, 1982). However, while most studies indicate that depressive symptoms in boys remain, on average, quite stable during adolescence (Nolen-Hoeksema and Girgus 1994; Petersen *et al.*, 1991; Reinherz *et al.*, 1993; Kandel and Davies, 1982), research is much less conclusive as far as girls are concerned. Thus, studies of girls have reported that depressive symptoms remain relatively stable, increase linearly, or follow a curvilinear trend with a peak in midadolescence, respectively (Radloff, 1991; Petersen *et al.*, 1991; Kandel and Davies, 1982). In summary, research suggests that the sex difference in depressive symptoms is least pronounced in early and late adolescence and most pronounced in midadolescence (for further discussion, see Nolen-Hoeksema and Girgus, 1994).

In the present study, we addressed the issue of absolute consistency in depressed mood by comparing levels of depressed mood in girls and boys at ages 13, 15, 18, and 19 years. With reference to most of the studies cited above, we expected to observe that girls had higher scores than boys at all ages but that the sex difference would be less pronounced at ages 13 and 19 years compared with ages 15 and 18 years.

Relative Consistency in Depressed Mood

A different and complementary way to address stability in depressive symptoms is to study relative consistency. This measures the extent to which individuals in a group retain their relative position (i.e., relative to the average value of the group) across situations (cross-situational consistency) or measurement occasions

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(longitudinal relative consistency). In the present study, we were interested in studying longitudinal relative consistency in the total sample of adolescents, as well as determining to what extent adolescents with increased scores (compared with the average score) in depressed mood in early adolescence also showed increased levels at later measurement occasions. Although previous research in this area is limited, some studies seem to support the idea that depressed mood at the individual level seems to be relatively stable during adolescence (Charman, 1994; Devine *et al.*, 1994). Devine *et al.* (1994) examined relative stability in a group of 82 adolescents by measuring depressive symptoms once a year during a 4-year period reaching from early to midadolescence. They observed significant correlations in scores across the first 3 years, with the strongest correlations observed in scores between adjacent years. The authors concluded that depressed mood tends to be relatively stable for a period of up to 3 years. In a study of 268 adolescents, Charman (1994) reported data on depressed mood from three measurement occasions over a 6-month period. The results indicated that depressed mood was relatively stable. The researchers emphasized particularly that a group of subjects who were described as "ever-depressed" seemed to have more in common with a clinically depressed group than with their never-depressed peers. In contrast to the above studies, Garrison *et al.* (1990) concluded that depressive symptoms, both in the total sample and in the subgroup of adolescents with high depression scores, seem to show limited over-time stability. Thus in a 3-year follow-up study of depressive symptomatology, the total correlation over a 2-year interval was 0.39. The subjects with scores within the top decile at baseline were deemed high scorers. Only 30% of the subjects in this group had high scores the following year.

In our opinion, most previous studies on longitudinal relative consistency in depressive symptoms among adolescents have had methodological weaknesses. This is partly related to the fact that relative stability has been reported in terms of raw correlation coefficients between measurement points (see, e.g., Charman *et al.*, 1994; Devine *et al.*, 1994; Garrison *et al.*, 1990). However, it seems relevant to consider that depressed mood is conceived of as a latent construct (reflexive index) (e.g., Cohen *et al.*, 1991; MacCallum and Browne, 1993), which is empirically represented by a (varying) number of empirical indicators. Such reflexive indices (that represent theoretical constructs) have a level of internal consistency reliability below unity, a fact which will tend to attenuate the correlations observed between measurement points. One way to get around this problem is to calculate attenuation-corrected correlation coefficients (Alsaker and Olweus, 1992). However, the exact reliability of a test is unknown, and the most commonly used estimate, Cronbach's alpha, fails to meet certain basic criteria as an index of test homogeneity (e.g., Cortina, 1993; Miller, 1995). Alternatively, confirmatory factor analysis (CFA) provides the researcher with the possibility of decomposing the item variance into different components, such as shared or common variance and unique variance. In some designs, even more distant components can be estimated, like common ("trait")-specific, time ("state")-specific, item-specific, and residual-error

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components of variance (e.g., Marsh and Grayson, 1994). Moreover, a number of tests exist within the frames of confirmatory factor analysis, whereby the degree of fit between a proposed factor model and the actual data can be evaluated. An inappropriate model, such as a one-factor model (assuming homogeneity among the items) when the data actually reveal heterogeneity, would yield a poor fit. However, since none of the studies cited above applies these procedures, there is reason to believe that previous studies have reported levels of stability deflated by measurement errors. Accordingly, in the present study we have described longitudinal relative consistency in depressed mood in three ways. First, in congruence with previous studies, raw correlations between scores obtained at different measurement occasions were reported. Second, attenuation-corrected correlation coefficients were reported. Third, longitudinal relative consistency was studied by applying multilevel hierarchical and confirmatory factor analysis. The first-order level of this model included the index of depressed mood, along with the "state" temporal component (represented empirically by seven items) measured at four measurement points. The second-order level was represented by a latent stability variable, a "trait" factor, conceived of as representing the "common cause" (the sum of what the four measurements have in common) of the observed, longitudinal relative consistency (e.g., Dumenci and Windle, 1996) (Fig. 1). Additionally, we wanted to study longitudinal relative consistency in subgroups of adolescence as defined by level of depressed mood at the first measurement occasion. To the extent that depressed

