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BRIEF REPORT

Depression Is Associated With the Escalation of Adolescents' Dysphoric Behavior During Interactions With Parents

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Though much is known about the stable mood patterns that characterize depressive disorder, less attention has been directed to identifying and understanding the temporal dynamics of emotions. In the present study, we examined how depression affects the trajectory of dysphoric and angry adolescent emotional behavior during adolescent-parent interactions. Adolescents (72 depressed; 69 nondepressed) engaged in video recorded positive and negative interactions with their parents. Depressed adolescents showed a linear increase in dysphoric behaviors throughout the negative interactions, while the incidence of these behaviors remained relatively stable across the interactions among nondepressed adolescents. A similar linear increase was not found in angry behavior. These findings show that depression in adolescence is associated with greater escalation of dysphoria during conflictual interactions between adolescents and their parents.

Keywords: depression, emotions, sadness, parent–child relations, adolescence

Recent research has yielded an increasingly detailed depiction of the emotional experiences and behaviors characteristic of depressed youth, revealing disturbances in both positive and negative affects (Klein, Dougherty, Laptook, & Olino, 2008) akin to those of adults. In particular, depressed youth experience significantly longer durations and greater frequency and intensity of anger and sadness, as well as less frequent and briefer occurrences of happy affect, compared to healthy youth (Sheeber et al., 2009; Silk, Steinberg, & Morris, 2003).

Despite the increasing depth and complexity of our understanding of the affective functioning of depressed adolescents, the depiction largely fails to capture one of the most striking aspects of emotional experience: its movement across time. Of course, movement is somewhat inherent in measures like duration or reactivity, which capture continuance and change, respectively. However, neither tells us anything about the flow of emotion across an interaction. Does the mood lighten or darken over the course of a discussion? Does the nature of the conversation or the particular emotion experienced matter? With as much as we have learned about the emotional behaviors of depressed youth, it's as if we've been taking still photos of a dance.

The relative lack of attention to emotional dynamics over time is significant because emotional disturbances characteristic of disorder may relate to how affect unfolds over time, especially within important social contexts. Gunlicks-Stoessel and Powers (2008) reported that change in experienced emotion over the course of mother–daughter interactions predicted subsequent internalizing symptomatology, although mean levels throughout the interaction did not. Moreover, in a prior paper we (Kuppens, Allen, & Sheeber, 2010) reported that internalizing syndromes (i.e., both depression and low self-esteem) were associated with greater emotional "inertia," especially in stressful situations. That is, the emotional states of persons experiencing internalizing syndromes were more resistant to change than were those of their counterparts in the comparison samples (see also, Hollenstein, Granic, Stoolmiller, & Snyder, 2004). The way that affect unfolds during interpersonal situations may also have implications for relationship functioning. In a seminal study on affective

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processes in marital couples, Gottman and Levenson (1992) reported that couples who were "dysregulated," that is, those who had a negative slope on a variable representing the accumulation of affectively positive versus negative behaviors over the course of an interaction, reported lower marital satisfaction.

Within adolescence, parent–child relationships and interactions provide an important environmental context for understanding affective experiences and depression. This is the case, in part, because family environments characterized by harsh and conflictual family interactions are associated with adolescent depressive symptoms and disorder (Sheeber, Davis, Leve, Hops, & Tildesley, 2007). Moreover, family conflict peaks during adolescence (Paikoff & Brooks-Gunn, 1991), with parent–child disagreements being not only more frequent than before, but also more intense than those that adolescents experience in peer relationships (Laursen & Collins, 1994). Learning to negotiate these conflicts while maintaining the strong relationships that promote psychological health is a critical developmental task of adolescence (Gunlicks-Stoessel & Powers, 2008). In this regard, it should also be noted that the presence of warm and supportive family relationships continues to be protective during adolescence (Sheeber, Hops, Andrews, Alpert, & Davis, 1998). The family environment thus appears to provide a significant context for examining how adolescent affective behavior flows over the course of interpersonal interactions.

