

A Longitudinal Investigation of Depression, Hopelessness, Social Support, and Major and Minor Life Events and Their Relation to Suicidal Ideation in Adolescents

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The longitudinal relationship of psychological and social-environmental factors with adolescent suicidal ideation over a 1-year-period was examined in a sample of 374 high school students. Students were assessed twice over a 1-year period with measures of depression, hopelessness, major negative life events, daily hassles, social support, and suicidal ideation. At the initial assessment, daily hassles and negative life events for males and social support and depression for females were significant factors related to suicidal ideation levels 1 year later. Changes in depression and hopelessness were significantly related to changes in suicidal ideation over the 1 year interval for males and females. Differences found between males and females in the relationship of psychological and social-environmental variables with suicidal ideation supports the need to examine gender specific relationships when conducting research on suicidal behavior in adolescents.

The increased rates of adolescent suicide and suicidal behavior are a major concern to the mental health field as well as to the general population. According to the Centers for Disease Control (CDC, 1995), the rate of suicide in adolescents ages 15–19 increased 28.3% from 1980 to 1992. Although the actual base rate of adolescent suicide is relatively low, approximately 11 per 100,000 (Centers for Disease Control, 1995), it ranks as a leading cause of death for this age group (National Institute of Mental Health, 1992). Data gathered by the CDC and other investigators (Adcock, Nagy, & Simpson, 1991; Reynolds & Mazza, 1992a) suggest that suicidal behaviors, including suicide attempts and suicidal ideation, are relatively common among youth. The extent of adolescent sui-

cidal behaviors supports the need for examining potential processes and factors that may affect or exacerbate adolescents' suicidal cognitions. Such research is important for increasing our understanding of these behaviors and developing appropriate intervention procedures.

Within the fields of psychology and psychiatry, much of the research on factors considered to be related to adolescents' suicidal behaviors has focused on variables such as depression (Brent, 1989; Smith & Crawford, 1986), hopelessness (Cole, 1989; Rotheram-Borus & Trautman, 1988), social support (Hawton, 1986; Lewinsohn, Rohde, & Seeley, 1993; Pfeffer et al., 1991; Wagner, Cole, & Schwartzman, 1995) and socioenvironmental stressors (Lewinsohn et al., 1993; Rubenstein,

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Heeren, Housman, Rubin, & Stechler, 1989; Wagner et al., 1995). This research has used both clinical and nonclinical samples of adolescents, and, for the most part, has examined concurrent relationships among these variables.

Research examining longitudinal relationships is important for enhancing our understanding of the development of affective psychopathology from childhood to adulthood (Harrington, Fudge, Rutter, Pickles, & Hill, 1990; Rao, Weissman, Martin, & Hammond, 1993; Rutter, 1995). Rao and colleagues (1993) conducted a 10-year follow-up study of 159 children and adolescents who were diagnosed with depression and reported a higher rate of suicide in the depressed group than in a small comparison group previously diagnosed with anxiety disorders. Similarly, Harrington and colleagues (1990), who compared depressed children to nondepressed psychiatric controls, reported that the depressed children were 4 times more likely to experience recurring episodes of major depression in early adulthood than the nondepressed comparison group. Thus, the longitudinal approach to developmental psychopathology appears to be a viable method for examining psychopathology characteristics in children and adolescents who may be at risk later for other type of psychopathologies. This approach is relevant to the study of suicidal behavior in adolescents, given that suicidal behavior is rare in children under the age of 10 (Centers for Disease Control, 1995; Reynolds & Mazza, 1994) and becomes prevalent during adolescence.

The conceptualization of developmental psychopathology has changed over the past 2 decades with an expanding focus on areas of depression, anxiety disorders, and conduct disorder (Kovacs, Goldston, & Gatsonis, 1993; Quinton, Pickles, Maughan, & Rutter, 1993; Rao et al., 1993; Rutter, 1995). Rutter (1995) notes that psychosocial variables were previously considered causal factors in the development of psychopathology. The current thought is that psychosocial variables,

rather than being the sole cause of change, may also interfere or exacerbate preexisting psychological conditions in some youngsters who manifest psychological dysfunction or vulnerability (Caspi & Moffitt, 1993; Rutter, 1995). Cicchetti, Rogosch, and Toth (1994) suggest that the current developmental psychopathology framework allows research to move beyond distinguishing factors to examining why these pathologies occur in some individuals and not in others. The latter is best addressed by examining the changes that occur over time in both psychopathological and normal functioning individuals (Cicchetti et al., 1994). A significant portion of recent research in developmental psychopathology has focused on depression, and to a lesser extent, suicidal behavior in adolescents (Reynolds & Johnston, 1994). As described later, most of the latter research has examined concurrent relationships between psychological and stress-related factors and suicidal behavior. There have been few research investigations using a longitudinal developmental perspective to study suicidal behaviors in adolescents (Garrison, Addy, Jackson, McKeown, & Waller, 1991; Reifman & Windle, 1995; Vegas, Gil, Warheit, Apospori, & Zimmerman, 1993). Given that suicidal behavior may be viewed as a potential outcome of changes in a youngster's psychosocial functioning, the examination of changes in psychosocial factors over time and the relationship of these changes to suicidal behavior may provide for a better understanding of suicidal behaviors in adolescents.