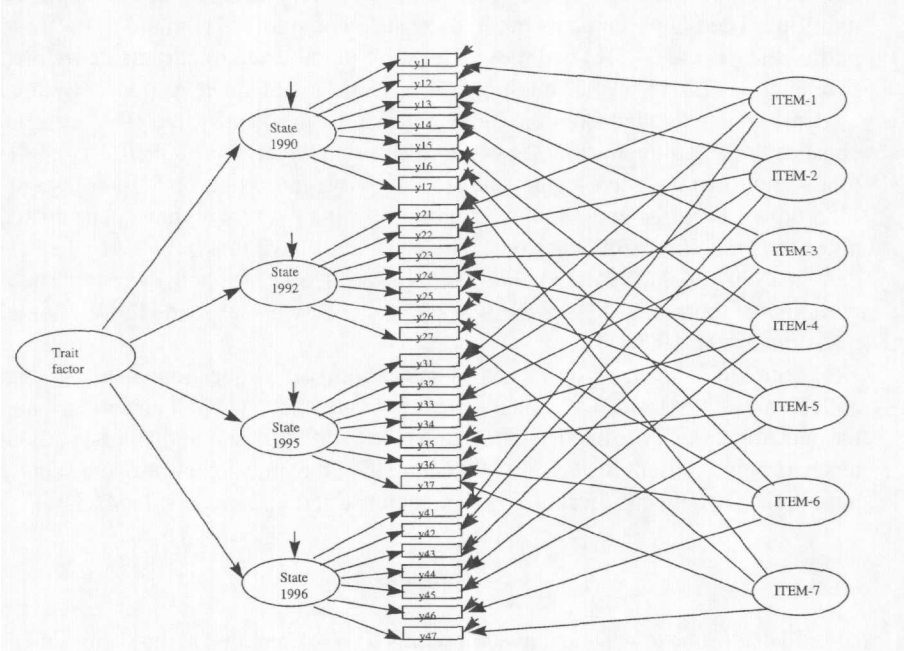


Fig. 1. General variance decomposition model.

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mood was relatively stable in subgroups of adolescents with high initial scores, this finding confirms its importance as a psychosocial problem and encourages intervention at an early age to minimize the possibility of a long chain of difficulties.

METHODS

Study Design and Participants

The data for this article stemmed from four data collections within the framework of the Norwegian Longitudinal Health Behaviour Study (NLHB). The NLHB is a prospective 10-year longitudinal, two-generational study that focuses upon health behavior, lifestyle, and self-reported health among a community sample of adolescents and their parents. The first data collection took place in 1990, and subsequent data collections were performed in 1991, 1992, 1993, 1995, and 1996. The present article reports data mainly from 1990, 1992, 1995, and 1996. The final data collections will take place in 1998 and 2000. By that date, a panel of adolescents will have been followed from age 13 in 1990 to age 23 in the year 2000. To obtain the original sample in 1990, 22 schools were selected from 130 urban and rural schools in the county of Hordaland in the western part of Norway. A total of 1195 seventh graders (age 13) and their parents were invited, with 927 pupils and their parents giving written informed consent to participate in the longitudinal study. The nonparticipants in 1990 consisted of students who did not want to participate ($n = 46$; 3.8%) and those who were not allowed to participate by their parents ($n = 222$; 18.6%). In addition, the obviously inadequate responses of three students were excluded from the 1990 material. Consequently, the 1990 material consisted of 924 students (510 boys and 414 girls), which represented 77% of the total sample of 1195 adolescents. The present study reports data on 538 adolescents (253 boys, 272 girls, and 13 who did not report their sex) who have participated at all four measurement occasions. These subjects have thus provided adequate data in 1990, 1992, 1995, and 1996; i.e., at ages 13, 15, 18, and 19 years. These participants represent 58% of the 924 13 year olds who responded to the initial questionnaire in 1990.

Data were collected by means of self-administered questionnaires. At data collections in 1990 and 1992, the respondents were contacted at their schools, and the questionnaires were handed out by university staff during school hours, without teachers being present in class. In 1995 and 1996, the questionnaires were sent by mail to the participants, because by then they had left upper-secondary school.

Dropouts

To determine to what extent adolescents who participated at the various measurement occasions were different from those who dropped out during the study

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period, comparisons were conducted on sex, age, and mean scores in depressed mood for the years 1990–1992, 1992–1995, 1995–1996, and 1990–1996. More boys than girls dropped out during the study period. No differences in mean depressed mood scores between respondents and dropouts were observed (the same finding occurred when separate analyses were performed for girls and boys). There is a possibility that those who completed the questionnaire differed from the dropouts on variables that were not addressed in this study but that might still have influenced the findings.