Though depressed adolescents display more distressed affect during parent–child interactions compared with nondepressed adolescents (Sheeber et al., 2009) we do not know how their affective behavior accumulates across the interactions. This is an important question because the arc of the emotional experience may not only influence adolescents' subsequent mood, but also their appraisal of the conversations, and hence their openness to future interactions. This is to say that an emotionally difficult conversation with a "happy ending" may be a distinctly different experience than one in which the adolescent continues to feel angry or dysphoric at the end.

The only study of which we are aware that examines the trajectory of adolescent emotion during parent–adolescent interactions reported that increasingly negative emotional experience over the course of the interaction was prospectively (but not concurrently) associated with *less* internalizing symptoms within a community sample of girls (Gunlicks-Stoessel & Powers, 2008). The investigators interpreted this to suggest that the capacity to tolerate mildly negative affect during developmentally normative parent–adolescent conflict is adaptive and necessary for the achievement of age-appropriate individuation. As these investigators note, however, these data were based on a community sample and may not generalize to populations with diagnostic levels of symptomatology, in which levels of both affective distress and family conflict are likely to be more intense.

In this investigation, we examined trajectories of negative affective behavior in depressed and nondepressed adolescents during interactions with their parents. Because depression is characterized by elevations in anger as well as dysphoria (Sheeber et al., 2009; Wenze, Guntheret, Forand, & Laurenceau, 2009), we examined trajectories of both forms of negative affect. Moreover, because previous theory and research suggest that context influences valence and dynamics of affective experience (Thompson, 1994), adolescent affective trajectories were examined within distinct interactional tasks that differentially elicit affective behavior (Allen, Sheeber, Davis, Katz, & Shortt, 2010).

Despite the very small body of literature examining trajectories of affective behavior, we offer the hypothesis that the incidence of negative emotional behavior of depressed youth, unlike that of nondepressed youth, will accumulate and increase throughout interactions with their parents, especially when these interactions are of a taxing or challenging nature. This hypothesis is consistent with theories that frame depression as a disorder of affect regulation (e.g., Gross & Muñoz, 1995) as well as with interpersonal theories that emphasize the reciprocal influence of relational behaviors between depressed persons and those with whom they interact in maintaining and escalating depression states (Joiner, Coyne, & Blalock, 2003). More particularly, it is guided by evidence that adolescents with elevated depression or internalizing symptoms have more difficulty regulating affective states (Silk et al., 2003), such that the onset of negative emotions may initiate a cycle of increasingly depressogenic thinking and deepening of dypshoric moods (Joormann, 2010). They are, moreover, more likely to experience negative moods when spending time with their families (Larson, Raffaelli, Richards, Ham, & Jewell, 1990; Schneiders et al., 2007), to generate stress in their relationships (e.g., Rudolph, 2008) and to view their parents as less likely to provide effective assistance in regulating affect (Garber, Braafladt, & Weiss, 1995). Moreover, the hypothesis that depressed youth are more likely to experience an escalation of negative behavior during their social interactions is congruent with related research on trajectories of affective behavior in other distressed populations (Anderson, Buckey, & Carnagey, 2008; Gottman & Levenson, 1992).

Method

Participants

Participants were 141 adolescents (94 women; mean age = 16.2 years, range 14.5–18.5) and their parents. Adolescents were selected and enrolled using a two-gate recruitment process consisting of an in-school depression screening and a subsequent diagnostic interview of selected youth. Depressed adolescents ($n = 72$) evidenced elevated scores on the CES-D (>31 for men and >38 for women) during the screening and subsequently met criteria for current major depressive disorder. Median disorder duration was 13.5 weeks (range 2–284). Approximately 43% of the depressed adolescents had experienced a previous episode. The median age at first onset was 14.67 (range 7–18). Adolescents were excluded if they evidenced comorbid psychotic, externalizing, or substance dependence disorders or were taking either Serotonin Norepinephrine Reuptake Inhibitors or Tricyclic antidepressants; these exclusion criteria related to the potential of these factors to influence psychophysiological measures collected as part of the study though reported here. Approximately 28% of depressed adolescents evidenced current comorbid conditions (i.e., anxiety, eating, or substance use disorders).

