

# Peer Contagion of Depressogenic Attributional Styles Among Adolescents: A Longitudinal Study

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This study examined longitudinal associations between adolescents' and their friend's depressive symptoms and depressogenic attributional style. Participants included 398 adolescents in grades six through eight at the outset of the study. Adolescents completed peer nominations to identify reciprocated and unreciprocated best friendships as well as measures of depressive symptoms and depressogenic attributional style at an initial time point, and again 11 months later. Results revealed that best friends' reported level of depressive symptoms was prospectively associated with adolescents' own depressive symptoms and with adolescents' depressogenic attributional style. Moderator effects suggested that friends' attributional styles were prospectively associated with adolescents' own attributional styles for those involved in reciprocated friendships. Lastly, findings offered preliminary support for adolescents' Time 2 depressive symptoms as a mediator of the association between friends' depressive symptoms and adolescents' attributional style. Findings have important implications for cognitive and interpersonal models of adolescent depression, as well as the study of peer contagion effects.

**KEY WORDS:** depression; friendship; attributional style.

Investigations of cognitive theories of depression among adolescents have now yielded substantial evidence to suggest that individuals' attributional style can contribute significantly to the development of depressive symptoms (Abramson, Metalsky, & Alloy, 1989; Hankin & Abramson, 2001). Specifically, studies have revealed that the tendency to attribute negative life events to internal, global, and stable causes, and positive events to external, specific, and unstable causes (i.e., a depressogenic attributional style) is significantly associated with adolescents' depression (see Gladstone & Kaslow, 1995; Joiner & Wagner, 1995 for reviews) and can predispose individuals to future depressive symptoms in the event of stressful circumstances (e.g., Abela, 2001; Hankin, Abramson, & Siler, 2001; Panak & Garber, 1992; Prinstein & Aikins, 2004). Thus, recent work has emphasized a need to iden-

tify possible antecedents of a depressogenic attributional style that might be targeted in preventive intervention efforts. A focus on potential gender differences in the examination of antecedents of attributional style is especially important given girls' greater cognitive vulnerability to depression in adolescence (Hankin & Abramson, 2001) and the dramatic increases in depressive symptoms that emerge among girls during this developmental period (Hankin et al., 1998).

Few prior studies have examined antecedents of adolescents' depressogenic attributional style. To date, only three sets of predictors have been explored. Consistent with hopelessness theories of depression, one of these antecedents is depressed affect itself. Garber, Keiley, and Martin (2002) revealed that initial levels of youths' depressed affect are prospectively associated with increasing trajectories of youths' depressogenic attributional style over a 6-year period (see also Nolen-Hoeksema, Girgus, & Seligman, 1992). A second area of research has suggested that negative life events or adverse circumstances in childhood may contribute to the development of a depressogenic attributional style in adolescence. For example, evidence from both retrospective and prospective studies

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has revealed that a history of physical/emotional/sexual maltreatment, emotionally manipulative parenting, or major life stressors is associated with a depressogenic attributional style in adolescence and young adulthood (Crossfield, Alloy, Gibb, & Abramson, 2002; Garber & Flynn, 2001; Gibb, 2002; Gibb, Abramson, & Alloy, 2004; Gibb, Alloy, Abramson, & Marx, 2003; Gibb et al., 2001; Rose & Abramson, 1992).

A third area of research examining antecedents of a depressogenic attributional style has explored the transmission of depressive cognitions (or symptoms) within significant interpersonal relationships. Studies examining this contagion hypothesis propose that individuals may be particularly likely to develop a depressogenic attributional style or depressive symptoms through interactions with significant others who exhibit high levels of depressive cognitions or symptoms. For instance, past work has provided evidence for synchrony in the timing of mothers' and children's depressive episodes (Hammen, Burge, & Adrian, 1991) as well support for mothers' depressive symptoms as prospective predictors of adolescents' depressive symptoms and attributional styles (Downey & Coyne, 1990; Garber & Flynn, 2001; Hammen & Brennan, 2001; Jaenicke et al., 1987). The adult psychopathology literature provides evidence for the contagion of depressive symptoms within college roommate dyads (Joiner, 1994) and correlations between the level of depressive symptoms among spouses (Tambs, 1991). Social psychological studies using experimental paradigms also have provided evidence for contagion of sad affect among unfamiliar dyads of young adults (e.g., Strack & Coyne, 1983).

The present study focuses specifically on the potential contagion of depressive symptoms and cognitions between adolescents and their peers. The study of contagion effects offers an important direction for research on antecedents of a depressogenic attributional style not only because this provides a possible target for preventive interventions (i.e., by addressing the reinforcement of depressive cognitions from significant others), but also to understand the synergy between cognitive and interpersonal factors that poses increased risk for depressive symptoms in adolescence.

Theory and research suggest that significant increases in depressive symptoms and cognitive vulnerability that occur at the transition to adolescence are likely related, in part, to substantial interpersonal transitions also occurring at this developmental stage, particularly among girls (Cyanowski, Frank, Young, & Shear, 2000; Hankin & Abramson, 2001; Rudolph & Hammen, 1999). This critical developmental period is characterized by significant increases in the frequency of youths' contact with peers, increased autonomy from parents, and experimentation

with new roles and experiences in the peer context (Brown, 1990; Rudolph & Hammen, 1999). Given these changes, adolescents' interactions with peers may provide a unique context for the potential transmission of depressive symptoms and depressogenic attributional styles; however, this hypothesis rarely has been examined. As compared to children, adolescents establish friendships that are characterized by high levels of intimacy and emotional disclosure, particularly among girls (Buhrmester & Furman, 1987; Furman & Buhrmester, 1992). Adolescents also are especially likely to rely on peers as sources of social support during times of stress (Harter, Stocker, & Robinson, 1996), and thus opportunities to discuss life stressors and relevant attributions are numerous (Rose, 2002). Research also suggests that susceptibility to peer influence increases at this developmental period as many adolescents crave conformity and acceptance within the peer group and use peer interactions as a basis for reflected appraisal of their own self-worth (Brown, 1990).

