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The Blues of Adolescent Romance: Observed Affective Interactions in Adolescent Romantic Relationships Associated with Depressive Symptoms

Thao Ha · Thomas J. Dishion · Geertjan Overbeek · William J. Burk · Rutger C. M. E. Engels

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Abstract We examined the associations between observed expressions of positive and negative emotions during conflict discussions and depressive symptoms during a 2-year period in a sample of 160 adolescents in 80 romantic relationships (M age=15.48, SD =1.16). Conflict discussions were coded using the 10-code Specific Affect Coding System. Depressive symptoms were assessed at the time of the observed conflict discussions (Time 1) and 2 years later (Time 2). Data were analyzed using actor–partner interdependence models. Girls’ expression of both positive and negative emotions at T1 was related to their own depressive symptoms at T2 (actor effect). Boys’ positive emotions and negative emotions (actor effect) and girls’ negative emotions (partner effect) were related to boys’ depressive symptoms at T2. Contrary to expectation, relationship break-up and relationship satisfaction were unrelated to changes in depressive symptoms or expression of negative or positive emotion during conflict discussion. These findings underscore the unique quality of adolescent romantic relationships and suggest new directions in the study of the link between mental health and romantic involvement in adolescence.

Keywords Adolescent romantic relationships · Observations · Negative and positive emotions · Depressive symptoms · Actor–partner interdependence model

Romantic relationships are common during adolescence. By age 16, 76 % of Dutch adolescents have had at least one romantic relationship (De Graaf et al. 2012). Once the relationship is established, romantic partners are central in their lives and quickly become comparable in importance to parents, siblings, and best friends (Furman et al. 2007). Despite the normative nature of romantic relationships in adolescence, they can be potentially disruptive to both social and emotional adjustment (Collins et al. 2009). Several studies have linked adolescent romantic relationships with increases in problem behavior (Furman et al. 2007) and increased depression (Ayduk et al. 2001; Joyner and Udry 2000; Monroe et al. 1999). Although problem behavior and depression are certainly not characteristic of all adolescent romantic relationships, they occur commonly enough to warrant further study of the interpersonal characteristics and dynamics associated with adjustment. Surprisingly little is known about how relationship dynamics within romantic relationships might amplify, or reduce, adolescents’ depressive symptoms (Davila 2008). Hence, in this observational study we investigated whether negative and positive emotions during conflict discussions in adolescents’ romantic relationships related to longitudinal changes in depressive symptoms.

The significance of the interpersonal context in the development of depressive symptoms has been generally established since it was initially formulated in Coyne’s corrosion theory (1976). Depression is embedded within an interpersonal system that involves a cycle of eliciting negativity in others and rejection, resulting in more depression. Recent theoretical perspectives, such as the diathesis stress model and the stress generation theory, have postulated that negative mood potentially

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amplifies depression by generating interpersonal stress and rejection (Eberhart and Hammen 2009; Rudolph et al. 2000). Interpersonal stressors, such as high levels of conflict, in combination with poor problem-solving skills likely exacerbate the depressive symptoms (Davila et al. 1995). Furthermore, the extent to which the relationship itself generates stress might be linked to depression (Davila 2008). Generally, interpersonal theories of depressive symptoms suggest that problems in close dyads are both a consequence and a risk factor for the development and continuation of depression (Joiner and Coyne 1999). While there is extensive support for the importance of the marital context in adult depression (Kahn et al. 1985) adolescents' interpersonal functioning in romantic relationships has rarely been investigated in association with depressive symptoms (Davila 2008).

This is remarkable since adolescence is a critical developmental period in which youth show increased vulnerabilities to depressive symptoms (Petersen et al. 1993). One of the key developmental issues during adolescence are the changes in the nature and quality of interpersonal relationships that potentially change mood (Joiner and Coyne 1999). An increasing emphasis on egalitarian relationships with peers is particularly salient, especially in the process of differentiating from parents (Buhrmester and Furman 1987). Longitudinal research suggests that conflicts and disagreements in peer relationships predict depressive symptoms over time (Connell and Dishion 2006). Romantic relationships are also voluntary and egalitarian, but potentially more salient than peer relationships during adolescence because of the intense feelings of positivity such as affection and anticipation of sexual behavior (Collins et al. 2009; Larson et al. 1999). These intense feelings possibly put youth at risk for the negative consequences of rejection. As has been formulated in the stress and coping model (Davila 2008), adolescents' limited experiences with navigating inevitable relationship conflicts may be challenging and therefore relate to the development of depressive symptoms.