Nondepressed adolescents ($n = 69$) scored below an adolescent-appropriate cut off on the CES-D (<21 for men and <24 for women) and did not meet criteria for current or lifetime depressive or other disorders at subsequent interview. To the extent possible, nondepressed participants were matched to depressed participants

on adolescent age, sex, ethnicity, and the socioeconomic characteristics of their schools. Detailed recruitment and assessment procedures as well as demographic data are presented in Sheeber et al. (2009).

Assessment Measures and Lab Procedures

Depression screener. The CES-D (Radloff, 1977) is a widely used, self-report measure that has a well-established record as a screener for depressive symptoms in adolescent samples (e.g., Asarnow et al., 2005; Sheeber et al., 2007).

Diagnostic interview. The K-SADS interview (Orvaschel & Puig-Antich, 1994) was conducted with the adolescents to obtain current and lifetime diagnoses. Reliability ratings were obtained on 20% of the interviews, chosen at random. The average agreement was $\kappa = .94$.

Lab assessment. Families of the selected adolescents participated in three family interactions in the lab, one that differentially elicits positive emotions (family activity task), and two that differentially elicit negative emotions (Conflict task; Reminiscence task). Each interaction consisted of two 9-min discussions. As task habituation and dynamics from the first discussion could influence the dynamics during the second discussion, we only considered data obtained from the first discussion of each interaction task. In the first discussion of the family activity task, families were instructed to plan a pleasant activity, which they could do together. In the first discussion of the conflict task, families were asked to discuss and resolve an area of disagreement. In the first discussion of the reminiscence task, families were asked to identify and describe the best and most difficult years the adolescent had experienced. Tasks were characterized as positive or negative, for the purpose of analyses, as a function of the affect that they elicited. The family activity task was considered positive because it differentially elicited happy affect. The other two tasks were considered negative, as they differentially elicited anger (conflict task) and dysphoria (reminiscence task), respectfully (Allen, Sheeber, Davis, Katz, & Shortt, 2010). Interactions were videorecorded for subsequent behavioral coding.

The Living in Family Environments coding system (LIFE; Hops, Biglan, Tolman, Arthur, & Longoria, 1995) was used to code adolescent behavior during the family interactions. The LIFE is an event-based, microanalytic coding system in which a new code is entered each time there is a change in verbal content or affective behavior. Affective behavior is coded based on facial expression, voice tone, and body posture and movement. Extensively trained observers, blind to diagnostic status and hypotheses, coded the adolescents' nonverbal affect and verbal content. Data analysis is done at the level of mutually exclusive constructs, which are operationalized as a particular combination of content and affect codes. Two constructs tapping angry and dysphoric behavior were derived from the individual affect and content codes. Angry behavior included aggressive (i.e., clenched teeth; raised voice) or contemptuous (e.g., eye-rolling; sneering) nonverbal behavior and cruel or provoking statements (e.g., insults; threats). Dysphoric behavior was defined by sad nonverbal behavior (tearfulness; sighing) or complaining statements that are not directed at the other participants in the interaction. The validity of these LIFE constructs has been established in numerous studies of adolescent depression (e.g., Katz & Hunter, 2007; Kuppens et al., in press; Sheeber et al., 2009). The coding yielded second-by-second time-series information on adolescents' emotional behavior during the interactions with their parents. Approximately 20% of videos, stratified by type of interaction, were coded by a second observer to assess reliability. Kappas for angry and dysphoric behavior were .73 and .70, respectively, indicating good agreement (Fleiss, Levin, & Paik, 2003). Additional information regarding the LIFE system is presented in Hops, Davis, and Longoria (1995).