Indeed, substantial evidence demonstrates that adolescent adjustment is strongly associated with the social-psychological adjustment of their closest friends. Effects of peer contagion have been revealed in the study of adolescents' delinquency, illegal behavior, aggression, and a host of health risk behaviors, including substance use, sexual risk behavior, general risk behavior, and suicidality (e.g., Kandel, 1996; Prinstein, Boergers, & Spirito, 2001; Prinstein, Meade, & Cohen, 2003; Urberg, Degirmencioglu, & Pilgrim, 1997; Vitaro, Tremblay, Kerr, Pagani, & Bukowski, 1997; Wills & Cleary, 1999). Findings have revealed that adolescent peer contagion is not only due to selection of friends with similar social-psychological characteristics (i.e., selection effects), but also to socialization effects (Kandel, 1978). Although the mechanisms responsible for socialization effects remain largely unknown, results have demonstrated that characteristics of adolescents' friends are significantly and prospectively associated with increases in adolescents' own symptoms and behaviors (e.g., Keenan, Loeber, Zhang, Stouthamer-Loeber, & Van Kammen, 1995).

Some evidence is available to suggest that peer-contagion effects may apply to the homophily of internalizing symptoms (e.g., depression) specifically. Several studies have revealed that among adults, depressed individuals are particularly likely to select other depressed individuals as friends and respond more favorably to social interactions that involve a similarly depressed partner (Rosenblatt & Greenberg, 1988, 1991). Evidence for a socialization effect within youth samples has been provided in a recent study examining peer cliques (Hogue & Steinberg, 1995). Findings revealed that adolescents' own "internalizing distress" was predicted longitudinally

by the average level of internalizing distress within their friendship group.

The current study was designed to extend findings regarding antecedents of a depressogenic attributional style, as well as research regarding the effects of peer contagion, by examining associations between adolescents' and their best friends' attributional style and depressive symptoms. The focus on adolescents' best friends allowed for a study of depressogenic attributional style antecedents that relied on external reporters (i.e., best friends). This study also utilized a prospective, longitudinal design among adolescents who were at the critical developmental stage during which cognitive vulnerabilities to depressive symptoms may emerge.

To replicate and extend findings reported by Hogue and Steinberg (1995), an initial hypothesis suggested that best friends' depressive symptoms and attributional style would be prospectively associated with adolescents' own depressive symptoms. It also was predicted that best friends' depressive symptoms and attributional style would be prospectively associated with adolescents' own depressogenic attributional style. To provide a stringent test of these hypotheses, the incremental contributions of friends' depressive symptoms and attributions were examined after controlling for adolescents' initial levels of depressive symptoms and attributional styles as predictors. The potential effects of friends' depressive symptoms and attributional styles were examined simultaneously to determine whether each contributed uniquely to adolescents' own functioning. As a marker of sad affect or low levels of positive reinforcement within friendships, friends' depressive symptoms may be most relevant as an agent of contagion between friends. As an indicator of friends' potential reinforcement of maladaptive cognitions, friends' attributional styles may be a more relevant predictor of adolescents' own functioning.

Two potential moderators of these predicted contagion effects were examined. Consistent with prior findings regarding greater similarities between mutual (i.e., reciprocated) as compared to unilateral (i.e., unreciprocated) friends (e.g., Haselager, Hartup, van Lieshout, & Riksen-Walraven, 1998; Kandel, 1978; Lea, 1979), it was hypothesized that friendship reciprocity would be a significant moderator of the association between adolescents' and their friends' depressive symptoms. Stronger associations among reciprocal friends might be due to higher levels of friendship quality and increased opportunities for interaction and disclosure than among unreciprocated friends (Parker & Asher, 1993). Gender was examined as a second moderator. Research and theory indicate that girls are not only at greater risk for developing depressive symptoms and cognitive vulnerabilities during the transi-

tion to adolescence, but also may exhibit unique behaviors that are especially likely to contribute to the contagion of depressive symptoms and depressogenic attributions within close friendships (e.g., co-rumination; Rose, 2002; see below). Moreover, girls are more likely to develop reciprocated friendships than boys (Parker & Asher, 1993). Thus, it was anticipated that gender and friendship reciprocity may be competing moderators that explain similar variance in peer contagion.

In addition to an examination of the presence of potential contagion effects, this dataset also offered an opportunity to examine mediator models, helping to elucidate the direction of effects involved in the contagion of depressive symptoms and attributional styles. An initial model suggested that best friends' depressive symptoms and/or attributional styles might exert a direct influence on adolescents' own attributional style, with indirect implications for adolescents' own depressive symptoms (i.e., a 'cognitive influence model'). In other words, it was anticipated that the association between best friends' depressive symptoms (or attributional style) and adolescents' own depressive symptoms would be mediated by adolescents' own depressogenic attributional style.

Recent research regarding unique depression-related friendship behaviors, particularly among adolescent girls, offers compelling evidence for the effects of best friends' depressive symptoms and/or cognitions on adolescents' attributional styles directly. Rose (2002) indicates that high levels of friendship quality are positively associated with repeated discussions of interpersonal ambiguities and excessive self-disclosure between friends (i.e., referred to as "co-rumination"). Co-rumination is more commonly reported among girls than boys, and is a significant mediator of the gender disparity in the prevalence of adolescent internalizing symptoms (Rose, 2002). Through co-rumination, best friends have an opportunity to explicitly discuss attributions of interpersonal events; thus, direct effects of friends' depressive symptoms or attributional styles on adolescents' own depressive attributional style may be especially likely, and may explain the transmission between the level of depressive symptoms among adolescents and their best friends.