Indeed, survey studies have shown that negative qualities of romantic relationships are associated to higher levels of adolescents' depressive symptoms, even when the negative quality of peer and best friend relationships was considered (La Greca and Harrison 2005; Simon et al. 2008). Moreover, youths involved in a relationship with a depressed adolescent reported that the partner was less interpersonally competent (Daley and Hammen 2002). Depressive symptoms have been shown to be related to the use of more destructive conflict resolution styles (Ha et al. 2012), and adolescents with higher levels of depressive symptoms were likely to show increases in conflict and decreases in positive problem solving in romantic relationships over a 5-year period (Vujeva and Furman 2011). These studies imply that the inability to handle conflict and the ensuing emotional consequences may increase depressive symptoms (Davila 2008).

The vast majority of studies to date have focused on adolescents' self-reported relationship experiences that yield global thoughts about specific interaction sequences (Welsh and Shulman 2008). However, awareness of complex interaction sequences within intimate relationships is rarely achieved (Gottman and Notarius 2000), thus it is possible there are discrepancies in the predictive validity of self-reports and direct observations (Cairns and Green 1979). In observational research, relatively mundane, daily interaction patterns captured during well-defined behavioral tasks are associated with change in developmental outcomes that unfolds over years (Laurent et al. 2009). A common way to assess social interactions in intimate relationships is to ask both partners to discuss personal areas of conflict (Gottman and Notarius 2000; Welsh and Shulman 2008). In observation studies on marital interactions, it was found that problem-solving discussions were critical for differentiating distressed from nondistressed marriages (Birchler et al. 1975). Relationship dynamics that are captured in observational studies are assumed to be predictive because they sample a social interaction pattern that occurs daily and defines the interpersonal space within which an individual is adapting and developing (Sameroff 2009).

Although little observational research exists that links adolescent romantic relationships to depressive symptoms, it has been shown that in adult romantic relationships depressed individuals tend to show hostility and irritability with their spouse during conflict discussions (Johnson and Jacob 2000; Kahn et al. 1985). Similarly, Laurent and colleagues (2009) found that in a sample of young adults, couples with high levels of psychological aggression (e.g., verbal attacking) and concomitant negative emotions predicted women's depressive symptoms over time. Adolescent romantic couples have not been investigated with observations, however, an observational study of adolescent best friendship dyads has found that anger and hostility expressed during interactions predicted relative increases in depressive symptoms over time (Allen et al. 2006). Since romantic relationships are more characterized in terms of intense feelings of positivity as compared to friendships (Collins et al. 2009), negative emotions in the face of conflict might consequently be even more detrimental for depressive symptoms in adolescent romantic relationships.

Less understood is the potential role of positive relationship dynamics in protecting adolescents from depressive symptoms. Little research has examined the possibility that positive emotions in adolescents' romantic relationships, such as humor and affection, might be an important source of support and bolster adolescents' mental health. Depressed adolescents show less positive emotions in general, and in all probability, this holds true in their interactions with romantic partners (Forbes and Dahl 2005). Positive emotions in adult intimate relationships are prognostic of low levels of conflict and

negative behavior (Gottman and Levenson 1986; Yuan et al. 2010). Previous studies have found that women’s positive engagement (positive and neutral emotions) in conflicts predicted lower levels of depression in both partners over time (Laurent et al. 2009).

Adolescents’ negative and positive emotions in romantic relationships are inherently transactional. How adolescents interact with their romantic partner depends not only on their own emotions, but also on the emotions of the partner. Statistically, it is important to disentangle characteristics of each partner of a dyadic relationship from the characteristics of the social interaction. The actor–partner interdependence model (APIM; Cook and Kenny 2005) enables one to simultaneously estimate these unique and interdependent relationships. Levels of depressive symptoms are correlated not only with the individual’s own emotions (actor effect), but also with the level of the partner’s emotions (partner effect; Fig. 1).

Using the APIM model enables the investigation of possible gender differences in how adolescents are affected by the dynamics of their romantic relationship. Girls tend to be more interested in and attuned to romantic relationships than are boys (Rudolph and Hammen 1999). Therefore girls might be more strongly affected by romantic relationship conflicts, compared with boys (Hammen 2009), and their emotions may define the emotional climate of the relationship. This could mean that girls’ negative and positive emotions in the interaction are more strongly related to their own and their

partner’s depressive symptoms, as compared with boys’ negative and positive emotions.