Data Analysis

The second-by-second binary data (i.e., dysphoric/not dysphoric; angry/not angry) were converted to data reflecting the incidence of the given affective behavior in a continuous 60-s moving time window throughout the interactions. A 60 s window was considered a meaningful unit of duration in terms of yielding a continuous and reliable estimate of the incidence of emotional behavior (aggregating the binary coded observed behavior variables across 60 s). The resulting data reflect changes in the incidence of emotional behavior across the interactions, with the incidence being based on the proportion of each emotional behavior during the moving 60-s time windows.[1]

These data were subsequently used to model the average and linear trends in incidence of emotional behavior across the interactions, as a function of interaction type (positive vs. negative tasks) and adolescent group status (depressed/nondepressed), separately for each emotion using multilevel regression models (Bryk & Raudenbush, 1992). Specifically, the time-moving incidence of a particular emotional behavior (e.g., dysphoric behavior) was modeled as a function of a random intercept and linear time at Level 1 of the model. The corresponding intercept and slope values were modeled as a function of interaction type at Level 2 of the model by including a dummy variable indicating whether the task type was negative (1) or positive (0); as a result, the intercept at this level reflects the value for the positive task, and the effect of the dummy variable reflects the difference between the negative and the positive tasks. Finally, the intercept and slope values per interaction type were modeled as a function of the presence (1) or absence (0) of depression in the adolescent at Level 3 of the model; hence, the intercept at Level 3 reflects the value for nondepressed adolescents and the effect of the dummy variable reflects the difference between depressed and nondepressed adolescents.[2] When such between group differences were significant, results from auxiliary analyses are reported based on multilevel models in which all intercepts were removed and dummy variables for both positive and negative tasks and for both depressed and nondepressed were retained (yielding absolute instead of relative regression coefficients).

[1] To examine whether results were specific for this particular time window, we also performed all analyses based on a 30 s time-window, yielding similar results.

[2] Additional analyses including sex were also performed. These analyses did not reveal a main effect of sex in analyses including sex, or an interaction between depression and sex in analyses including sex, depression, and their interaction.

Results

Dysphoric Behavior

Average levels. Though the primary research question related to change in affective behavior across time, results regarding the average levels of behavior are described first to provide context. The results of the analyses regarding dysphoric behavior can be found in the first half of Table 1. The first coefficient in the table gives the intercept, which reflects the average proportion of dysphoric behavior of the nondepressed adolescents during the positive interaction, which was significantly greater than zero. The second coefficient reflects the difference between that value and the average incidence of dysphoric behavior by depressed adolescents during positive interactions, which was not significant. The third coefficient indicates that, as expected, the average incidence of dysphoric behavior for nondepressed adolescents was greater in the negative interaction tasks than in the positive interaction task. Moreover, depressed adolescents displayed a significantly higher proportion of dysphoric behavior in these tasks compared to nondepressed adolescents, as indicated by the fourth coefficient.

Change across Time. The next four coefficients reflect the effect of time. Coefficient 5 indicates that nondepressed adolescents showed a linear increase in incidence of dysphoric behavior throughout the positive interaction. This was not different for the depressed adolescents (Coefficient 6). However, during the negative interactions, the increasing trend disappeared for nondepressed adolescents (Coefficient 7), with auxiliary analyses showing that the linear effect of time for nondepressed adolescents indeed became nonsignificant ($\beta = 0.004$, $SE = 0.004$, *ns*). In contrast, the increase in the incidence of dysphoric behavior throughout the negative interactions became stronger for depressed adolescents (Coefficient 8), and was highly significant (auxiliary analyses, $\beta = 0.016$, $SE = 0.005$, $p = .002$).

To summarize, the incidence of dysphoric behavior was greater in the negative than the positive interactions, and this was more so for depressed than for nondepressed adolescents. Moreover, while the incidence of dysphoric behavior slightly increased for both depressed and nondepressed adolescents throughout the positive interaction, only the depressed adolescents showed a strong increase in the incidence of dysphoric behavior across the negative interactions. Figure 1 graphically illustrates the moving incidence of dysphoric behavior for both depressed and nondepressed adolescents.