PSYCHOLOGICAL FACTORS RELATED TO ADOLESCENT SUICIDAL BEHAVIORS

Research on adolescent suicidal behavior has identified numerous psychological factors that demonstrate moderate relationships with suicidal behaviors (Brent, 1989; King, Raskin, Gdowski, Butkus & Opipari, 1990; Shafii, Steltz-Lenarsky,

Derrick, Beckner, & Whittinghill, 1988). Depression has been frequently reported in adolescents who exhibit suicidal behavior (Brand, King, Olson, Ghaziuddin, & Naylor, 1996; Brent, 1989; Kovacs et al., 1993; Reynolds & Mazza, 1992b; Sadowski & Kelley, 1993; Shafii et al., 1988). Research studies examining the relationship between depression and suicidal ideation in adolescent suicide attempters report moderate correlations, ranging from .40 to .60 (Clarkin, Friedman, Hurt, Corn, & Aronoff, 1984; Sadowski & Kelley, 1993). Similarly, in studies of nonclinical adolescents, the relationship between depression and suicidal ideation is of similar magnitude (Cole, 1989; Reynolds, 1987; Reynolds & Mazza, 1990; Smith & Crawford, 1986).

Although depression and suicidal behavior are related, they are not synonymous (Cole, 1989; Reynolds, 1993). Adolescents who exhibit suicidal behavior are not necessarily depressed (Reynolds & Mazza, 1990), nor are all depressed youngsters contemplating suicide. Because suicidal behavior is generally included as a symptom of depression in diagnostic systems (e.g., *the Diagnostic and Statistical Manual of Mental Disorders*, 4th ed., [DSM-IV]; American Psychiatric Association, 1994), as well as in self-report and clinical interview measures of depression, a small proportion of variance is added to the relationship between these two variables (Levy & Deykin, 1989).

Hopelessness, conceptualized as a pessimistic perception of the future (Beck, Weissman, Lester, & Trexler, 1974), has been studied as it relates to suicidal behavior in adolescents. In adults, hopelessness has been found to mediate the effects of depression on suicidal behavior (Beck, Steer, Kovacs, & Garrison, 1985; Wetzell, Margulies, Davis, & Karam, 1980). Studies of hopelessness, depression, and suicidal behavior in adolescents have reported mixed results (Cole, 1989; Lewinsohn et al., 1993; Rich, Kirkpatrick-Smith, Bonner, & Jans, 1992; Rotheram-Borus & Trautman, 1988). In a study of approxi-

mately 1,700 high school students, Lewinsohn and colleagues (1993) found that when depression was statistically controlled, other psychosocial variables, including hopelessness, were no longer related to previous suicide attempts. These results are generally consistent with Cole's (1989) findings. Cole, in a study of school-based adolescents, found that when depression was statistically controlled, the relationship between hopelessness and suicidal ideation for males was not statistically significant. Hopelessness in females remained moderately related to suicidal ideation levels when the relationship with depression was controlled. When hopelessness was statistically controlled, depression remained a significant predictor of suicidal ideation in males and females. Pinto and Whisman (1996), in a study of 228 psychiatrically hospitalized adolescents, reported significant correlations between the Suicidal Ideation Questionnaire (SIQ; Reynolds, 1988) and scores on self-report measures of depression ($r = .62$) and hopelessness ($r = .53$). The partial correlation between suicidal ideation and depression was .42 ($p < .002$) controlling for hopelessness, although the partial correlation between hopelessness and suicidal ideation was nonsignificant ($pr = .19$) when depression was controlled. Somewhat different results were found by Rich and colleagues (1992), who examined depression, hopelessness, and other psychosocial variables, who reported that hopelessness was the best predictor of suicidal ideation, accounting for a majority of the explained variance using stepwise regression procedures. To some extent, the issue of collinearity, which may not be adequately addressed in stepwise regression analyses, may account for the findings by Rich and colleagues (1992). Because stepwise entry of variables into a multiple regression analysis uses an empirical rather than a theoretical approach to address the issues of collinearity, changes may occur in the order of variables being entered, depending on the sample (Marascuilo & Serlin, 1988).

SOCIOENVIRONMENTAL FACTORS RELATED TO ADOLESCENT SUICIDAL BEHAVIOR

Social and environmental variables that have been found to be related to suicidal behavior include stressors (major and minor life events) and level of social support (De Wilde, Kienhorst, Diekstra, & Wolters, 1992; Hoberman & Garfinkel, 1988; King et al., 1990; Reynolds, 1988; Rotheram-Borus & Trautman, 1988; Smith & Crawford, 1986; Wagner et al., 1995). Lewinsohn and colleagues (1993) found that the relationship between suicidal behavior and both major life events and daily hassles was primarily a function of depression. Lewinsohn et al. (1993) found that when depression was controlled, family support remained a significant predictor of suicidal behavior but peer social support did not. Kandel, Raveis, and Davies (1991), examined the relationship of social support and suicidal ideation with 593 high school students, and found that social support differentiated those males and females with high levels of suicidal ideation compared to same sex peers with low suicidal ideation. Kandel et al. (1991) reported that adolescents with high levels of suicidal ideation depended on their peers more for social support than their parents.