An alternate mediator model suggests an indirect contagion effect of depressive attributions via depressive symptoms. Specifically, it may be that best friends' depressive symptoms and/or attributional styles are associated longitudinally with adolescents' depressive symptoms, and adolescents' symptoms serve as a proximal antecedent to their own subsequent depressive cognitions.

Several possible theoretical models may be relevant for understanding this potential 'symptom influence model.' Research in social psychology demonstrates that

individuals' depressed affect increases through interactions with others who exhibit sad affect, as would be predicted by social learning theories (Strack & Coyne, 1983). Symptoms of depression also might be potentially transmitted between friends through mutual interactions that lack sufficient positive reinforcement or adaptive social support (Lewinsohn, 1974). Although these symptom and cognitive influence models might best be explored over three or more time points, prospective analyses of depressive symptoms and cognitions as both predictors and/or mediators in this study offers a preliminary opportunity to examine directions of effect between two inter-related constructs and explore mechanisms that might explain peer contagion.

## METHOD

### Participants

Participants included 398 children and adolescents (48% female) in grades six (36%), seven (27%), and eight (37%) at the outset of the study. All participants were between the ages of 11 and 14 years old,  $M = 12.70$ ;  $SD = .95$ . The ethnic composition of the sample included 87% White/Caucasian, 2% African-American, 4% Asian-American, 2% Latino-American, and 6% of participants from multi-ethnic backgrounds. At Time 1, participants were enrolled in one middle school within a city of fairly homogeneous middle-class socioeconomic status. According to school records, 11% of children were eligible for free/reduced-fare lunch.

At the outset of the study all sixth, seventh, and eighth grade students were recruited for participation (i.e., approximately 300 students per grade). Consent forms were returned by 92% of families ( $n = 846$ ); of these, 80% of parents gave consent for their child's participation ( $n = 677$ ; 74% of the total population), and all but 52 of these children provided information at Time 1. Missing data were due to absenteeism during one of the days of testing ( $n = 35$ ), incomplete responses ( $n = 13$ ) and denial of assent to participate in the study ( $n = 4$ ).

Because a main focus of this study was to examine associations between adolescents' and their friends' depressive cognitions and symptoms, all analyses were restricted to adolescents who selected friends for whom data were also available. Of the 625 youth who participated at Time 1 of this study, 462 selected a best friend who was also a study participant. Chi-square and *t*-test analyses revealed no significant differences on any study variables between adolescents who did vs. did not select a best friend who was also a study participant. Of these 462 adolescents with available data, 20 selected a best friend

who also was selected by at least one other participant, thus 12 of these were deleted at random to ensure that friend's data were included only once in analyses.

Of these 450 adolescents, a total of 398 (88%) were available for testing 11 months later (i.e., Time 2), when students were in grades seven through nine. Ninth grade students had entered the local high school; however, no interactions by grade were revealed in analyses of main study hypotheses below. Attrition was due to participants moving away from the area ( $n = 36$ ), absenteeism ( $n = 7$ ), incomplete data ( $n = 9$ ), and five participants who refused to continue participation. Attrition analyses revealed no significant differences on any of the measures included in this study between the 398 adolescents in the final sample as compared to the remaining adolescents from the initial sample.

### Measures

#### *Depressive Symptoms*

The Children's Depression Inventory (CDI; Kovacs, 1992) is a 27-item questionnaire that assesses cognitive and behavioral depressive symptoms. A three-item response format is used, scored 0–2, in which children endorse statements that best describe their level of depressive symptoms in the previous 2 weeks. A summed score was computed with a higher score indicating a higher level of depressive symptoms. Good psychometric properties have been reported for the CDI as a reliable and valid index of depressive symptoms (Saylor, Finch, Spirito, & Bennett, 1984). In the present sample internal consistency was high (Time 1 and Time 2  $\alpha$ 's = .88).

#### *Attributional Style*

The 24-item version of the children's attributional style questionnaire (CASQ) was used as a measure of depressogenic attributional style at Time 1 and Time 2 (Thompson, Kaslow, Weiss, & Nolen-Hoeksema, 1998). This measure assesses three attributional dimensions (internal–external, stable–unstable, and global–specific) that have been associated with depression (Abramson et al., 1989). The CASQ lists 12 positive (e.g., athletic success, praise) and 12 negative (e.g., academic failure, interpersonal rejection) events; for each, adolescents are asked to select one of two possible causes. For both positive and negative events, a score of 1 was coded for each internal, stable, or global attribution, and a score of 0 was coded for each external, unstable, or specific attribution. Consistent with prior research (Panak & Garber, 1992; Seligman et al., 1984), a sum of attributions for negative

events was subtracted from a sum of attributions for positive events to derive a overall summary score, with lower total CASQ scores indicating higher levels of depressogenic attributional style. Results from the current sample suggested adequate internal consistency for this measure (i.e., Time 1 = .66; Time 2 = .73), consistent with previous investigations utilizing the CASQ (Garber et al., 2002; Gladstone & Kaslow, 1995; Robins & Hinkley, 1989).