Table 1
Results From Multilevel Analyses Predicting Incidence of Dysphoric and Angry Behavior in a 60 s Moving Time Window as a Function of Time, Interaction Type, and Depression

Multilevel parameter	Coefficient (*SE*)	*p*-value
Predicting dysphoric behavior		
Intercept		
Positive interaction (intercept)		
1. Nondepressed (intercept)	0.075 (0.008)	<.001
2. Depressed (dummy)	−0.012 (0.011)	.274
Negative interaction (dummy)		
3. Nondepressed (intercept)	0.104 (0.016)	<.001
4. Depressed (dummy)	0.045 (0.021)	.035
Slope Time		
Positive interaction (intercept)		
5. Nondepressed (intercept)	0.014 (0.004)	<.001
6. Depressed (dummy)	−0.006 (0.004)	.211
Negative interaction (dummy)		
7. Nondepressed (intercept)	−0.010 (0.005)	.048
8. Depressed (dummy)	0.018 (0.008)	.018
Predicting angry behavior		
Intercept		
Positive interaction (intercept)		
9. Nondepressed (intercept)	0.035 (0.007)	<.001
10. Depressed (dummy)	0.025 (0.013)	.054
Negative interaction (dummy)		
11. Nondepressed (intercept)	0.042 (0.011)	<.001
12. Depressed (dummy)	0.050 (0.018)	.008
Slope time		
Positive interaction (intercept)		
13. Nondepressed (intercept)	0.008 (0.002)	.001
14. Depressed (dummy)	−0.006 (0.004)	.136
Negative interaction (dummy)		
15. Nondepressed (intercept)	−0.004 (0.004)	.295
16. Depressed (dummy)	0.008 (0.007)	.227

Note. As a result of the dummy coding for interaction type and depression, the coefficients for nondepressed in the negative interaction reflect the difference between the effect for nondepressed in the negative interaction compared with that in the positive interaction, and the coefficients for depressed reflect the difference between the depressed compared with the nondepressed. Where useful, absolute coefficients are reported in the text based on auxiliary analyses.

Angry Behavior

Average levels. Analyses regarding angry behavior are presented in the lower half of Table 1. The average incidence of angry behavior in the positive interaction was significantly greater than zero for nondepressed participants (Coefficient 9), and depressed adolescents displayed marginally higher levels of angry behavior than nondepressed adolescent in these interactions (Coefficient 10). Negative interactions elicited a higher incidence of angry behavior than did the positive interactions in the nondepressed adolescents (Coefficient 11). Again, this was even more so for the depressed adolescents, who displayed a significantly higher average incidence of angry behavior during the negative interactions relative to the nondepressed adolescents (Coefficient 12).

Change across time. The incidence of angry behavior increased slightly for nondepressed adolescents during the positive interaction (Coefficient 13), which was not significantly different from the time effect for depressed adolescents (Coefficient 14). During the negative interactions, however, the incidence of angry behavior did not significantly change over time for either depressed or nondepressed adolescents (Coefficient 15); nor did the effect of time differ between the two groups (Coefficient 16). Thus, the findings show that, as for dysphoric behavior, depressed adolescents displayed a heightened incidence of angry behavior mainly in the negative interactions. Unlike the results for dysphoric behavior, however, the incidence of angry behavior did not significantly increase with time.

Discussion

How emotions are experienced over time may provide important information regarding emotional functioning and regulation. In this study, we examined how depression affects the trajectories of

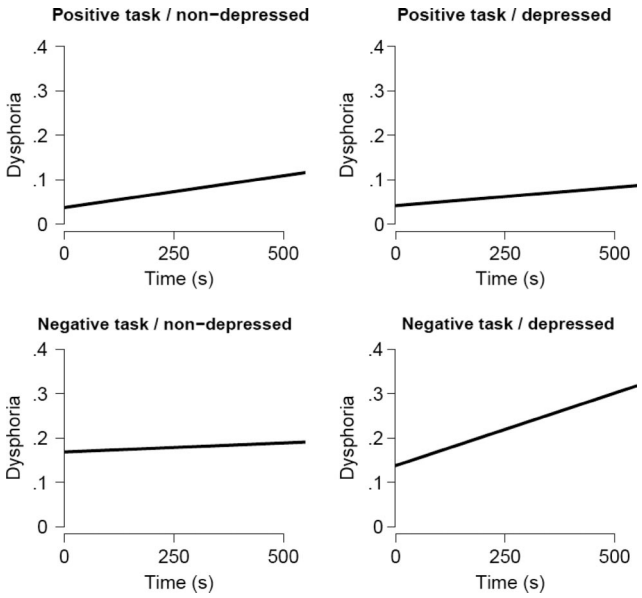

Figure 1. Linear trend of the incidence of dysphoric behavior across time (based on a 60 s moving time-window) as a function of interaction type (positive and negative) and depression.