Epidemiological studies have also found that depressed adolescents were more likely to report recent relationship break-ups (Ayduk et al. 2001; Monroe et al. 1999). However, the studies did not measure the dynamics of the romantic relationship and longitudinal change in depressive symptoms during adolescence. This developmental research is necessary to disentangle potential confounds associated with recall bias about depressive symptoms and to clarify how depressive symptoms may lead to relationship break-up. Specifically, longitudinal research could elucidate whether the dynamics of the relationship (i.e., negative and positive emotions) or the break-up contributes to depressive symptoms over time. As such, we included measurements of negative and positive emotions, break-up, and depressive symptoms at two time points over a 2-year period.

This Study

This observational study investigated whether adolescents’ expressed negative emotions and positive emotions during conflict discussions related to relative increases in depressive symptoms over a 2-year period. Specifically, it was hypothesized that high levels of negative emotions (actor and partner effects) at Time 1 (T1) would be associated with higher levels of depressive symptoms at Time 2 (T2). Conversely, we expected that more positive emotions (actor and partner effects) during conflict discussions would be related to less depressive symptoms at T2. These hypotheses were tested while taking relationship break-up into account to control for the fact that a relationship break-up could have contributed to heightened levels of depressive symptoms. In addition, we controlled for relationship satisfaction, relationship duration, and age.

Method

Participants

A total of 1,913 adolescents between 13 and 18 years old ($M=15.34$, $SD=0.80$; $n=983$ girls) participated in a large project examining social skills and general dating behaviors (see Ha et al. 2010b). The participants had been recruited from 10 secondary schools in the east of The Netherlands. For our study, 701 adolescents (36.6 % of the original sample) were approached who had provided contact information and were willing to participate in a longitudinal study. A criterion for inclusion was that adolescents were, at the time of inquiry, involved in a heterosexual relationship. In total, 163 adolescents (23.3 %) were involved in a romantic relationship, which is comparable to other Dutch samples (Ha et al. 2010a).

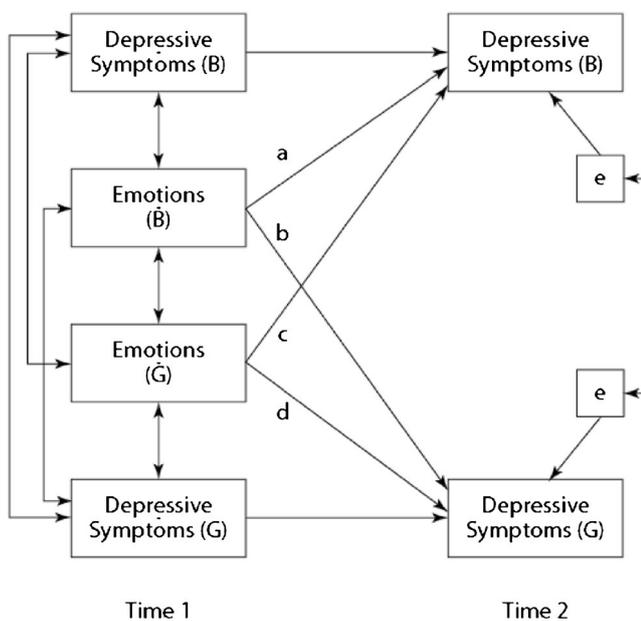


Fig. 1 The actor–partner interdependence model of emotions and depressive symptoms. Note. G = girls, B = boys. Path a = actor effect from boys’ emotions on their own depressive symptoms; Path b = partner effect from boys’ emotions on girls’ depressive symptoms; Path c = partner effect from girls’ emotions on boys’ depressive symptoms; Path d = actor effect from girls’ emotions on their own depressive symptoms

Adolescents who met the inclusion criteria but declined participation did so because of practical reasons ($n=29$, 17 %); for example, the partner lived in another city or the assessment would interfere with their school schedule. In total 5 (3 %) adolescents declined participation because they were not interested in the study. A common reason for not participating was that adolescents initially agreed to participate but broke up their romantic relationship before the study assessment ($n=22$, 13 %). The range of time between assessment of the full sample and assessment of the observational subsample was 2 to 6 months. After obtaining adolescents' consent, we contacted each adolescent's partner and asked them to participate as well. Parents were informed about the aims of the study and were asked to provide active consent for their child's participation. Three parents contacted the researchers for additional information, but none of them declined consent.