### Friendship Selection

A peer nomination procedure was used to identify adolescents' closest friends at Time 1 (Parker & Asher, 1993). Adolescents were asked to select an unlimited number of their "closest friends" from a roster of grademates alphabetized by first name (or nickname, e.g., Bill/William, as indicated in focus groups), and from this list to select a "very best friend" as well as two additional "best friends." Adolescents' very best friend's scores on the CDI and the CASQ were used as a measure of friend's depressive symptoms and depressogenic attributional style, respectively.

The reciprocity of adolescents' very best friend selection was determined by examining mutual friendship nominations. Adolescents' very best friendship nomination was coded as a "reciprocal best friendship" if the peer selected as an adolescent's very best friend selected the adolescent as one of their best friends (i.e., among the top 3 closest friends) (Parker & Asher, 1993). Of the 450 adolescents at Time 1 for whom reciprocity data were available, 313 adolescents' (69%) very best friendship choices were "reciprocated best friendships" at Time 1. Of the remaining 137 adolescents, 93 adolescents (21% of the sample) selected a very best friend who selected the adolescent as a close friend, but not a best friend (i.e., not among the top 3 closest friends), and 44 adolescents (10% of the sample) selected a very best friend who did not select the adolescent as a friend at all. These relationships were coded as "reciprocal friendships" and "unreciprocated friendships," respectively.<sup>4</sup>

<sup>4</sup>In the friendship literature, reciprocal friendship coding is often used to determine the number of adolescents' reciprocated friendships. For these purposes, adolescents' second and third choice friend selections also might be referred to as "reciprocal best friends" if these peers reciprocated adolescents' nomination (e.g., Parker & Asher, 1993). This study focused specifically on associations between adolescents' and their very best friend's (i.e., only the number one closest friend's) psychological functioning, consistent with prior literature examining peer contagion effects. Thus, the use of the term reciprocal friendship in this study is not meant to capture the number of adolescents' reciprocal friendships, but rather to serve as an indicator of whether the peer that adolescents' selected as a very best friend (i.e., listed as the number one

**Table I.** Descriptive Statistics for Main Study Variables, Means and Standard Deviations ( $n = 398$ )

	Mean	SD	Observed range
Time 1 Variables			
Depressive symptoms	7.47	6.49	0–33.00
Attributional style	5.99	3.19	–6.00–12.00
Time 2 Variables			
Depressive symptoms	6.47	6.08	0–32.00
Attributional style	6.40	3.67	–5.00–12.00

\*  $p < .05$ .

Chi-square analyses revealed that boys were over-represented within the group of adolescents whose very best friend nominations were not reciprocated at all (i.e., "unreciprocated friendships"),  $\chi^2(2) = 12.82$ ,  $p < .001$ . No other significant differences emerged on any measures in this study between adolescents in reciprocal best friendships, reciprocal friendships, and unreciprocated friendships.

## RESULTS

### Preliminary Analyses

Means, standard deviations, and observed ranges for all primary variables are presented in Table I. As would be expected in this community sample, the prevalence of clinically significant levels of depressive symptoms (i.e.,  $t$ -scores above 63) was approximately 5% at both time points (Time 1 = 6.4%; Time 2 = 4.0%). Preliminary analyses revealed no gender or grade main effects in participants' reports of depressive symptoms or depressogenic attributional styles at Time 1 or Time 2. Two statistically significant grade  $\times$  gender interaction effects were revealed; however, neither accounted for a meaningful effect,  $\eta^2 < .03$ . Simple effects analyses revealed a significant grade effect for boys only,  $F(2, 201) = 5.17$ ,  $p < .05$ , indicating that students in the seventh grade at Time 2 reported lower levels of Time 2 depressive symptoms,  $M = .17$ ;  $SD = .19$ , than eighth grade students,  $M = .29$ ;  $SD = .26$ ; no significant differences emerged for students in the ninth grade,  $M = .24$ ;  $SD = .19$ . For girls only, a significant grade effect revealed that students in the seventh grade at Time 2 reported lower Time 2 CASQ scores,  $M = 5.92$ ;  $SD = 4.10$ , than eighth grade students,  $M = 7.74$ ;  $SD = 2.85$ ,  $F(2, 191) = 4.12$ ,  $p < .05$ ; no significant differences emerged for students in the ninth grade,  $M = 6.60$ ;  $SD = 3.49$ .

best friend) also reported that the adolescent was a best friend, a close friend, or not a friend at all.

**Table II.** Correlations among Adolescents' and their Friends' Depressive Symptoms and Attributional Style

	Time 1			Time 2	
	Adolescents' CASQ	Friends' CDI	Friends' CASQ	Adolescents' CDI	Adolescents' CASQ
Time 1					
CDI	-.56**	.16**	-.19**	.66**	-.50**
CASQ		-.20**	.18**	-.44**	.62**
Friend's CDI			-.59**	.32**	-.23**
Friend's CASQ				-.20**	.19**
Time 2					
CDI					-.63**

Note. \* $p < .001$ . \*\* $p < .0001$ . CDI = Depressive symptoms; CASQ = Attributional style.

Pearson correlations were conducted to examine associations among primary variables (see Table II). Results revealed moderate stability of adolescents' depressive symptoms and depressogenic attributional style from Time 1 to Time 2. Results also revealed significant associations between adolescents' and their friends' depressive symptoms and depressogenic attributional style, both concurrently and longitudinally.