In a study of 920 adolescents in grades 10, 11, and 12, Reynolds and Waltz (1986) found zero-order correlation coefficients of .39, .48, and $-.32$ (all $p < .001$), between suicidal ideation as measured by the SIQ and measures of negative life events, hassles, and social support, respectively. A multiple regression analysis with SIQ as dependent variable resulted in a multiple R of .54 ($R^2 = .29$). Standardized beta coefficients of .32 with hassles, $-.21$ with social support, and .18 for major negative life events were found (all $p < .01$), suggesting the relative importance of these variables for understanding suicidal behavior in adolescents. The importance of examining hassles or chronic strains in addition to major negative life events when studying suicidal behaviors in adolescents was also

demonstrated by Adams, Overholser, and Spirito (1994). Adams et al., in a sample of 91 adolescent suicide attempters, found significant correlations between scores on the SIQ and chronic strains ($r = .39$, $p < .001$) but not major negative life events ($r = .18$, $p = ns$) for females with nonsignificant correlations for males. The correlation between the SIQ and overall stress scores was .05 ($p = ns$) for males and .36 ($p < .001$) for females. This study also illustrates the importance of gender specific relationships in the study of variables related to suicidal behavior in adolescents.

PURPOSE OF THE CURRENT STUDY

The studies cited earlier provide evidence that psychological and social-environmental variables are concurrently related to adolescent suicidal behaviors. However, the relationship of these factors to suicidal behavior over time has received minimal attention (Garrison et al., 1991; Reifman & Windle, 1995). Based on research studies and theoretical examinations of internalizing disorders in young people (Cicchetti et al., 1994; Kovacs et al., 1993; Rao et al., 1993; Reynolds, 1992; Rutter, 1995), it is reasonable to assume that psychological and social factors do not necessarily co-occur with suicidal behavior within the same time frame or that their impact is the same for males as for females. Some psychosocial factors measured at one point in time may be more or less related to future suicidal behavior than others. Examining the longitudinal relationships of psychological and social-environmental factors may enhance our understanding of the nature and development of adolescent suicidal behavior in males and females.

The purpose of this investigation was threefold: first, to examine the longitudinal relationship of five selected psychological and social-environmental factors (e.g., depression, hopelessness, social support, daily hassles, and negative life-events) to suicidal ideation 1 year later. The second

focus of this study was to examine how the changes in these psychosocial variables relate to changes in suicidal ideation over a 1 year period. The third purpose was to examine gender-specific relationships. Given that gender differences are widely recognized in adolescent suicidal behavior (Berman & Jobes, 1991; Brent, 1995; Centers for Disease Control, 1995; Spirito et al., 1993), as well as in the relationships found between psychosocial variables and suicidal ideation (Adams et al., 1994; Cole, 1989), this study examined the relationships between psychological and social-environmental factors and suicidal ideation separately for males and females.

METHOD

Participants

The participants were 374 high school students enrolled in a public school located in an urban-suburban city in the Midwest, who were evaluated for potential mental health problems as part of an annual, school-mandated screening program. At the initial assessment at Time 1, there were 655 students who participated in the study; however, due to student dropout, moving, absenteeism, invalid responses, and incomplete data, there were 374 (57.1%) students from Time 1 that completed the Time 2 assessment 1 year later and had complete data for both assessment periods. Of the 374 participants, there were 235 sophomores and 139 juniors, with a mean age of 15.5 years ($SD = 1.02$) at the initial assessment. Gender was approximately equal with 172 (46%) males and 202 (54%) females. By ethnicity, the sample consisted of 81.5% Caucasian, 15.5% African American, 1.6% Hispanic American, and 1.3% Asian American and Native American.

Measures

The mental health assessment battery completed by participants on both assessment occasions consisted of self-report paper-and-pencil measures of daily hassles, major negative life events, social support,

depression, hopelessness, and suicidal ideation. The negative life events and daily hassles questionnaires were slightly modified for the Time 2 administration. Modifications to these measures were minimal and are described along with the description of each measure.

Dependent Measure: Suicidal Ideation.

Suicidal Ideation Questionnaire (SIQ). The SIQ developed by Reynolds (1988) is a self-report measure of suicidal ideation designed for use with adolescents. The 30-item SIQ assesses specific thoughts and cognitions about suicide and death over the past month. The SIQ uses a 7-point scale, with score points ranging from having the cognition "almost every day" (6) to "I never had this thought" (0).

The psychometric properties of the SIQ are well established. Internal consistency reliability using Cronbach's coefficient alpha (Cronbach, 1951) of .97 has been reported in school-based (Reynolds, 1988) and clinical samples (Pinto, Whisman, & McCoy, 1997) of adolescents. Construct validity was established through convergent validity, with SIQ scores moderately to strongly correlated (.52 to .70) with related constructs such as depression, hopelessness, learned helplessness, and self-esteem (Reynolds, 1988, 1989). Criterion-related validity has been demonstrated by its relationship to a structured clinical interview of suicidal behaviors (Reynolds, 1990). Pinto et al. (1997) provided evidence for the concurrent validity of the SIQ with psychiatrically hospitalized adolescents. The SIQ has been used in numerous clinical and school-based studies of suicidal behavior in adolescents as a measure of suicidal ideation (e.g., Adams et al., 1994; King et al., 1990, 1995; Pinto & Whisman, 1996). The SIQ was the dependent measure for this study.

Assessment of Psychological Factors.

Reynolds Adolescent Depression Scale (RADS). The RADS (Reynolds, 1987) was used to assess severity of depressive symp-

tomatology in participants. The RADS was developed for use with adolescents and consists of 30 items utilizing a 4-point (1–4) Likert-type scale with higher scores indicating greater depressive symptomatology. The items on the RADS reflect the symptom criteria from the *Diagnostic and Statistical Manual of Mental Disorders*, 3rd edition (DSM-III; American Psychiatric Association, 1980) for major depression and dysthymia disorder as well as symptoms found in unipolar depression (Reynolds, 1987). The RADS was standardized on 2,460 adolescents from 7th to 12th grade, and has been used as a measure of depressive symptomatology in numerous studies with school-based and clinical samples of adolescents (e.g., Brand et al., 1996; Reynolds & Coats, 1986; Sadowski & Kelley, 1993).