The final sample comprised 80 heterosexual adolescent couples between age 13 and 18 years at Time 1 (M age=15.48 years, $SD=1.16$). Most adolescents (96.2 %) were of Dutch origin; 10.1 % were involved in lower vocational education, 32.3 % in intermediate general education, 53.8 % in the highest level of secondary school (i.e., preparatory college and university education), and 3.8 % in other education. We performed independent t -tests to examine whether sample characteristics differed between the total sample and the sample of adolescents in romantic relationships who were observed. No significant differences were found regarding age, gender, origin, and level of education. Given the schools' concerns about asking for sensitive information from the entire school population, depressive symptoms were not measured in the total survey sample. Two years later at T2, 7 boys and 7 girls (8.75 %) did not provide complete information about depressive symptoms. Independent t -tests showed that there were no significant differences between participants who dropped out at T2 and those who stayed in the study with regard to demographics variables (age, gender, origin, and level of education). More important, no significant differences were found regarding occurrence of depressive symptoms at T1 and of positive and negative emotions.

Mean duration of the current relationship at T1 was 7.83 months ($SD=6.13$); 56 % of the participants had been in a relationship for less than 6 months. Regarding relationship experience at T1, 85 % had at least one previous romantic relationship, and girls and boys reported having had an average of more than three previous relationships ($M=3.8$, $SD=2.17$; and $M=3.3$, $SD=1.65$, respectively). Between T1 and T2, 68 % of the couples dissolved their relationship ($n=54$ couples). Of these dissolved couples, 48 participants were involved in a new relationship at T2 and 60 participants were not involved in a relationship. Adolescents were paid €15 each for completing the questionnaire and the observational component.

Procedure

One week before the observation sessions both partners completed their questionnaire online. In the instructions we emphasized that answers would not be given to any third party, including parents, teachers, or their partner. We instructed adolescents to fill out their questionnaires individually at home and to not consult with others. Adolescents and their partners were observed and videotaped in a private room at one of the participants' schools. Prior to the series of interactions both adolescents were asked to independently choose the most applicable conflict subject from a list of eight common conflict issues between adolescent romantic partners (cf. Capaldi, and Crosby 1997). These conflict topics included not being on time/forgetting appointments, jealousy, parents not liking your partner, disliking friends, cheating with or kissing someone else, parental rules about dating, taking your boyfriend or girlfriend to parties, and money issues. Next, the partners participated in five interaction tasks of 4.5 min each. Each topic was introduced by the researcher, who then left the room during each interaction task. As a warm-up task, the couple discussed a hypothetical situation in which they won one million euros in the lottery and could spend this money. In a second, neutral task, they planned a party together. In the third discussion the boy's conflict topic was discussed and in the fourth discussion, the girl's conflict topic.¹ Finally, as a positive task the adolescents discussed past shared happy memories or fun times in the relationship (cf. Kim et al. 2007). Approximately 2 years after T1, adolescents were contacted again and they filled out questionnaires online. We received approval for this study from the ethics committee of the Faculty of Social Sciences, Radboud University Nijmegen, The Netherlands.

Coding Procedures

The video recordings were coded using Observer software (The Observer, version 5) and a simplified 10-code version of the Specific Affect Coding System instead of the original 18 codes (SPAFF; Gottman et al. 1996; Granic et al. 2007). Adapted versions of the SPAFF have been used for observational coding regarding late-adolescence romantic relationships (Capaldi et al. 2003). Behaviors were coded in real time for each adolescent separately. This means that coders continuously defined expressed behaviors using an emotion code. Each emotion code was based on a combination of facial expressions, gestures, and speech characteristics, such as tone,

¹ The order of the conflict discussions of the boys and the girls was not counterbalanced; therefore, possible order effects could not have been ruled out.

volume, and speech rate. The modified SPAFF system consisted of 10 mutually exclusive emotion codes: contempt, anger, fear/anxiety, sad/withdrawn, whine/complain, neutral, interest/curiosity, humor, joy/excitement, and affection. With this system, trained observers entered codes for both adolescents independently in real time, yielding two synchronized streams of continuous data.