Measures

A seven-item inventory developed by Alsaker *et al.* (1991) was applied to measure *depressed mood/depressive tendencies*. The inventory includes items which relate to hopelessness, sadness, and depressive feelings. Thus, the applied measure resembles the definition of depressed mood that most researchers seem to agree on, in that it involves that part of the depressive symptomatology that refers to the presence of sadness, hopelessness, unhappiness, and miserable feelings (Compas *et al.*, 1993; Harrington, 1993). The exact wording of the items and response categories are provided in the Appendix. The internal consistency of the scale (Cronbach's α) was .83, .87, .90, and .91 in 1990, 1992, 1995, and 1996, respectively. The Guttman Split-half correlations for the corresponding years were .79, .83, .89, and .87. Test–retest reliability was studied in 1991 by having 80 respondents fill out the questionnaire a second time 1 week after the main data collection. An acceptable temporal stability was observed in terms of a correlation of .87 between total scores, while the test–retest correlations varied between .52 and .80 for the single items.

The present study addressed the issue of depressed mood. It is important to note that in the present paper when we use terms like "more" and "less" depressed, it is in a relative sense. This means, for example, that a person or subgroup who is characterized as more depressed than another does not necessarily have any clinical or substantial meaning. Thus the notions of more and less depressed is used in a strictly comparative perspective. It will hence be seen from the results that even those subjects who are described as comparatively "more" depressed (compared to those less depressed) on average represented a group who in actual terms experienced low levels of depressed mood.

Taking into account that a depressed mood inventory is different from a depressive symptoms inventory in that the latter usually also covers a variety of depressive symptoms, the 1996 questionnaire also included a depressive symptoms scale—the Center for Epidemiological Studies Depression Scale (CES-D) (Radloff, 1977). The CES-D scale is a 20-item self-report instrument for use in general adult and adolescent populations. The scale has been specifically constructed to assess the frequency of depressive symptoms, although particular emphasis has

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also been put on depressed mood and affect (Sheehan *et al.*, 1995). The items reflect the presence of depressed mood, feelings of guilt and worthlessness, feelings of helplessness, and loss of appetite and sleep disturbance. Respondents indicate (using a 4-point response format) the frequency of occurrence of each symptom over the past week. Possible CES-D total scores range from 0 to 60, with higher scores indicating increased depressive symptomatology. In the present study, the internal consistency of the CES-D total scale was .89. The correlation between the depressed mood scale and the CES-D total scale was .72 (calculated from the 1996 data). Refined analysis with latent variables revealed a correlation between the two scales of .82. From internal consistency, test–retest reliability, and concurrent validity with the CES-D scale, it seemed appropriate to consider that the depressed mood scale was a reliable and valid instrument.

RESULTS

Absolute Consistency in Depressed Mood

We first calculated depressed mood mean scores at the four measurement occasions (Table I). Among girls, a significant increase in depressed mood was observed from age 13 to age 15 years; no change was observed between age 15 and age 18 years, while a significant decrease was observed from age 18 to age 19 years. The highest mean depression score in girls was observed at age 15 years. The over-time changes in mean scores revealed a tendency for a curvilinear trend between age 13 and age 19 years. We do not know the shape of the curve between age 15 and age 18 years. Thus, it is possible that the mean level of depressed mood in girls increases continuously from age 13 to age 17 years (and certainly until age 15 years). Additionally, it can be reasoned that sometime between age 15 and age 17 years, a peak level in depressed mood in girls is reached, after which a decrease occurs which continues until at least age 19 years. This pattern was not observed among boys. The only significant finding in boys was a decrease in mean depressed mood score from age 18 to age 19 years, while no changes

Table I. Mean Depressed Mood Score by Sex and Age: Significant Age and Sex Differences

	Boys				Girls				*t*-value	
Age	*n*	M	SD	*t* value	*n*	M	SD	*t* value	sex diff.	df
13	216	2.17	0.8		243	2.29	0.8		ns	457
15	245	2.16	1.0	ns	264	2.52	1.0	2.89**	4.07**	507
18	252	2.18	1.0	ns	272	2.48	1.0	ns	3.21**	522
19	246	1.96	1.0	3.81**	268	2.24	1.1	4.06**	2.79**	512

Note. ns, not significant. * $p < .01$; ** $p < .001$. *t* value age diff., from with previous age mean depressed mood score.

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were observed between age 13 and age 18 years. As we hypothesized, the mean depressed mood scores were higher in girls than in boys at all ages. The smallest differences according to sex were observed at ages 13 and 19 years, while the most pronounced differences were observed at ages 15 and 18 years. When subjected to a t test for equality of means, the sex differences were significant at ages 15, 18, and 19 years (Table I).

When interpreting the results on absolute consistency in depressed mood it is important to keep in mind that a mean score of between 2 and 3, which is typically reported, reflects the answering categories "does not apply well" and "applies somewhat" on the depressed mood items. Thus, the mean score on the depressed mood measure indicates that the average sample was not depressed.