#### *Longitudinal Prediction of Adolescents' Depressive Symptoms from Friend's Depressive Symptoms and Attributional Style*

It was predicted that best friends' depressive symptoms and attributional style would be associated longitudinally with adolescents' own depressive symptoms. A hierarchical multiple regression analysis using adolescents' depressive symptoms at Time 2 as a dependent variable was conducted to examine this hypothesis. Adolescents' depressive symptoms and attributional style at Time 1 were entered on an initial step. The entry of adolescents' attributional style as a predictor allowed for an examination of the incremental predictive value of friend's depressive symptoms and attributional style above and beyond the effects of adolescents' own attributional style. This approach also helped to minimize the possibility that adolescents' friend's cognitions and symptoms were merely serving as a proxy for adolescents' own attributional style as a predictor. Dummy-coded variables were entered on a second step to account for the main effects of gender and the reciprocity of adolescents' best friend nominations. For the three levels of friend reciprocity (i.e., reciprocal best friendship, reciprocal friendship, unreciprocated friendship), two dummy-coded variables were computed (Cohen & Cohen, 1983). The first of these variables, reciprocity 1 (i.e., reciprocated best friendships vs. others), was coded to reveal the effects of reciprocated best friendships as compared to the other two groups combined, and

the second variable, reciprocity 2 (unreciprocated friendships vs. others) was coded to reveal the effects of unreciprocated friendships as compared to the other two groups combined.

To examine the main study hypothesis, adolescents' friend's depressive symptoms and attributional style were entered on a third step. Product terms were computed between each predictor (friends' attributional style and depressive symptoms) with each of the three dummy-coded variables (i.e., gender, reciprocity 1, reciprocity 2). Because of significant associations between each of these predictors and between each of the potential moderators, there was substantial multicollinearity between the resulting six product terms. Moderators were therefore examined separately in two parallel analyses. In the first analysis, product terms examining gender and reciprocity as moderators of best friends' attributional style were entered on Step 4. The analysis was then reconducted using product terms examining gender and reciprocity as moderators of friends' depressive symptoms on Step 4; see Table III).

Results revealed that higher levels of friends' depressive symptoms at Time 1 were associated longitudinally with higher levels of adolescents' depressive symptoms at Time 2, after controlling for initial levels of adolescents' depression and attributional style (see  $\beta$  at step). The effect of friends' depressive symptoms was not qualified by either gender or friendship reciprocity status; no interaction terms were statistically significant (see Alternate Step 4, Table III). No significant main or interaction effects were revealed for friend's attributional style as a prospective predictor of adolescents' own depressive symptoms.

#### *Longitudinal Prediction of Adolescents' Attributional Style from Friend's Depressive Symptoms and Attributional Style*

A second hypothesis pertained to the examination of adolescents' friend's depressive symptoms and

**Table III.** Longitudinal Prediction of Adolescents' Time 2 Depressive Symptoms from Friend's Time 1 Depressive Symptoms and Attributional Style

Predictors	$\Delta R^2$	$\beta$ at step	Final $\beta$
Step 1	.44*		
Time 1 depressive symptoms		.61*	.62*
Time 1 attributional style		-.09 <sup>†</sup>	-.06
Step 2	.00		
Gender (Female)		.06	.23**
Reciprocity 1 (reciprocated best friendships vs. others)		.00	-.11
Reciprocity 2 (unreciprocated friendships vs. others)		.00	-.13
Step 3	.04*		
Time 1 friend's depressive symptoms		.24*	.24*
Time 1 friend's attributional style		.07	-.27
Step 4	.01 <sup>†</sup>		
Friend's attributional style $\times$ gender			-.36**
Friend's attributional style $\times$ reciprocity 1			-.01
Friend's attributional style $\times$ reciprocity 2			-.07
Alternate step 4	.00		
Friend's depressive symptoms $\times$ gender			.22
Friend's depressive symptoms $\times$ reciprocity 1			.01
Friend's depressive symptoms $\times$ reciprocity 2			.00

Note. \* $p < .001$ . \*\* $p < .05$ . <sup>†</sup> $p = .07$ .

attributional style as longitudinal predictors of adolescents' attributional style. A hierarchical multiple regression using Time 2 attributional style scores as a dependent variable was conducted. Adolescents' levels of depressogenic attributions and depressive symptoms at Time 1 were entered on an initial step. As mentioned earlier, adolescents' depressive symptoms were entered as a predictor on an initial step to examine the incremental contributions of friend's depressive symptoms and attributional style as predictors and to ensure that friends' depressive symptoms and cognitions were not serving as a proxy for adolescents' own depression. Dummy-coded variables for gender and adolescents' friendship reciprocity were entered on a second step. The main effects of friend's depressive symptoms and cognitions were entered on Step 3. As above, product terms were entered on a last step in two parallel analyses to examine gender and friendship reciprocity as potential moderators of friends' depressive symptoms and attributional style, respectively (see Table IV).

A main effect was revealed for friend's Time 1 depressive symptoms as a predictor of adolescents' attributional style at Time 2, after controlling for adolescents' initial levels of attributional style and the effects of adolescents' own depressive symptoms as a predictor (see  $\beta$  at step).<sup>5</sup> However, this significant effect was qualified by a

significant interaction term, suggesting that gender moderated this association. The nature of this moderating effect was subsequently examined using Holmbeck's (2002) recent guidelines for post hoc probing. This included: (a) recomputation of "reduced" regression models including only significant predictors to eliminate potential errors in parameter estimation or errors in partialling of unique effects due to multicollinearity; (b) computation of slope estimates using centered variables (thus, further reducing multicollinearity); and (c) examining the statistical significance of these slopes at different levels of the moderator variable (e.g., for girls and for boys). A significant slope was revealed for girls,  $b = -2.80$ ;  $\beta = -.19$ ,  $p < .01$ , suggesting that higher levels of friends' depressive symptoms were associated with higher levels of depressogenic attributional styles (i.e., lower CASQ scores). In contrast,

inflated due to data redundancy, all analyses were reconducted using a reduced dataset in which one participant's data from each dyad was omitted at random and all participants therefore were included as only a target adolescent or a best friend, but not both. Results from these analyses revealed an identical pattern of findings as reported in the text with one exception. In contrast to findings reported in Table IV, the main effect of friends' depressive symptoms as a longitudinal predictor of adolescents' own depressogenic attributional style was no longer significant. However, the gender  $\times$  friends' depressive symptoms interaction effect remained significant in this analysis,  $\Delta R^2 = .01$ ,  $p < .01$ . As reported for the full sample, the longitudinal association between best friends' depressive symptoms at Time 1 and adolescents' own depressogenic attributional style at Time 2 was statistically significant for girls,  $b = 2.10$ ,  $\beta = -.15$ ,  $p < .05$ , but not for boys,  $b = 1.20$ ;  $\beta = .07$ , *ns*.