The psychometric properties of the RADS show strong reliability and validity. Reynolds (1987) reported an internal consistency coefficient using Cronbach's alpha (Cronbach, 1951) of .92. Concurrent validity was established comparing the RADS to the Hamilton Depression Rating Scale (HDRS; Hamilton, 1960) in a school-based sample; the resulting correlation coefficients were strong, $r = .83$. Convergent validity was determined by strong correlation coefficients with other self-report measures of depression (Reynolds, 1987). In studies of clinical samples, investigators have reported strong evidence for criterion related validity for the RADS with diagnostic and semistructured clinical interview measures of depression (King et al., 1997; Reinecke & Schultz, 1995; Shain, Naylor, & Alessi, 1990).

Hopelessness Scale (HS). The HS by Beck, Weissman, Lester, and Trexler (1974) was used to assess hopelessness. The HS is a 20-item, true-and-false measure that assesses the individual's negative expectations for the future (Beck et al., 1974). Each item is scored as 0 or 1, with a total score ranging from 0 to 20. The first nine items on the HS assess the person's attitude about the future. The remaining 11 items assess the amount of pessimism the

individual is currently experiencing. The HS was developed with 294 hospitalized adults who had recently attempted suicide and were committed to a Pennsylvania hospital. The HS has been used extensively as measure of hopelessness for adolescents in other suicidal behavior research (Eggert, Thompson, & Herting, 1994; Rich et al., 1992; Rubenstein et al., 1989). The HS shows high internal consistency with a reliability coefficient of $r_\alpha = .93$. Concurrent validity was determined through a clinical interview assessing hopelessness and negative expectancies. The resulting concurrent validity coefficient was at an acceptable level of $r = .74$.

Social-Environmental Factors.

Life Events List—Revised (LEL-R). The LEL-R is a revision of Gersten, Langer, Eisenberg, and Orzeck's (1974) Life Events List developed by Reynolds (1982). The LEL-R consists of 16 items that assess major negative life events (i.e., parental separation or divorce, breaking up with girlfriend/boyfriend, severe illness of a parent, etc.). The initial version of the LEL was scored in a dichotomous manner with each event scored as either having or not having occurred. As revised by Reynolds (1982), the item responses are scored on a 6-point (0–5) Likert-type scale based on the recency of the event, with a rating of 5 given to the most recent events and a 0 rating for those events that have not occurred. The revision of this measure is predicated on the assumption that more recent events cause more stress for the individual and, with increased time, the potential effects of the event would decline. The scale was slightly revised at Time 2 to include two additional items. Research with the 18 item LEL-R by Reynolds and Waltz (1986) showed satisfactory internal consistency at $r_\alpha = .71$ using Cronbach's alpha (Cronbach, 1951). Although the alpha coefficient is below the traditional acceptability level of .80 (Anastasi, 1988), some of the items are low frequency events, which may explain the lower than expected alpha coefficient.

Adolescent Hassle Inventory (AHI). The AHI (Reynolds & Waltz, 1984a) was designed to measure discrete minor events and chronic stressors in adolescents. Discrete minor events are those negative events that, although considered stressful, are not associated with major life changes and may occur either infrequently or on a relatively frequent basis. Chronic stressors are undesirable conditions, difficult relationships, and negative ongoing social situations that occur almost every day (Pearlin & Schooler, 1978), but that, individually, are of significantly less severity than major negative life events. The AHI consists of 32 true-false items at Time 1 and was revised to 31 items at Time 2 with the deletion of an item with very low endorsement proportions. Items were originally selected from the domains of adolescent hassles with school, parent/family, jobs, friends, and personal matters, and were written to avoid overlap with major negative life events. Research with the 32 item AHI by Reynolds and Waltz (1986) showed a reliability coefficient of $r_\alpha = .86$.

Adolescent Support Inventory (ASI). The ASI was developed by Reynolds & Waltz, (1984b; 1986) to assess adolescent social support. The ASI is comprised of 16 true-false items that assess perceived social support by the adolescent. The items on the ASI examine social support provided by peers, teachers, friends, family members, and others who are likely to be in contact with adolescents. The ASI shows acceptable internal consistency reliability with an alpha coefficient of $r_\alpha = .81$ (Reynolds & Waltz, 1986). The items on the ASI were merged with the items on the AHI to form one questionnaire.

Procedures

Data were collected through the use of self-report measures completed by participants as part of an annual schoolwide mental health screening program (see Reynolds, 1986, for general descriptions of

screening procedures). Self-report measures were administered by the teachers to students in their respective classrooms. Teachers were informed of the data collection procedures approximately 2 weeks prior to the assessment by the second author (WMR) and also were provided with detailed instructions for administration of the questionnaires (see Reynolds, 1987, 1988, for teacher administration guidelines). Students were tested over 2 consecutive years on the same measures. Assessments occurred during the month of November. Students who did not complete the measures for both years or who had invalid responses during one of the years were not included in this current investigation. The schoolwide screening took place in the morning during the second or third period of the school day. The screening battery took approximately 40 minutes to complete.