Relative Longitudinal Consistency

The first examination of relative consistency in depressed mood was performed by calculating raw and attenuation-corrected Pearson's correlation coefficients, respectively, between depressed mood scores at the four measurement points. The formula used for calculating the attenuation-corrected coefficients was $r_{xtyt} = r_{xy} \times (r_{xx} \times r_{yy}) - \frac{1}{2}$, where r_{xx} and r_{yy} represent the internal consistency coefficients (Cronbach's alpha) for the scale at the two measurement occasions x and y, and r_{xy} the raw correlation between the two variables. All correlations are presented in Table II; all correlations were significant at $p < .01$. It can be seen

Table II. Raw and Attenuation-Corrected Correlation Coefficients (in Parentheses) Between Depressed Mood Scores at Different Ages

	Age			
Age	13	15	18	19
13				
Total sample	1.00			
Girls				
Boys				
15				
Total sample	.42 (.50)	1.00		
Girls	.32 (.38)			
Boys	.51 (.61)			
18				
Total sample	.33 (.39)	.49 (.56)	1.00	
Girls	.31 (.36)	.54 (.61)		
Boys	.34 (.40)	.42 (.47)		
19				
Total sample	.30 (.35)	.46 (.52)	.70 (.77)	1.00
Girls	.25 (.29)	.46 (.52)	.69 (.76)	
Boys	.35 (.41)	.45 (.51)	.71 (.78)	

Note. All correlations were significant at the $p < .01$ level.

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that for the total sample the raw correlations ranged from .30 (age 13 years to age 19 years depressed mood scores) to .70 (age 18 years to age 19 years). The corresponding attenuation-corrected correlations ranged from .35 to .77. For girls, the raw correlations ranged between .25 (age 13 years to age 19 years) and .69 (age 18 years to age 19 years), while the corresponding corrected coefficients were .29 and .76, respectively. In boys the raw correlations ranged between .35 (age 13 years to age 19 years) and .71 (age 18 years to age 19 years), while the corresponding corrected coefficients were .41 and .78, respectively. When all correlations for boys and girls were taken into account, the corrected correlation coefficients were on average .06 greater than the raw correlation coefficients. The attenuation-corrected correlations between adjacent years ranged from .50 to .77 for the total sample.

To express relative longitudinal consistency by multilevel hierarchical confirmatory factor analysis, the EQS for Windows software and maximum-likelihood estimation (Bentler, 1995) were applied. Based on a variance decomposition formula provided by Schmitt and Steyer (1993) (as reported by Dumenci and Windle, 1996, p. 322), the mean variances for all the seven items were calculated. A model fit for the seven-item depressed mood scale was estimated for each of the four measurements. The overall model revealed an acceptable fit, with $\chi^2(318, N = 459) = 1039.4$, $p < .001$, CFI = .901, and RMSEA = .070 (.066–.075) (confidence interval for RMSEA given in parentheses). These fit measures all exceeded the recommended threshold of incremental fit indexes (such as the CFI) of .90 or above (e.g., Bentler and Bonnett, 1980). Recently, however, several researchers have argued in favor of a more restricted use of fit measures and have recommend the incremental fit index to be acceptable only if it exceeds .95 (e.g., Hayduk, 1996). However, with seven items loading on one single latent variable, there will be very few occasions where such high fit values are achieved.

By computing the "trait"-specific (common stable component) and "state"-specific (temporal component) variance in this model (the general variance decomposition model) (see Fig. 1), estimates of the relative stability for depressed mood were obtained. The results from the analysis, which are presented in Table III, indicate that depressed mood becomes more stable with increasing age. This is

Table III. Decomposition of Variance in Depressed Mood Scores at Different Ages (% of Total Variance)

Age	"Trait"	"State"	Item	Error
13	7.2	28.9	5.3	58.5
15	18.0	30.6	6.9	44.5
18	42.2	14.8	10.3	32.6
19	39.6	22.3	11.2	27.0

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indicated by the observation that the relative importance of the stability component accounts for 7.2 and 18.0% of the total variance at ages 13 and 15 years, while the variance explained by the stability component was 42.2 and 39.6% at ages 18 and 19 years, respectively. In contrast, the variance explained by the "state" component was 28.9 and 30.6% at ages 13 and 15 years, decreasing to 14.8 and 22.3% at ages 18 and 19 years, respectively.

Relative Consistency in Depressed Mood in Subgroups of Adolescents

To study relative stability in subgroups of adolescents based on their age 13 years depressed mood scores, the sample at baseline (in 1990; age 13 years) was divided into quartiles. Mean scores for each group were obtained and compared for each year using a repeated-measures one-way ANOVA. The results showed that the quartile/group with the highest mean depressed mood score at age 13 years (denoted Group 4) scored above the other quartiles at all later measurement occasions (Fig. 2).