<sup>5</sup>Because both adolescents and their friends were drawn from the same dataset, there was some potential for data redundancy (i.e., some participants were included as both a target adolescent and a best friend in analyses). To ensure that the magnitude of associations were not

**Table IV.** Longitudinal Prediction of Adolescents' Time 2 Attributional Style from Their Friend's Time 1 Depressive Symptoms and Attributional Style

Predictors	$\Delta R^2$	$\beta$ at step	Final $\beta$
Step 1	.42*		
Time 1 attributional style		.49*	.46*
Time 1 depressive symptoms		-.22*	-.23*
Step 2	.01		
Gender (female)		.07	.16**
Reciprocity 1 (reciprocated best friendships vs. others)		-.01	-.01
Reciprocity 2 (unreciprocated friendships vs. others)		.04	-.05
Step 3	.01**		
Time 1 friend's depressive symptoms		-.10*	.01
Time 1 friend's attributional style		.00	-.12
Step 4	.01**		
Friend's attributional style $\times$ gender	.20		
Friend's attributional style $\times$ reciprocity 1	-.13		
Friend's attributional style $\times$ reciprocity 2	-.25**		
Alternate step 4	.01**		
Friend's depressive symptoms $\times$ gender			-.26**
Friend's depressive symptoms $\times$ reciprocity 1			.01
Friend's depressive symptoms $\times$ reciprocity 2			.11

Note. \* $p < .05$ . \*\* $p < .001$ .

the slope for boys was not statistically significantly different from zero,  $b = -.42$ ;  $\beta = -.03$ , *ns*.

No main effect was revealed for friends' attributional style as a predictor of adolescents' own attributional style. However, a significant product term revealed that friendship reciprocity (i.e., reciprocity 2) significantly moderated the longitudinal association between friends' and adolescents' attributional style. Post hoc probing revealed that among adolescents with reciprocated best friendships and reciprocated friendships (combined),  $b = .11$ ;  $\beta = .09$ ,  $p < .05$ , friends' attributional style was associated longitudinally with adolescents' own attributional style. No significant slope emerged for adolescents in unreciprocated friendships,  $b = -.33$ ;  $\beta = -.28$ , *ns*.

#### Examination of a Cognitive Influence Model

Two mediator models were proposed. The first model suggested that the association between friends' Time 1 depressive symptoms or attributional style and adolescents' own Time 2 depressive symptoms would be mediated by adolescents' own Time 2 attributional style. This 'cognitive influence model' therefore posited that friends' functioning may exert a direct influence on adolescents' cognitions, which subsequently are associated with adolescents' depressive symptoms. Analyses reported above support the preliminary criteria required to examine this mediator model (Baron & Kenny, 1986; Holmbeck, 2002). Correlations revealed a significant association between ado-

lescents' Time 2 attributional style and depressive symptoms. Analyses above also revealed that friend's depressive symptoms were associated prospectively with adolescents' own depressive symptoms, for boys and girls, and with attribution style, for girls only. This mediator hypothesis was therefore examined for girls ( $n = 194$ ).

Analyses also revealed that friend's attributional style was significantly associated with adolescents' own Time 2 attributional style among those in reciprocal friendships. However, no significant association was revealed with adolescents' own depressive symptoms. Thus, criteria for mediation were not met.

A hierarchical multiple regression was conducted to examine adolescents' Time 2 attributional style as a potential mediator of the association between friend's Time 1 depressive symptoms and adolescents' Time 2 depressive symptoms. Because an ideal examination of this mediator hypothesis would involve data at three time points, results should be interpreted cautiously. Using adolescents' Time 2 depressive symptoms as a dependent variable, and initial levels of depressive symptoms and attributional style entered on an initial step, friend's depressive symptoms were entered on a second step. Adolescents' Time 2 attributional style was next examined on a third step, and the change in the value of the regression weight for friend's depressive symptoms at Steps 2 and 3 were compared to test for mediation.

As can be seen in Table V, friend's depressive symptoms were significantly associated with adolescents' depressive symptoms both before (see  $\beta$  at step) and after

**Table V.** Cognitive Influence Mediator Model: Longitudinal Prediction of Adolescents' Time 2 Depressive Symptoms from Friend's Time 1 Depressive Symptoms via Adolescents' Time 2 Attributional Style for Girls in Reciprocal Friendships ( $n = 194$ )

Predictors	$\Delta R^2$	$\beta$ at step	Final $\beta$
Step 1	.51**		
Time 1 depressive symptoms		.67**	.57**
Time 1 attributional style		-.07	.16
Step 2	.06**		
Time 1 friend's depressive symptoms		.25**	.18**
Step 3	.06**		
Time 2 attributional style			-.35**

Note. \* $p < .001$ . \*\* $p < .0001$ .