Before initiating coding of the video interactions, observers were intensively trained by the first author for 4 months to reach a criterion of 75 % agreement and 0.65 kappa using a frequency/sequence-based comparison and a criterion of 80 % agreement using a duration/sequence-based comparison (Noldus Observer 5.0). These two reliability methods were used to ensure accuracy in coding both the onset and the duration of the events. Weekly recalibration training was conducted to minimize coder drift. Thirty percent of all sessions were coded by two or three coders. Coders were blind to which interactions were used to assess observer agreement. In addition, the first author randomly checked the SPAFF codes of three remaining interactions every week. The average coder agreement was 81 % ($\kappa=0.76$) and 95 % duration/sequence based.

Measures

Depressive Symptoms We assessed depressive symptoms at T1 and T2 with a Dutch version (Cuijpers et al. 2008) of the 20-item Center for Epidemiological Studies Depression Scale (CES-D; Radloff 1977). Adolescents used a scale ranging from 0 (*less than one day*) to 4 (*5–7 days*) to indicate how often during the past week they had been bothered by the listed depressive symptoms. The CES-D has well-established psychometric properties, including high test–retest reliability and high internal consistency of 0.85 in the general population (Radloff 1977). For adolescent samples a score of 16 or more is generally considered to be indicative of potential depression. With this cutoff score, 28.5 % (T1) and 30.1 % (T2) of the girls and 13.5 % (T1) and 21.9 % (T2) of the boys in this sample could be classified as having a potential risk for depression, which are somewhat higher percentages than those reported in other studies (e.g., Ge et al. 1994). A continuous depression score was used in all analyses. Cronbach's α across all items of the scale at T1 was 0.92 for girls and 0.84 for boys and at T2, 0.89 for girls and 0.91 for boys.

Negative and Positive Emotions Adolescents' affective responses during the boys' and girls' conflict discussions were used to measure negative and positive emotions during conflict discussions. *Negative emotions* consisted of contempt, anger, fear/anxiety, sad/withdrawn, and whine/complain, whereas *positive emotions* consisted of interest/curiosity, humor, joy/excitement, and affection. Average duration of time spent in positive and negative emotions was computed by

taking the total duration of expressions of negative and positive emotions and dividing by the frequency at which each occurred (Granich et al. 2007). We were primarily interested in each adolescent's tendency to express positive and negative emotion during conflict discussions, so we aggregated both conflict discussions into a single score. The correlation for boys was 0.28 ($p=0.01$) for negative and 0.41 ($p<0.001$) for positive emotions, and for females 0.25 ($p=0.03$) for negative and 0.27 ($p=0.01$) for positive emotions. Aggregating across conflict tasks also improves the reliability of the estimate of each participant's emotional expressiveness (Stoolmiller et al. 2000).

Relationship Status At T2, relationship status was assessed. We asked both adolescents whether they were still together with the same partner.²

Relationship Satisfaction The Satisfaction subscale of the Investment Model Scale was used to measure relationship satisfaction at T1 (IMS; Rusbult et al. 1998). The IMS had originally been developed to measure commitment level, satisfaction level, investment size, and quality of alternatives. The IMS was shown to have good reliability and validity when used with a Dutch sample of adolescents (Branje et al. 2007). Five questions tapped into facet levels of satisfaction and five questions tapped into global dimensions of satisfaction. The facet items were included to enhance measurement quality of the global items. In accordance with of Rusbult et al. (1998), only the global items were used in the current analyses. An example of a global item is "My relationship is close to ideal." Response categories ranged from 1 (*do not agree at all*) to 9 (*agree completely*). Cronbach's alpha for the global items of the scale at T1 was 0.81 for girls and 0.80 for boys.

Strategy of Analyses

We specified two path models using Mplus 5.1 (Muthén and Muthén 1998–2008) to test whether negative emotions and positive emotions were related to depressive symptoms at T2, controlling for previous levels of depression at T1 (Fig. 1). The models were estimated for negative and for positive emotions separately. The effect of each participant's emotions during the conflict discussion was estimated as both actor and

² At T2 adolescents in stable relationships reported on whether there was a break-up between T1 and 2. It appeared that in total, 10 of the 26 stable couples had broken up their relationship at least once. However, with the current sample size it was not possible to investigate the effects of the three break-up groups (stable couples, stable couples with break-up, and break-up at T2) in the APIM models. However, correlational analyses indicated that multiple breakups in stable couples was not significantly related with depressive symptoms at T2.