The correlations in depressed mood scores across years in the group with the highest depressed mood score were significant across all the measurements except in the 6-year period, 1990 to 1996. The attenuation corrected correlations were .40 (1990–1992), .40 (1990–1995), .45 (1992–1995), .53 (1992–1996), and .67 (1995–1996). This subgroup quartile was the one with the highest correlations

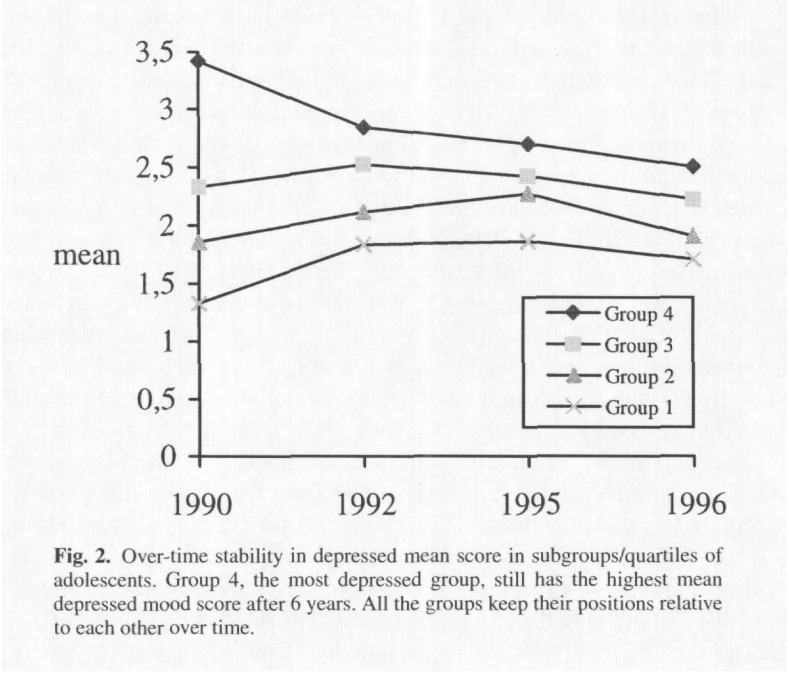


Fig. 2. Over-time stability in depressed mean score in subgroups/quartiles of adolescents. Group 4, the most depressed group, still has the highest mean depressed mood score after 6 years. All the groups keep their positions relative to each other over time.

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between measurement occasions. The correlations between baseline and the other measurement occasions in the other groups were not significant and are not presented.

A stricter cutoff score was applied to select cases with high depressed mood scores. The cutoff at baseline measurement in 1990 was set to 3.96 (a score that approximated the top decile and was above the standard deviation from the mean). This group was followed over time, primarily to investigate how many still belonged to the top decile in 1992, 1995, and 1996. Furthermore, we investigated how this group scored on the CES-D scale, when the cutoff here was set to 20 (which also includes the upper decile in the present study). Traditionally, the cutoff on the CES-D scale has been set to 16, but when the purpose is to detect cases with high depressive symptom scores, higher cutoffs have been applied (Radloff, 1991). Of 52 individuals with high depressed mood scores in 1990, 41% still had high scores in 1992, 37% in 1995, and 24% in 1996. As regards the CES-D scale, 26% of the 52 subjects scored above the cutoff in 1996.

DISCUSSION

Absolute Longitudinal Consistency in Depressed Mood

The first goal of this research was to examine over-time absolute consistency in depressed mood in adolescents. Our results indicated that among boys no substantial changes in depressed mood mean scores occurred between age 13 and age 19 years. The mean depressed mood scores among girls increased from, at least, age 13 to age 15 years, reached a peak level sometime between age 15 and age 18 years, and decreased from age 18 until at least age 19 years. Still if the changes were significant, they were small in absolute terms. However, the findings might also reflect a tendency of a curvilinear trend as reported previously by Kandel and Davies (1982) and Radloff (1991). When previous research has reported depressed mood in adolescent girls as increasing (e.g., Petersen *et al.*, 1991) or staying constant across time (e.g., Devine *et al.*, 1994), these observations may in fact all be true. A possible conflict in empirical observations may be explained by the fact that different studies have researched girls in different age segments and followed the subjects for varying periods of time (when a longitudinal design has been applied).

As hypothesized, and in accordance with most previous research (e.g., Petersen *et al.*, 1991; Nolen-Hoeksema and Girgus, 1994), the mean depressed mood scores in girls tended to be above that for boys. Several previous studies have reported that, in preadolescence, boys' depression scores appear to be higher than girls', whereas by age 13 or 14 years, higher depressed mood scores are usually observed in girls (Nolen-Hoeksema, 1991; Reinherz *et al.*, 1993; Kandel and Davies, 1982). Although the latter finding was confirmed in the present study, lack of data for ages earlier than 13 years prevented us from addressing empirically the

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possible existence of a crossover in mean depressed mood scores between girls and boys.

If the curvilinear pattern in depressed mood scores in adolescent girls and the observed sex differences are confirmed [at least the latter seem to be relatively well documented (for review see Petersen *et al.*, 1993)], a relevant next step would be to reveal the underlying causal mechanisms involved. In this endeavor it seems reasonable to take into account both that the biological, psychological, and social changes and influences that girls and boys experience may differ in both quality and magnitude (Petersen *et al.*, 1991; Gjerde, 1993) and that gender differences in strategies to cope with such changes and influences may exist (Nolen-Hoeksema, 1991).

Consequently, a limitation of much previous research in this area relates to the fact that very few studies have applied a longitudinal (panel) design and that, when such a design has been applied, the study period has usually been much too short (e.g., Charman, 1994; Garrison *et al.*, 1990). The relevance of this limitation was clearly demonstrated even by the present study, in which the study subjects were followed for a period of 6 years. It would have been particularly beneficial if the subjects had been surveyed below age 13 years. Such data would have made it possible to reveal more specifically at what age girls began to report higher levels than boys on the depressed mood measure.