The mental health screening procedures used in this investigation were approved by the school board of the city in which the study took place. The mental health screening was part of an annual school-directed procedure that had been integrated into the high school curriculum for identifying students who may be at risk for depression, suicide, or both. Parents were notified by the school prior to the screening and had the option to exclude their child from participating. Because the primary purpose of the assessment was the identification of at-risk school-based adolescents, students' names were used on the measures as part of the identification process. Parents of students who were identified as at risk for depression and/or suicidal behavior were informed of their youngster's risk status by school personnel, provided with sources for psychological assistance and urged to contact community counselors or psychologists to obtain services for their child. The procedure used in this investigation was also approved by the University of Wisconsin-Madison School of Education Human Subjects Ethics Review Committee.

Data Analyses

Data analyses were conducted using version 6 of SPSS[®] for Windows[™] (SPSS, 1993). Zero-order correlation coefficients were calculated separately for each gender on the longitudinal and change score analyses to examine the relationship of each predictor to suicidal ideation. For the longitudinal analyses, male and female participants' scores on independent measures of depression, hopelessness, social support, hassles, and negative life events at Time 1 were correlated with participants' suicidal ideation scores at Time 2. A similar set of analyses was conducted with the change scores between Time 1 and Time 2. In the latter set of analyses, the correlation between change scores on the psychological and social-environmental independent variables and the residual change score in suicidal ideation were computed. The residual change score was determined by examining the predictive value of suicidal ideation at Time 1 to the suicidal ideation scores at Time 2, thus accounting for the correlation between Time 1 and Time 2 suicidal ideation scores. The Type I error rate for each set of analyses was set at an alpha level of .05.

Multiple regression analyses with all independent variables entered simultaneously were conducted to examine the unique contribution of each predictor while controlling for the relationship of the other independent variables. This type of regression design accounted for the issue of multicollinearity, given that the independent variables are moderately correlated. The multiple regression analyses were conducted separately for each gender. The longitudinal analyses were conducted using suicidal ideation scores at Time 2 as the dependent variable and scores on the Time 1 measures of depression, hopelessness, social support, daily hassles, and negative life events as the independent variables. The regression analyses examining change scores used the residual change score of suicidal ideation as the dependent variable and the

difference scores (Time 1 - Time 2) for the psychological and social-environmental measures as the independent variables. In the regression analyses, the overall amount of explained variance due to the five independent variables was represented by the R^2 coefficient. Given the issue of multicollinearity, the focus of the regression analyses was on the standardized beta coefficients (β), which represent the unique contribution of each predictor with the others partialled-out (Marascuilo & Serlin, 1988); t tests were used to determine if the unique contribution was significant. To examine gender differences on the independent variables that showed a significant unique contribution to the dependent variable, a test between beta coefficients was conducted.

For each multiple regression analysis, five directional planned comparisons were conducted. Directional predictions were based on previous research conducted with these variables (Adams et al., 1994; Cole, 1989; De Wilde et al., 1992; Lewinsohn et al., 1993; Pinto & Whisman, 1996; Reynolds, 1987, 1988; Wagner et al., 1995). Higher scores on the psychological variables of depression and hopelessness and the social-environmental measures of negative life events and hassles were hypothesized to be significantly related to higher scores on the measure of suicidal ideation. Because social support was scored in a positive direction it was hypothesized that lower scores on the measure of social support would be significantly related to higher levels of suicidal ideation, resulting in a negative relationship.

Preliminary regression analyses were completed in order to conduct a test of parallelism to determine if the sample could be divided according to gender (Marascuilo & Levin, 1983). The test of parallelism was conducted for both the change score and longitudinal analyses. The test of parallelism was based on the unique contribution of the product terms created by multiplying each independent variable by gender (dummy coded) to scores on the measure of suicidal ideation.

RESULTS

Participant Characteristics on Dependent and Independent Variables and Inferential Statistics

The means and standard deviations for the dependent and independent variables of suicidal ideation, depression, hopelessness, negative life events, hassles, and social support, at Time 1, Time 2, and their change scores (Time 1 - Time 2) for males and females are presented in Table 1. Gender differences on each variable were examined using independent *t*-tests with a corrected alpha level set at .0056 (.10/18) for each comparison. The results of the *t*-tests along with the respective effect-size statistics (*d*) are also presented in Table 1. Gender differences were found among

three of the six variables: depression, daily hassles, and suicidal ideation. At the initial assessment, gender differences were found in depression and suicidal ideation, with females scoring significantly higher. Negative life events at Time 1 showed a trend, $t(372) = -2.60, p < .01$ with females scoring higher than males, although this difference was not statistically significant at the adjusted alpha level of .0056. At Time 2, depression and suicidal ideation continued to show significant gender differences as did daily hassles, again with females scoring higher on these measures. None of the variables showed significant gender differences in their change scores, although daily hassles showed a trend, $t(372) = -2.46, p < .014$, with males reporting a somewhat greater reduction in daily hassles compared to females over the 1-year period. The number of participants

TABLE 1
Male and Female Mean and Standard Deviations of Scores
at Time 1, Time 2, and Change Score (T1 - T2)