(see final  $\beta$ ) adolescents' Time 2 attributional style was entered into the model. Moreover, the reduction in the beta weight for friend's depressive symptoms between Steps 2 and 3 was not statistically significant,  $z = 1.88$ , *ns* (Holmbeck, 2002). Thus, results did not support the 'cognitive influence model;' friend's depressive symptoms were prospectively associated with adolescents' own depressive symptoms, but not via effects on adolescents' attributional style.

#### Examination of a Symptom Influence Mediator Model

The second mediator model proposed that peer contagion would occur at the symptom level. Specifically, this hypothesis suggested that friends' depressive symptoms would be directly associated with adolescents' own depressive symptoms, which would subsequently be associated with increases in adolescents' attributional style. This model reversed the mediator and criterion variables in the analysis above, and therefore all preliminary criteria for a test of mediation were still met.

A hierarchical multiple regression was conducted with adolescents' Time 2 attributional style scores entered as a dependent variable. After controlling for prior levels of adolescents' attributional style and the effects of adolescents' Time 1 depressive symptoms as a predictor, friends' depressive symptoms were entered on a third step followed by adolescents' own Time 2 depressive symptoms on a fourth step. The change in the value of the regression weight for friend's depressive symptoms at Steps 3 and 4 were compared to test for mediation (see Table VI).

Higher levels of friend's depressive symptoms were significantly associated with higher levels of a depressogenic attributional style (i.e., lower CASQ scores) before, but not after adolescents' depressive symptoms were entered into the model. Moreover, the reduction in beta

**Table VI.** Symptom Influence Mediator Model: Longitudinal Prediction of Adolescents' Time 2 Attributional Style from Friend's Time 1 Depressive Symptoms via Adolescents' Time 2 Depressive Symptoms for Girls in Reciprocal Friendships ( $n = 194$ )

Predictors	$\Delta R^2$	$\beta$ at step	Final $\beta$
Step 1	.51**		
Time 1 attributional style		.54**	.49**
Time 1 depressive symptoms		-.25**	.01
Step 2	.03*		
Time 1 friend's depressive symptoms		-.19**	-.10
Step 3	.06**		
Time 2 depressive symptoms			-.37**

Note. \* $p < .001$ . \*\* $p < .0001$ .

weight for friend's depressive symptoms was statistically significant,  $z = 3.80$ ,  $p < .01$ . Analysis of direct and indirect effects indicated that 74% of the effect of friend's depressive symptoms on adolescents' attributional style was accounted for by the mediating effects of adolescents' depressive symptoms (Holmbeck, 2002). Thus, consistent with a symptom influence model, results suggested that friend's depressive symptoms were proximally associated with adolescents' depressive symptoms, which were then associated with adolescents' attributional style.

## DISCUSSION

Recent findings regarding substantial increases in the prevalence of depressive symptoms during adolescence as well as the important predictive role of depressive cognitions in the onset and maintenance of adolescent depression have led to an increased interest in possible antecedents of adolescents' depressogenic attributional style (Garber & Flynn, 2001). To date, few investigations in this area have utilized a prospective longitudinal design, examined predictors that may explain unique variance in attributional style beyond the effects of adolescents' own depressive symptoms, or explored aspects of adolescents' peer relationships that may be relevant to the development of depressive cognitions.

On the basis of theory and research indicating that peer relationships may be particularly relevant for understanding adolescents' vulnerability to depression, especially among girls (Rudolph, 2002), this study revealed that the level of depressive symptoms reported by adolescents' friends was prospectively and uniquely associated with adolescents' own depressive symptoms and girls' depressogenic cognitions. Moreover, results indicated that among adolescents in reciprocal friendships, friends' reports of their attributional style were associated longitudinally with adolescents' own attributional

style. Findings contribute to literatures on cognitive and interpersonal theories of depression as well as peer-contagion effects, and offer important directions for preventive interventions.

Cognitive theories of depression suggest that adolescents' tendencies to interpret negative life events as due to internal, global, and stable causes are directly associated with the experience of depressed affect, and an increased risk for depressive disorders (Abramson et al., 1989). However, given the negative emotional consequences of this attributional style, it is unclear why individuals continue to rely on depressogenic interpretations of events. From a behavioral perspective, it might be predicted that this attributional style would extinguish in the absence of positive reinforcement. Yet, research has clearly demonstrated that individuals' depressive cognitions are indeed stable over time and applied with moderate stability across domains of life events (Hankin & Abramson, 2001), suggesting that this cognitive style is likely maintained by numerous factors. Some of these factors may pertain to the reciprocal associations between individuals' cognitions and their social experiences. Depressed cognitions (e.g., "I am worthless") alter individuals' interpersonal behavior (e.g., social withdrawal), which reciprocally reinforces the negative cognitions (e.g., "I am alone, I must be worthless") (e.g., Sacco, 1999). Depressive symptoms and cognitions may also be maintained and reinforced through interaction with other depressed individuals (Downey & Coyne, 1990; Hammen & Brennan, 2001). Negative interpretations of life events may be explicitly discussed and corroborated by others (Rose, 2002), and depression-motivated social-behavioral decisions may be learned by observing others make similar decisions.

Consistent with these latter hypotheses, findings from this study supported a peer-contagion effect for adolescent depressive symptoms and cognitions. The findings may be best interpreted to suggest that exposure to a close friend who exhibits depressive symptoms is a factor that serves to reinforce or maintain adolescents' tendencies towards depression. It is not possible to determine from these data whether adolescents' friends' depressive symptoms are causally associated with adolescents' own depressive symptoms, or predict the development of attributional styles beyond the effects of other potential predictors (e.g., traumatic events). Nor do these data address whether adolescents might initially select friends who possess similar attributional styles or depressive symptoms (i.e., selection effects). However, findings do support a socialization (i.e., influence) effect between friends over time that might be especially important to consider as a factor that affects trajectories of depression during this

critical developmental interval and may interfere with treatment attempts to reduce adolescents' negative cognitions.