Relative Longitudinal Consistency in Depressed Mood

The above results on relative longitudinal consistency in depressed mood provoke several comments. The first is that the existence of relative stability in depressed mood is somewhat underestimated when judged by raw correlation coefficients only. Hence, the attenuation-corrected correlation coefficients were on average .06 larger than the raw correlation coefficients. The corrected correlations among baseline, age 13 years, and age 18 and 19 years were only moderate to low (.41–.29). However, there seems to be a certain degree of relative stability from age 15 years on and to subsequent measurements (age 18 and age 19 years), hence, the corrected correlations were moderately high and ranged from .61 to .47. This finding confirms research by Devine *et al.* (1994) and Charman (1994), who reported relative stability in depressed mood over a period of 4 years and 6 months, respectively. It may be worth noting that the above studies reported raw correlation coefficients only and that, therefore, the impression of stability may have been somewhat deflated. However, despite the occurrence of a certain stability, a real degree of over-time instability was also observed in that the lowest attenuated correlation coefficient over the 6-year period in our study was .29.

Applying structural equation modeling appeared to be quite useful in identifying the relative importance of the stable ("trait") and change ("state") components of depressed mood at different ages. The results obtained clearly indicated that the

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stability component increased with age. However, the relative instability on the depressed mood measure in early adolescence compared to late adolescence could not be ascribed to low reliability of the depressed mood scale, as the instrument proved to be reliable at all ages. Rather, what we observed can be interpreted as a real increase in stability.

Consequently, these findings might imply that while adolescents experience more labile features of depressed mood/(or not depressed mood) in periods with a great deal of environmental and maturational change such as early adolescence, these tendencies tend to be more constant in periods with fewer transitions, such as middle and late adolescence. A corresponding finding was reported by Alsaker *et al.* (1992), who studied the relative stability of global negative self-evaluation.

An additional interest in the present study was the question of relative stability in subgroups of adolescents. After dividing the adolescent group into four subgroups based on their baseline scores, the findings revealed that the groups kept their positions relative to each other over time. Thus, the quartile of subjects with the highest mean baseline depressed mood score was also the group with the highest level at all subsequent measurement occasions. The tendency for the difference between groups (upper and lower quartiles) to level out over time may be due partly to the phenomenon of "regression toward the mean." Furthermore, based on each quartile's correlations over time, the upper quartile group of adolescents (in depressed mood at baseline) proved to be more stable over time than the other groups (quartiles). A longitudinal relative consistency was observed over a relatively long time interval (up to 5 years), although the corrected correlations varied between measurements, from .67 over a 1-year interval (1995–1996), to .53 (1992–1996), to .45 (1992–1995), to .40 (1990–1992), to .40 over a 5-year interval (1990–1995). All these correlations were statistically significant. The correlation over the 6-year period (1990–1996) was not significant. The upper quartile group of adolescents may include a proportion of adolescents who experience depressed mood as well as impairment in their quality of functioning. Accordingly, we examined a group with higher depressed mood score, the top decile from baseline with a group mean of 3.96. This group displayed modest stability over time: 47% belonged to this group after 2 years, 37% after 5 years, and 24% after 6 years. This examination also revealed that 75% did not report high depressed mood scores after 6 years. However, the top decile in our study showed more stability over time than was the case in the study by Garrison *et al.* (1990), who reported that only 30% of the top decile remained high over a 1-year interval. Overall, the findings about relative stability in subgroups of adolescents in part supported the argument of Charman (1994) and Rutter (1976), who indicated that there seemed to be a group of adolescents who were unhappy over time (in the present study) for a period of 5 years. This finding seems important when we take into account the fact that depressive symptoms in adolescents often remain undetected by parents and teachers (Lange, 1991; Offer and Schanert-Reichel, 1992) and that the field of adolescents' mental

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health has been given a low priority in many Western societies (Petersen *et al.*, 1993).

Conclusions and Some Final Methodological and Conceptual Considerations

There is an increased recognition that depressed mood in adolescence warrants study in its own right, even if the adolescents fall short of a clinical diagnosis of depression (depressive disorder, depressive syndromes) (Block *et al.*, 1991). However, some of the adolescents in the present study will have a symptomatology close to the threshold for a clinical diagnosis, as elevated scores do represent a risk factor for becoming clinically depressed (Lewinsohn *et al.*, 1988; Compas *et al.*, 1993). Nevertheless, the findings in the present study, based on self-reported depressed mood data in a community sample of adolescents, may not be generalized to clinical depression as defined in psychiatry.