Scales	Males		Females		<i>t</i> ^a	<i>p</i> <	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
RADS-T1	55.29	12.01	61.44	14.13	-4.49*	.001	.47
RADS-T2	51.53	13.29	59.16	14.61	-5.25*	.001	.55
Mean score change ^b	3.76	11.41	2.28	14.06	1.10	.272	.11
HS-T1	4.29	3.49	4.09	3.81	.52	.606	.05
HS-T2	3.73	3.56	3.75	3.26	-.06	.955	.01
Mean score change ^b	.56	3.24	.34	3.85	.58	.561	.06
AHI-T1	42.45	5.97	43.16	5.98	-1.15	.250	.12
AHI-T2	38.10	5.21	40.12	5.69	-3.56*	.001	.37
Mean score change ^b	4.35	4.77	3.04	5.39	2.46	.014	.26
ASI-T1	28.73	2.93	29.04	2.90	-1.03	.303	.11
ASI-T2	29.45	2.60	29.59	2.22	-.56	.573	.06
Mean score change ^b	-.72	2.91	-.55	2.54	-.61	.543	.06
NLE-T1	13.97	10.19	16.96	11.81	-2.60	.010	.27
NLE-T2	12.84	11.80	15.00	11.24	-1.81	.071	.19
Mean score change ^b	1.13	11.62	1.96	11.01	-.71	.477	.07
SIQ-T1	12.72	16.85	21.41	30.48	-3.33*	.001	.35
SIQ-T2	9.50	13.17	16.71	22.65	-3.68*	.001	.38
Mean score change ^b	3.22	17.20	4.70	5.46	-.65	.519	.07

Note. RADS = Reynolds Adolescent Depression Scale, HS = Hopelessness Scale, ASI = Adolescent Support Inventory, AHI = Adolescent Hassle Inventory, NLE = Negative Life Events, SIQ = Suicidal Ideation Questionnaire.

^a*t* test (male mean - female mean) $df = 372, *p < .005, d = \frac{t(n_1 + n_2)}{\sqrt{df} \sqrt{n_1 n_2}}$.

^bChange in mean score (T1 - T2).

identified as at risk based on their SIQ scores at Time 1 was 9.4% (35) while 4.8% (18) were identified as at risk at Time 2.

Zero-Order Correlations

Longitudinal Analyses. The results of the zero-order correlation analyses examining the relationship of the psychological and social variables at Time 1 with suicidal ideation at Time 2 for males and females are presented in Table 2. For males, four of the five independent variables showed a significant relationship to suicidal ideation scores 1 year later, with correlation coefficients ranging from $r(170) = .25$ to $.41$. Social support was the only variable that was not significant, $r(170) = -.09$, $p > .10$, in its relationship with suicidal ideation. For females, all five psychological and social-environmental measures completed at Time 1 were significantly ($p < .01$) related to suicidal ideation scores 1

year later, with correlation coefficients (absolute value) ranging from $r(200) = .25$ to $.40$. The negative correlation coefficient for social support was a function of the ASI being scored in a positive direction.

Change Score Analyses. The results of the zero-order correlation analyses of the change scores of the psychological and social-environmental measures to the residual change in suicidal ideation are presented in Table 3 for males and females. For males, change scores on depression, hopelessness, daily hassles, and social support were significantly related to the residual changes in suicidal ideation scores. The nonsignificant change score variable was negative life events. Similarly, female change scores on depression, hopelessness, daily hassles, and social support were significantly related to the residual change score in suicidal ideation, with the nonsignificant variable being negative life events.

TABLE 2
Summary of Multiple Regression Analyses of Time 1 Psychosocial Variables as Independent Variables and Suicidal Ideation at Time 2 as Dependent Variables for Male and Female Samples

Variable	r^a	B	SE B	β	t^b	$p <$
Male						
Depression	.37**	.166	.107	.151	1.55	.062
Hopelessness	.25**	.059	.340	.015	.17	.432
Daily hassles	.41**	.487	.219	.221	2.23*	.014
Social support	-.09	.145	.350	.032	.41	.339
Negative life events	.35**	.238	.103	.184	2.31*	.011
Multiple $R = .460$, $F(5,166) = 8.89$, $p < .0001$, $R^2 = .211$						
Female						
Depression	.40**	.248	.150	.155	1.65*	.050
Hopelessness	.35**	.382	.520	.064	.73	.232
Daily hassles	.37**	.574	.370	.151	1.55	.061
Social support	-.38**	-1.655	.597	-.212	-2.77**	.003
Negative life events	.25**	.025	.163	.013	.15	.440
Multiple $R = .473$, $F(5,196) = 11.26$, $p < .0001$, $R^2 = .223$						

^aZero order correlation coefficients.

^bThe t tests and associated p values are for the beta coefficients.

* $p < .05$. ** $p < .01$.

TABLE 3
Summary of Multiple Regression Analyses with Changes in Psychosocial Variables as Independent Variables and the Residual Changes in Suicidal Ideation as Dependent Variables for Male and Female Samples

Variable	r^a	B	SE B	β	t^b	$p <$
Male.						
Depression	.38**	.408	.090	.374	4.56**	.001
Hopelessness	.20**	.488	.294	.127	1.66*	.050
Daily hassles	.18**	.107	.218	.041	.49	.315
Social support	-.13*	.334	.348	.078	.96	.170
Negative life events	.05	-.028	.081	-.026	-.35	.370
Multiple $R = .404$, $F(5,166) = 6.47$, $p < .0001$, $R^2 = .163$						
Females						
Depression	.45**	.447	.108	.339	4.15**	.001
Hopelessness	.43**	1.290	.383	.268	3.37**	.001
Daily hassles	.20**	-.093	.256	-.027	-.37	.358
Social support	-.16**	.504	.509	.069	.99	.167
Negative life events	.06	-.044	.110	-.026	-.40	.345
Multiple $R = .501$, $F(5,196) = 13.16$, $p < .0001$, $R^2 = .251$						

^aZero-order correlation coefficients.

^bThe t tests and associated p values are for the beta coefficients.

* $p < .05$. ** $p < .01$.