emotional behavior throughout interactions between adolescents and their parents. The findings showed that aversive interactions elicited not only higher levels of negative emotional behavior in depressed adolescents compared to nondepressed adolescents, but also that dysphoric behavior, in particular, displayed a linear increase throughout such interactions among depressed adolescents. When nondepressed adolescents engaged in such interactions, not only did they exhibit lower levels of negative emotional behavior, but the overall incidence of this behavior throughout the interaction remained more or less constant.[3] Such a pattern fits with evidence that depression is characterized by difficulty recovering from negative affect (Joormann, 2010).

The family environment plays an important role in adolescents' emotional upbringing, providing the context in which both adaptive and maladaptive emotional functioning is often learned. Evidence that negative interactions between depressed adolescents and their parents result in an escalation of adolescent dysphoric behavior may provide clues as to the relations between family processes and depressive disorder. Given the adverse effect of dysphoric emotion on problem solving and conflict resolution (e.g., Frederickson, 2001), the increase in dyphoria may reduce the likelihood that families will resolve their differences. This may contribute to the finding that depressed adolescents perceive their parents (or at least their mothers) to be less effective at helping them to manage their emotions than do nondepressed adolescents (Garber et al., 1995), as well as to the greater level of conflict in families of depressed than nondepressed adolescents (e.g., Sheeber et al., 2007). That escalation of negative affect over the course of interactions is associated with poorer relationship quality is, moreover, consistent with findings from marital research, described earlier (Gottman & Levenson, 1992). Future research should focus on identifying the elements in the family interactions that drive the escalation of dysphoria in families of depressed adolescents. In particular, given the established differences in the quality of family interactions between families of depressed and nondepressed adolescents, it will be also be important to examine the extent to which aspects of parental behavior may contribute to the increases in dysphoric behavior over time.

Notably, our findings did not show a similar increase in angry behavior throughout negative interactions among depressed adolescents. Though depressed adolescents displayed higher levels of angry behavior than did their nondepressed peers, the level was constant over the course of the interactions. Hence, it appears that the process of engaging in emotionally challenging conversations with parents yields increasing sadness, more than increasing anger, among depressed adolescents.

At first sight, our findings may seem at odds with those of Gunlicks-Stoessel and Powers (2008) who reported that increasing negative emotionality over the course of mother–adolescent interactions was prospectively associated with fewer internalizing symptoms among girls. Our study differs in several important respects that may account for the different findings. First, their sample consisted of nondepressed adolescents, while the present study involved the comparison between a healthy and clinically depressed sample. Gunlicks-Stoessel and Powers emphasized that the negative emotions expressed by the participants was of mild intensity. Though the measurement differences between the two studies preclude a comparison of affective intensity, the disparity between the findings may reflect differences in the intensity of affect between a healthy sample and one with diagnosed depressive disorder; that is, the emotion dynamics in clinical depression may be qualitatively different from those associated with depressive variation within the normal range. There are also measurement differences between the studies, with their results based on retrospective self-report of emotion experienced during the interactions, and ours based on observed behavior. Though experience and behavior are both important components of emotion, they often diverge (Mauss & Robinson, 2009). Thus, it is worth noting as a limitation, that our paper cannot speak to how the adolescents felt during the interaction. Finally, Gunlicks-Stoessel and Powers examined the relationship prospectively, while the present study examined it concurrently.

To summarize, this study showed that depression is associated with an increased incidence of dysphoric behavior during emotionally challenging interactions between adolescents and their parents. The observed escalation of dysphoria may be associated with the adverse interactional styles that characterize families of depressed adolescents. Examining the potentially reciprocal relations between family and emotional processes over time, among depressed adolescents, is an important direction for ongoing research.

[3] Surely, the data should not be taken as evidence that the emotional behavior of nondepressed adolescents did not change throughout the interactions. There were considerable fluctuations in the moving time window incidence of dysphoric behavior for both depressed and nondepressed adolescents. However, on the whole, this incidence showed an increase for depressed participants, and not for nondepressed.

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