partner effects. That is, the model disentangles the extent to which the participant's depressive symptoms at T2 were affected by their own emotions at T1 (actor effect) and by their partner's emotions at T1 (partner effect) during the conflict discussions. Second, we specified two path models that controlled for the possible effects of relationship break-up as a competing explanation for the adolescents' depressive symptoms at T2. Similar models were tested as in Fig. 1, again separately for negative and for positive emotions, but now break-up was included as a predictor of depressive symptoms at T2. Moreover, the extent to which individual depressive symptoms and emotions at T1 predicted later break-up was also examined. Guided by the work of Furman and Simon (2006), which involved a sample of 65 dyads, we used observed variables in the estimation of the APIM model. Maximum likelihood was used for the estimation of missing data. The fit of the models was assessed using comparative fit index (CFI) and root mean square error of approximation (RMSEA). CFI is considered to show a good fit when it attains values of 0.90 or higher (Bentler 1989), and RMSEA reflects a good fit with values of 0.08 or lower (Browne and Cudeck 1993).

Results

Manipulation Check

To test whether we successfully elicited conflict in the paradigm employed, a repeated-measure ANOVA was conducted with negative emotions in the four discussion tasks (planning a party, conflict boy, conflict girl, happy memory discussion) as a within-subject factor. A repeated-measures ANOVA with a Greenhouse-Geisser correction showed that mean negative emotions differed significantly among the four discussion tasks: $F(2.54, 404.15)=18.78$, $\eta_p^2=0.11$, $p<0.001$. Post-hoc tests using the Bonferroni correction revealed that both conflict discussions elicited more negative emotions. Boys' conflict discussion elicited more negative emotions compared to the "planning a party" discussion (resp., $M=8.07$, $SD=9.25$, $M=3.96$, $SD=4.83$, $p<0.001$) and the happy memory discussion ($M=4.78$, $SD=6.20$, $p<0.001$). Similarly, girls' conflict discussion elicited higher levels of negative emotions than did the "planning a party" discussion ($M=8.13$, $SD=10.08$, $p<0.001$) and the happy memory discussion ($p<0.001$). Levels of negative emotions were not significantly different in the boys' and girls' conflict discussions ($p=0.94$) nor between the "planning a party" discussion and "happy memory" discussion ($p=0.09$). Thus, conflict was successfully elicited in the conflict discussions.

Descriptives

Independent t -tests showed that girls reported more depressive symptoms than did boys at T1, $t(149)=3.35$, $p<0.001$

(Table 1). No significant sex differences emerged for depressive symptoms at T2, positive emotions, and satisfaction. Girls showed more negative emotions than did boys, $t(158)=2.96$, $p=0.01$, but there were no differences between boys and girls on the average duration of positive emotion. Regarding conflict topics boys most often chose the "taking your girlfriend to parties" topic ($n=19$; 23.8%), followed by "cheating with or kissing someone else" ($n=15$; 18.8%), and "jealousy" ($n=13$; 16.3%). Girls most often chose "cheating with or kissing someone else" ($n=26$; 32.5%), "taking your boyfriend to parties" ($n=18$; 22.5%), and "jealousy" ($n=13$; 16.3%).

Bivariate correlational analyses (Table 2) showed that for boys and for girls, depressive symptoms at T1 correlated with depressive symptoms at T2. Notably, for girls but not for boys depressive symptoms at T1 were correlated with the expression of negative emotions. In addition, negative emotions were correlated to higher levels of depressive symptoms at T2 for boys and for girls. Positive emotions of boys were not correlated to depressive symptoms at T1 and T2. Positive emotions of girls, on the contrary, were positively correlated to depressive symptoms at T2, indicating that longer durations of positive emotion during the conflict discussions related to higher levels of depressive symptoms at T2. Concerning correlations between boys and girls (Table 2), it was found that boys' and girls' depressive symptoms were related at T1 and T2. Girls' depressive symptoms at T1 were not related to boys' negative and positive emotions at T1. In addition, boys' negative emotions at T1 were related to girls' depressive symptoms at T2. Boys' depressive symptoms at T1 were related to girls' negative emotions at T1. Moreover, both girls' negative and positive emotions at T1 were related to boys' depressive symptoms at T2.