Regression Analyses

Preliminary Analysis of Gender Differences: Test of Parallelism. The difference between slopes from the regression analyses for males and females for the longitudinal analyses, that is, the psychological and social-environmental variables with suicidal ideation scores 1 year later, was significant, $F(5,362) = 2.67$, $p < .02$. Likewise, the test of parallelism examining gender differences for the change score analyses was also significant, $F(5,362) = 3.82$, $p < .002$. These results support separate multiple regression analyses for males and females to examine the relationship of the psychological and social-environmental variables to suicidal ideation.

Longitudinal Analyses. The results of the multiple regression analyses examining the relationship between depression, hopelessness, social support, daily hassles, and negative life events at Time 1 and suicidal ideation scores at Time 2 for

males and females are presented in Table 2. These results showed significant overall R 's for males, $R(5, 166) = .460$, $p < .0001$, and females, $R(5, 196) = .473$, $p < .0001$. For males, an examination of the beta coefficients indicated that major negative life events and daily hassles were significantly related to suicidal ideation scores 1 year later, $\beta = .18$, $t(166) = 2.31$, $p < .011$ and $\beta = .22$, $t(166) = 2.23$, $p < .014$, respectively. Depression at Time 1 demonstrated a trend, $\beta = .15$, $t(166) = 1.55$, $p < .062$, and approached significance in its relationship with future suicidal ideation. In females, social support and depression at Time 1 had significant unique contributions to the prediction of suicidal ideation scores at Time 2, $\beta = -.21$, $t(196) = -2.77$, $p < .003$ and $\beta = .16$, $t(196) = 1.65$, $p < .05$, respectively. Daily hassles at Time 1 showed a trend, $\beta = .15$, $t(196) = 1.55$, $p < .061$, to the prediction of suicidal ideation at Time 2.

Change Scores Analyses. The results of the multiple regression analyses examining

the change scores for males and females are presented in Table 3. Similar to the longitudinal results, the overall R s for males and females were significant, $R(5, 166) = .404$, $R^2 = .163$, $p < .0001$, and $R(5, 196) = .501$, $R^2 = .251$, $p < .0001$, respectively. For males, changes in depression and hopelessness showed significant unique contributions (standardized beta coefficient) to the residual change in suicidal ideation, $\beta = .37$, $t(166) = 4.56$, $p < .001$ and $\beta = .12$, $t(166) = 1.66$, $p < .050$, respectively. Similarly, changes in depression and hopelessness for females accounted for significant unique contributions to residual changes in suicidal ideation, $\beta = .34$, $t(196) = 4.15$, $p < .001$ and $\beta = .27$, $t(196) = 3.37$, $p < .001$, respectively. The unique contribution of the changes in the social-environmental variables (negative life events, hassles, and social support) in relation to changes in suicidal ideation were not significant for males and females. To further examine the relationship of changes in hopelessness to the residual changes in suicidal ideation for males and females, a test of the beta coefficients was conducted. The result of this test indicated that the contribution of changes in hopelessness to the residual changes in suicidal ideation were not significantly different between males and females, $\beta = -.33$, $t(366) = -.87$, $p = ns$.

DISCUSSION

Over the past decade, a number of studies have been conducted that examined concurrent relationships between suicidal ideation and depression, hopelessness, major life events, hassles, and social support in adolescents. The current study was conducted to examine the longitudinal relationship of five psychological and social-environmental variables with adolescent suicidal ideation over a 1-year time period. This was accomplished by examining the relationship of the change scores of the psychological and social factors to changes in suicidal ideation, and by examining the initial scores on psychological and social

factors in relation to severity of suicidal ideation 1 year later. Of interest were the gender-specific relationships of these variables to suicidal ideation in males and females.

The change score analyses provided evidence that, in males, changes in depression and hopelessness scores were related to the residual changes in suicidal ideation, even with the contribution of the social-environmental factors removed. Similarly, changes in depression and hopelessness scores for females were also significantly related to the residual changes in suicidal ideation. Although the statistical design and a number of predictors in this study were different, these results are consistent with those reported by Cole (1989), in that depression was related to suicidal ideation scores for both males and females when hopelessness was statistically controlled. However, Cole reported that hopelessness was related to suicidal ideation scores for females but not for males when depression was statistically controlled; this study found that changes in hopelessness were related to changes in suicidal ideation for males and females. Although the social-environmental variables were not significant in the change score analyses, their unique contributions were evident in subsequent suicidal ideation scores for males and females.

Lewinsohn et al. (1993) did not find hopelessness to be a significant predictor of suicidal behavior when controlling for depression, although they did not examine gender-specific relationships. In the current investigation, the unique contribution of changes in depression were highest for both males and females in relation to the residual changes of suicidal ideation. In addition, changes in hopelessness were related to changes in suicidal ideation, above and beyond that accounted for by changes in depression. These findings suggest that changes in depression as well as changes in hopelessness are important risk factors for males and females who are experiencing suicidal ideation.

The longitudinal results suggest that in adolescents, suicidal ideation 1 year later

is relatively difficult to predict from prior levels of depression, hopelessness, major life events, hassles, and social support. The results show that the social-environmental variables had the greatest unique relationship to suicidal ideation 1 year later. Although depression and hopelessness scores were related to current severity of suicidal ideation (zero-order correlations), which is consistent with numerous other studies (Cole, 1989; Lewinsohn et al., 1993; Pfeffer et al., 1991; Reynolds & Mazza, 1990, 1992a; Smith & Crawford, 1986), they were relatively weak in the multivariate prediction of future levels of suicidal cognitions 1 year later when levels of social support and stressors were also examined. These findings are similar to the results of the Reifman and Windle (1995) 6-month longitudinal study, where hopelessness did not predict future suicidal ideation and depression showed a weak relationship with suicidal ideation.