In a seminal paper, Compas *et al.* (1993) have argued that research on depression and depressed mood has too often been flawed by conceptual and methodological confusion. That critique highlighted the fact that many researchers have not explicitly distinguished between depression, depressive syndrome and depressed mood. Although a number of studies seem to defend the adequacy of including both mood (cognition and emotions) and nonmood (behavioral manifestations such as sleeping difficulties, appetite problems, and crying) items in measures of depressive syndrome and depression, the adequacy of measuring depressed mood by including both mood and nonmood items is not self-evident. This has caused some researchers to question the theoretical and psychometric validity of some of the "unclean" depressed mood inventories (Compas *et al.*, 1993). Although conceptual and methodological clarity should always be the aim, on the basis of the present research we may be reasonably confident about our methodology (this relates to survey research only, and not to clinical settings). For one thing, we were obviously able to measure depressed mood reliably. Second, and perhaps more importantly, depressed mood was substantially and significantly associated with depressive symptoms (as measured by CES-D), a fact that testifies both to the construct validity of depressed mood and to the relevance of studying depressed mood in adolescents.

In conclusion, the present research showed that at the aggregate level between age 13 and age 19 years, there was a tendency for girls to score higher on the depressed mood scale than boys. The absolute level of depressed mood remained quite stable for both sexes, with a slight tendency for a curvilinear trend among girls. As far as longitudinal relative consistency was concerned, the notion that adolescents experience some depressive turmoil was partly supported. In addition, the findings reveal that depressed mood was characterized by a certain degree of relative stability and that the stability ("trait") component in the total sample

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increased with age. This underscores the observation that a small proportion of adolescents does not appear to "grow out" of their depressed mood. Rather, depressed mood in adolescence may in itself represent an important psychosocial problem as well as being a predictor of more serious implications for health.

APPENDIX

Items on the Seven-Item Depressed Mood Scale

1. I often feel depressed without knowing why.
2. Sometimes I think everything is so hopeless that I don't feel like doing anything.
3. I don't think I have anything to look forward to.
4. Sometimes I am just so depressed that I feel like staying in bed for the whole day.
5. I am often sad without seeing any reason for it.
6. I think my life is mostly miserable.
7. Sometimes I think my life is not worth living.

Answer categories were 1 = does not apply at all, 2 = does not apply well, 3 = applies somewhat, 4 = applies fairly well, 5 = applies well, and 6 = applies exactly.

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REFERENCES

Alsaker, F. D., and Olweus, D. (1992). Stability of global self-evaluations in early adolescence: A cohort longitudinal study. *J. Res. Adolesc.* 2: 123–145.

Alsaker, F. D., Dundas, I., and Olweus, D. (1991). A growth curve approach to the study of parental relations and depression in adolescence. Paper presented in Seattle, April.

Bentler, P. (1995). *EQS Structural Equations Program Manual*, Multivariate Software, Encino, CA.

Bentler, P. M., and Bonett, D. G. (1980). Significance tests and goodness-of-fit in the analysis of covariance structures. *Psychol. Bull.* 88: 588–606.

Bergman, L. R., Eklund, G., and Magnusson, D. (1989). Studying individual development: Problems and methods. In Magnusson, D., Bergman, L. R., Rudinger, G., and Torestad, B. (eds.), *Problems and Methods in Longitudinal Research. Stability and Change*, Cambridge University Press, Cambridge.