Only girls' relationship satisfaction at T1 was related to girls' depressive symptoms at T1 and T2 and girls' negative emotions, indicating that lower levels of satisfaction were related to higher levels of depressive symptoms and negative emotions. Boys' relationship satisfaction was not related to any of the model variables. Additionally, age and duration of the relationship at T1 and break-up at T2 were uncorrelated to depressive symptoms at T1 and T2 and positive and negative emotions. After a break-up, being involved in a new relationship

Table 1 Means and standard deviations ($N=160$)

	Boys	Girls	t	p
Depressive symptoms T ₁	8.68 (6.48)	13.22 (9.97)	3.35	<0.001
Depressive symptoms T ₂	10.66 (9.59)	12.12 (8.28)	1.34	<i>ns</i>
Negative emotions T ₁	1.56 (1.34)	2.20 (1.39)	2.96	<0.01
Positive emotions T ₁	3.85 (1.62)	3.65 (1.35)	0.62	<i>ns</i>
Satisfaction T ₁	7.82 (0.94)	7.76 (1.08)	0.41	<i>ns</i>

Duration values for positive and negative emotions are in seconds

Table 2 Bivariate correlations of observed negative and positive emotions and self-reported depressive symptoms of girls and of boys

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Girls									
(1) Depressive symptoms T ₁									
(2) Depressive symptoms T ₂	0.50**								
(3) Negative emotions T ₁	0.37**	0.37**							
(4) Positive emotions T ₁	0.14	0.28*	0.22*						
(5) Satisfaction T ₁	-0.46**	-0.36**	-0.23*	-0.05					
Boys									
(6) Depressive symptoms T ₁	0.29*	0.22	0.25*	0.01	-0.09				
(7) Depressive symptoms T ₂	0.32**	0.38**	0.41**	0.25*	-0.21	0.50**			
(8) Negative emotions T ₁	0.17	0.37**	0.35**	0.14	-0.22	0.08	0.26*		
(9) Positive emotions T ₁	-0.08	0.09	-0.04	0.27*	0.06	-0.09	0.19	0.12	
(10) Satisfaction T ₁	-0.21	-0.16	0.05	-0.02	0.12	-0.12	-0.02	-0.03	0.17

* $p < 0.05$, ** $p < 0.01$

or having no relationship at T2 was not related to depressive symptoms at T1 and T2.

Negative and Positive Emotions and Future Depressive Symptoms

Table 3 presents the results of the APIM models predicting depressive symptoms in boys and girls at T2 in relation to negative and positive emotions at T1. The following results are reported separately for negative emotions and for positive emotions during conflict discussions, while controlling for age and relationship satisfaction. Boys' age and relationship satisfaction were regressed on boys' depressive symptoms at T1 and T2 and also on boys' negative and positive emotions at T1. Similarly girls' age and relationship satisfaction were regressed on girls' depressive symptoms at T1 and T2 and also on girls' negative and positive emotions at T1.³ Both the negative and the positive emotion models showed a good fit.⁴

³ In additional analyses, duration of the relationship at T1 was tested as a control variable instead of age. Duration at T1 was regressed on depressive symptoms at T1 and T2 and also on the boys' and the girls' negative and positive emotions at T1. Results showed that duration of the relationship at T1 was not significantly related to any of the variables. When age of first romantic relationship was included as a covariate, it was found that it related to boys' depressive symptoms at T2 ($\beta = -0.24, p = 0.01$), indicating that a younger age of first romantic relationships was related to higher levels of depressive symptoms at T2 for boys. Number of previous relationships was also tested as a covariate; a higher number of previous relationships was found to be related to boys' depressive symptoms at T2 ($\beta = 0.21, p < 0.02$). Age of first romantic relationship and number of romantic relationships were not related to other study variables. The main relationships between positive and negative emotions and depressive symptoms over time remained the same and including relationship duration, age of first relationship, and number of previous relationships did not change the results.

⁴ When positive and negative emotions were tested in one model, problematic model fit was attained (CFI=0.87; RMSEA=0.11), yet the pattern of the results remained the same.

Negative Emotions Depressive symptoms of boys and of girls were moderately stable over the 2-year period. An actor effect was found for only girls' negative emotions at T1 relating to their depressive symptoms at T2. In addition, a partner effect was found: girls' negative emotions at T1 related to boys' depressive symptoms at T2. Concerning the age control variable, it was found that age was significantly related to boys' depressive symptoms at T2. The direction of effects suggests that older boys had lower levels of depressive symptoms at T2 than did younger boys. In contrast, for girls there was no covariation between age, negative emotion, and depressive symptoms at T1 and T2. Only girls' relationship satisfaction related to depressive symptoms at T1, indicating that higher levels or depressive symptoms related to lower relationship satisfaction in girls.