The longitudinal findings reported in this study also illustrate the difficulty in predicting future suicidal ideation levels in adolescents. Although the five psychological and social-environmental variables at the initial assessment individually showed significant relationships to suicidal ideation scores 1 year later, their combination accounted for less than 23% of the explained variance in severity of suicidal ideation for either males or females. The longitudinal results also support the position of mental health professionals who suggest that predicting suicidal behavior from related risk factors is an extremely difficult and generally inaccurate undertaking (Addy, 1992; Pokorny, 1992).

Limitations

There are several limitations in this study that need to be addressed when interpreting the results. First, because the design of this study was longitudinal, it only included adolescents who completed the assessment measures at both Time 1 and Time 2. Thus, students who were assessed

at Time 1 but who dropped out of school or moved before the Time 2 assessment were not included in the study. However, it should be noted that the mean SIQ score of the 374 youngsters in the current study was similar to that reported by Reynolds (1988) for the SIQ standardization sample.

A second limitation is that, based on the SIQ normative information (Reynolds, 1988), 91% of the sample did not manifest a clinical level of suicidal ideation at Time 1. Thus, a high proportion of the sample was expected to score relatively low on the measures, reducing the variability. In this regard, one may consider the resultant relationships somewhat attenuated by a restriction of range among the dependent as well as independent variables. However, from a practical standpoint, the results reported can be viewed as indicative of an outcome based on a sample selected from the general population of adolescents. Although different results may be found between the set of independent variables and suicidal ideation in a clinical sample of adolescents, the problems of suicidal ideation and suicidal behaviors are also significant among adolescents from the general population (Reynolds & Mazza, 1994).

Another limitation was that some of the adolescents who were identified as being at risk at Time 1 may have received treatment or therapy prior to the Time 2 assessment. Because the purpose of the screening measures was to identify adolescents at risk for mental health problems, it is reasonable to assume that some adolescents who were identified as "at risk" at Time 1 received some type of treatment or psychological services. Because of ethical considerations related to participant confidentiality, we were not able to ascertain the between-assessment treatment status of participants. It is possible that the results of the longitudinal analyses may be an underestimation of the true relationships among variables. However, if data on participants' treatment status were available, it would have been difficult to ascertain the efficacy of such treatment, particularly after 1 year.

Suggestions for Further Research

The longitudinal design of this study was useful in examining the relationship of the five psychological and social factors to suicidal ideation from a developmental psychopathology perspective. The variables examined in this study, two psychological and three social-environmental factors, have demonstrated consistent relationships with suicidal ideation and behavior in previous research. However, these variables are not exhaustive of the characteristics and factors that may exacerbate or contribute to the ontogenesis of suicidal behaviors. Future research should include other variables, such as alcohol and drug abuse (Brent, 1989; Reifman & Windle, 1995; Vegas et al., 1993), that are related to adolescent suicidal behavior. Likewise, it would be useful to extend such research over multiple years to provide more information regarding the developmental processes specific to suicidal cognitions and to adolescent psychopathology.

The design of this study was exploratory, examining the unique relationships of psychological and social factors to changes in suicidal ideation as well as severity of suicidal cognitions 1 year later. Future research can use these findings as a starting point for developing models and examining causal links among the variables through structural equation modeling or path analysis. Results from this type of research would provide a theoretical framework in helping to understand the psychopathology processes by which male and female adolescents develop suicidal ideation.

The multiple regression procedures used in this investigation and the focus on prediction of suicidal ideation in adolescents points to the need for cross-validation. As noted by Wiggins (1973), in "multivariate-prediction" studies there is a need to cross-validate the weights of the predictors to criterion variable in a similar sample. Cross-validation research should include multiple measures and methods for assessing suicidal ideation. Thus, the

results of this investigation should be viewed as somewhat sample specific, although providing a basis for comparison of future longitudinal research.

It is also important to note that in interpreting the results of the longitudinal and change score analyses of this study, the complexity of the multivariate design needs to be kept in mind. The significant independent variables are those predictors that show a significant relationship to the dependent variable with the contribution of the other variables removed. For example, in examining the relationship of depression with suicidal ideation we are investigating the relationship of partial depression, because the overlap of hopelessness, social support, negative life events, and hassles with depression has been removed.

SUMMARY

Overall, the results of the current study revealed important gender-specific relationships of psychological and social-environmental factors in the prediction of suicidal ideation in male and female adolescents. The differential predictability of independent variables with suicidal ideation as a function of gender suggests that gender is an important factor in the prediction of suicidal ideation in adolescents. As shown, suicidal ideation in adolescent males and females was affected by different psychological and social-environmental variables over time. The longitudinal results also underscore the difficulty of trying to predict suicidal behaviors from scores on measures of related factors. It is suggested that future research regarding suicidal ideation should conduct analyses separately for males and females in order that gender-specific relationships are not overlooked.

Research such as that presented here is important for enhancing our understanding of factors that may contribute to the development of suicidal behaviors in young people. In addition, continued longitudinal research is important for the de-

velopment of contemporary models of suicidal behavior in adolescents. With further research and the examination of additional variables that may have direct or mediating effects on male and female suicidal behavior, confirmatory procedures may be used to evaluate these formal models and provide a better understanding of the developmental psychopathology of male and female adolescent suicidal behavior.

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