Bjerke, T. (1992). *Selvmord og selvmordsforsøk blant unge*, Tapir, Trondheim.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Carlson, G. A., and Cantwell, D. P. (1980). A survey of depressive symptoms, syndrome and disorder in a child psychiatric population. *J. Child Psychol. Psychiatry* 21: 19–25.
Charman, T. (1994). The stability of depressed mood in young adolescents: A school-based survey. *J. Affect. Disorder* 30: 109–116.
Cohen, P., Cohen, J., Teresi, J., Marchi, M., and Velez, C. N. (1990). Problems in the measurement of latent variables in structural equations causal models. *Appl. Psychol. Measure.* 14(2): 183–196.
Cole, D. A. (1989). Psychopathology of adolescent suicide: Hopelessness, coping beliefs, and depression. *J. Abnorm. Psychol.* 98(3): 248–255.
Compas, B. E. (1993). Promoting positive mental health during adolescence. In Millstein, S. G., Petersen, A. C., and Nightingale, E. O. (eds.), *Promoting the Health of Adolescents, New Directions for the Twenty-First Century*, Oxford University Press, New York.
Compas, B. E., Ey, S., and Grant, K. E. (1993). Taxonomy, assessment, and depression during adolescence. *Psychol. Bull.* 114(2): 323–344.
Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *J. Appl. Psychol.* 78(1): 98–104.
Cronbach, L. J. (1970). *Essentials of Psychological Testing*, Harper & Row, New York.
Cytryn, L., and McKnew, D. H. (1974). Factors influencing the changing clinical expression of the depressive process in children. *Am. J. Psychiatry* 131: 879–881.
Devine, D., Kempton, T., and Forehand, R. (1994). Adolescent depressed mood and young adult functioning: A longitudinal study. *J. Abnorm. Child Psychol.* 22(5): 629–641.
Dumenci, L., and Windle, M. (1996). A latent trait-state model of adolescent depression using the Center for Epidemiological Studies Depression Scale. *Multivar. Behav. Res.* 31(3): 313–330.
Garrison, C. Z., Jackson, A. B., Marsteller, F., McKeown, R., and Addy, C. (1990). A longitudinal study of depressive symptomatology in young adolescents. *Am. Acad. Child Adolesc. Psychiatry* 29(4): 581–586.
Gjerde, P. F. (1993). Depressive symptoms in young adults: A developmental perspective on gender differences. In Funder, D., Parke, R. D., Tomlinson-Keasey, C., and Widamanwash, D. C. (eds.), *Studying Lives Through Time. Personality and Development*, APA, Washington, DC.
Harrington, R. (1993). *Depressive Disorder in Childhood and Adolescence*, Wiley & Sons, Chichester, England.
Hayduk, L. A. (1996). *LISREL. Issues, Debates, and Strategies*, The John Hopkins University Press, London.
Kandel, D. B., and Davies, M. (1982). Epidemiology of depressive mood in adolescents. *Arch. Gen. Psychiatry* 39: 1205–1212.
Kandel, D. B., and Davies, M. (1986). Adult sequelae of adolescent depressive symptom. *Arch. Gen. Psychiatry* 43: 255–262.
Kandel, D. B., Raveis, V. H., and Davies, M. (1991). Suicidal ideation in adolescence: Depression, substance use, and other risk factors. *J. Youth Adolesc.* 20: 289–309.
Lange, J. (1991). Depresjon hos barn og unge—et osynliggjort fenomen. *Nordisk Med.* 106: 84–85.
Lewinsohn, P. M., Hobermann, H., and Rosenbaum, M. (1988). A prospective study for risk factors for unipolar depression. *J. Abnorm. Psychol.* 97: 251–264.
Lewinsohn, P. M., Gotlieb, I. H., and Seeley, J. R. (1997). Depression-related psychosocial variables: Are they specific to depression in adolescents? *J. Abnorm. Psychol.* 106(3): 365–375.
MacCallum, R. C., and Browne, M. (1993). The use of causal indicators in covariance structure models: Some practical issues. *Psychol. Bull.* 114(3): 533–541.
Marsh, H. W., and Grayson, D. (1994). Longitudinal confirmatory factor analysis: Common, time-specific, item-specific, and residual-error components of variance. *Struct. Eq. Model.* 1(2): 116–145.
McConville, C., and Cooper, C. (1992). The structure of moods. *Person. Indiv. Diff.* 13(8): 909–919.
Merikangas, K. R., and Angst, J. (1995). The challenge of depressive disorders in adolescence. In Rutter, M. (ed.), *Psychosocial Disturbances in Young People, Challenges for Prevention*, Cambridge University Press, New York.
Miller, M. B. (1995). Coefficient alpha: A basic introduction from the perspectives of classical test theory and structural equation modelling. *Struct. Eq. Model.* 2(3): 255–273.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *J. Abnorm. Psychol.* 100: 569–582.

Nolen-Hoeksema, S. (1994). An interactive model for the emergence of gender differences in depression in adolescence. *J. Res. Adolesc.* 4: 519–534.

Nolen-Hoeksema, S., and Girgus, J. S. (1994). The emergence of gender differences in depression during adolescence. *Psychol. Bull.* 115(3): 424–443.

Nolen-Hoeksema, S., Girgus, J. S., and Seligman (1992). Predictors and consequences of childhood depressive symptoms: A five year longitudinal study. *J. Abnorm. Psychol.* 101: 405–422.

Offer, D., and Schanert-Reichel, K. A. (1992). Debunking the myths of adolescence: Findings from recent research. *J. Am. Acad. Child Adolesc.* 31: 1003–1014.

Petersen, A. C., Sarigiani, P. A., and Kennedy, R. E. (1991). Adolescent depression: Why more girls? *J. Youth Adolesc.* 20: 247–272.

Petersen, A. C., Compas, B. E., Brooks-Gunn, J., Stemmler, M., Ey, S., and Grant, K. E. (1993). Depression in adolescence. *Am. Psychol.* 48(2): 155–168.

Radloff, L. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Appl. Psychosoc. Measure.* 1: 385–401.

Radloff, L. S. (1991). The use of the Center for Epidemiological Studies Depression Scale in adolescents and adults (Special Issue: The emergence of depressive symptoms during adolescence). *J. Youth Adolesc.* 20: 149–166.

Reinherz, H. Z., Giaconia, R. M., Pakiz, B., Silverman, A. M., Frost, A. K., and Lefkowitz, E. S. (1993). Psychosocial risks for major depression in late adolescence: A longitudinal community study. *J. Am. Acad. Child Adolesc. Psychiatry* 32(6): 1155–1164.

Rutter, M. (1987). Psychosocial resilience and protective mechanisms. *Am. J. Orthopsychiatry* 57(3): 316–332.

Rutter, M., Graham, P., Chadwick, O. F. D., and Yule, W. (1976). Adolescent turmoil: Fact or fiction? *J. Child Psychol. Psychiatry* 17: 35–57.

Schmitt, M. J., and Steyer, R. (1993). A latent trait-state model (not only) for social desiranility. *Person. and Indiv. Diff.* 14: 519–529.

Sheehan, T. J., Fitfield, J., Reisine, S., and Tennan, H. (1995). The measurement structure of the Center for Epidemiological Studies Depression Scale. *J. Person. Assess.* 64(3): 507–521.

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