Considering adolescents' increased orientation towards peer relationships, and heightened susceptibility to peer influence during this developmental period, the potent prospective effects of adolescents' friends' psychological characteristics on adolescents' own functioning are not entirely surprising. It is especially noteworthy that peer-contagion effects were revealed in the study of internalizing symptoms, however. Prior research examining adolescent peer contagion has almost exclusively explored the transmission of externalizing and health risk behaviors (e.g., Kandel, 1996). Findings from this study may offer some insight into mechanisms that might explain processes of peer contagion more broadly. A straightforward interpretation of these results would suggest that adolescents' depressive symptoms and cognitions are directly influenced by the presence of similar affective states among best friends. This interpretation is based on the assumption that adolescents' actively discuss their interpretations of life events and display their emotional states among their peers. Several findings support this interpretation. Adolescents indeed develop friendships that are characterized by higher levels of emotional disclosure, intimacy, and support than in childhood (Buhrmester & Furman, 1987). Thus, opportunities to discuss negative affective states and cognitions are available. These relationship characteristics are particularly prominent in reciprocated best friendships and among adolescent girls in particular. Accordingly, results from this study revealed that contagion effects between adolescents' friends' depressive symptoms and adolescents' subsequent attributional style were significantly stronger among girls and potential contagion of attributional styles was evident among adolescents in reciprocated friendships.

An alternate interpretation of these results suggests that affiliation with a friend who exhibits depressive symptoms increases the risk of other aversive experiences that can exacerbate adolescents' own depressive symptoms or cognitions. For example, depressed adolescents who affiliate with depressed friends may be less likely than other depressed adolescents to be included in social activities. Friendships among depressed adolescents may include lower levels of positive reinforcement and social support than other friendships. Affiliation with depressed friends also might increase adolescents' risk of engagement in maladaptive behaviors that often occur in collusion with others (e.g., substance use; school truancy). These potentially mediating variables may explain an indirect effect of peer affiliation that leads to exacerbations of depressive symptoms.

Still, a third possibility suggests that friends' depressive symptoms serve as merely a marker for other aspects of adolescents' social-psychological functioning that may exert a more causal influence on the development of adolescent depression. Future work examining friends' depressive symptoms in conjunction with other possible antecedents of attributional style (e.g., negative life events, poor parenting, maternal depression) will be needed to determine the unique effects of friends' depression on adolescents' developing depressive symptoms and cognitions.

Although this study did not examine these specific mechanisms, analysis of mediational models offered some preliminary insights to help determine potential pathways of transmission between friend's and adolescents' depressive symptoms and cognitions. Specifically, after revealing an association between friends' depressive symptoms and adolescents' own depressive symptoms and cognitions, it was of interest to explore whether friends' symptoms might have more direct implications for the development of similar symptoms among adolescents (with indirect consequences on adolescents' attributional style) (i.e., symptom influence model) or direct consequences for the development of a negative attributional style (with indirect consequences on adolescents' depressive symptoms) (i.e., cognitive influence model). Preliminary results examining data from two time points among girls offered compelling support for the symptom influence model and no significant support for the cognitive influence model.

Findings have implications not only for understanding the proximal correlates of friends' depressive symptoms, but also for the continued study of antecedents of a depressogenic attributional style. It will be important for future work to differentiate factors that uniquely predict the development of negative cognitions from those that have implications for attributional style via depressive symptoms. Although both types of predictors are relevant to enhance a developmental understanding of attributions, and both may be useful for prevention efforts, findings may vary in the breadth of implications. Findings regarding the potential effects of friends' depressive symptoms on adolescents' own depressive symptoms have implications for a range of depression-related consequences (e.g., hopelessness, suicidality, substance use), one of which may be increases in a depressogenic attributional style.

Also of note, findings from this study provided stronger support for friends' depressive symptoms, as compared to friends' attributional styles, as predictors of adolescents' own functioning. These results suggest that aspects of depression other than the communication of negative explanatory styles might be especially important in the interpersonal transmission of depressive symp-

toms. Future work examining specific symptoms or behavioral correlates of depression (e.g., sad affect, lethargy, anhedonia, hopelessness, reassurance-seeking) may reveal unique behaviors that are the most potent agents of contagion, and may be addressed directly in interventions.

Future research also would benefit by addressing some of the limitations of this investigation. For example, although findings from this study offer important directions for understanding the prevention of depressive symptoms among adolescents from a community sample, the study of similar processes in a clinically referred sample would be useful to elucidate interpersonal factors that are associated with more severe levels of symptoms. The use of additional assessment instruments (e.g., structured clinical interviews) also would be helpful for understanding symptoms of depressive disorders. Future research examining interpersonal correlates of adolescents' depressive cognitions also might benefit from behavioral observations of social behaviors and the study of mechanisms that may explain the peer-contagion effect. Lastly, future examination of friends' influence should include peers both within and outside the school setting to best capture multiple sources of contagion to which adolescents are exposed.

Overall, the results from this study offer additional evidence to suggest that adolescents' peer relationships may contribute significantly to the development of depressive symptoms and cognitions during the transition to adolescence, particularly among girls. Findings suggest that attempts to modify the cognitions of adolescents should consider the possibility that these cognitions may be strongly reinforced within adolescents' close interpersonal relationships. From a prevention perspective, it is also important to consider the effects of peer homophily on adolescents' adjustment not only for externalizing outcomes, but also for internalizing symptoms.

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