Gender differences in the stability paths of depressive symptoms and in the actor and partner effects of negative emotions on depressive symptoms at T2 were examined by individually constraining the three sets of paths to be invariant between girls and boys. A significant chi-square difference, using the correction suggested by Satorra and Bentler (2001), between constrained and unconstrained models indicates statistically significant differences between groups. The adjusted chi-square difference tests indicated that the three sets of paths did not differ as a function of gender.

Positive Emotions Depressive symptoms of boys and girls were moderately stable over time. Only actor effects were found: boys' and girls' positive emotions during conflict discussions related to their own levels of depressive symptoms at T2. More specifically, longer average durations of positive emotions during conflict discussion were related to more depressive symptoms at T2, controlling for T1 levels. No partner effects were found; therefore, a buffer effect of positive emotions on adolescent depressive symptoms was not

Table 3 Summary of APIM models for the associations between negative emotions and positive emotions and depressive symptoms (standardized beta coefficients)

		Negative emotions	Positive emotions
Control variables			
Age (B) T ₁ —depressive symptoms (B) T ₁		0.20	0.21
Age (G) T ₁ —depressive symptoms (G) T ₁		-0.16	-0.16
Age (B) T ₁ —emotions (B) T ₁		0.00	0.01
Age (G) T ₁ —emotions (G) T ₁		0.15	0.14
Age (B) T ₁ —depressive symptoms (B) T ₂		-0.23*	-0.26**
Age (G) T ₁ —depressive symptoms (G) T ₂		-0.08	-0.08
Satisfaction (B) T ₁ —depressive symptoms (B) T ₁		-0.13	-0.10
Satisfaction (G) T ₁ —depressive symptoms (G) T ₁		-0.43***	-0.42***
Satisfaction (B) T ₁ —emotions (B) T ₁		-0.08	0.17
Satisfaction (G) T ₁ —emotions (G) T ₁		-0.16	-0.07
Satisfaction (B) T ₁ —depressive symptoms (B) T ₂		0.07	0.08
Satisfaction (G) T ₁ —depressive symptoms (G) T ₂		-0.11	-0.13
Stability paths			
Depressive symptoms (B) T ₁ —depressive symptoms (B) T ₂		0.44***	0.54***
Depressive symptoms (G) T ₁ —depressive symptoms (G) T ₂		0.30*	0.34***
Actor effects			
Emotions (B) T ₁ —depressive symptoms (B) T ₂	Path a	-0.06	0.22*
Emotions (G) T ₁ —depressive symptoms (G) T ₂	Path d	0.32**	0.23*
Partner effects			
Emotions (B) T ₁ —depressive symptoms (G) T ₂	Path b	-0.03	0.09
Emotions (G) T ₁ —depressive symptoms (B) T ₂	Path c	0.36**	0.23
Fit indices			
χ^2/df ratio		3.69	2.98
CFI		0.94	0.98
RMSEA		0.07	0.04

Path notations refer to Fig. 1. Explained variance in the negative emotions model controlling for age and satisfaction: boys’ depressive symptoms T₂, R²=0.39, *p*<0.001; girls’ depressive symptoms T₂, R²=0.31, *p*<0.001. Explained variance in the positive emotions model controlling for age and satisfaction: boys’ depressive symptoms T₂, R²=0.39, *p*<0.001; girls’ depressive symptoms T₂, R²=0.29, *p*=0.002
 p*<0.05, *p*<0.01, ****p*<0.001

supported. Concerning the age control variable, it was found that age was significantly related to boys’ depressive symptoms at T₂. The direction of effects suggests that older boys had lower levels of depressive symptoms at T₂ than younger boys did. No significant relationships were found for age and depressive symptoms at T₁ and T₂ and positive emotions for girls. Only girls’ relationship satisfaction related to depressive symptoms at T₁, indicating that higher levels of depressive symptoms related to lower relationship satisfaction in girls. As in the negative emotion model, the chi-square difference tests indicated that the three sets of effects did not differ for girls and for boys.

Break-Up To investigate whether the negative and positive emotions models were replicated when break-up was included, we conducted similar analyses. However, this time paths of depressive symptoms and negative emotions of boys and of girls at T₁ related to break-up were included. Relationship break-up at T₂ was regressed on depressive symptoms in boys and in girls at T₂. In the model involving negative emotions, depressive symptoms and negative and positive emotions of

boys and of girls at T₁ did not predict relationship break-up at T₂ (for boys’ depression, odds ratio=1.02, 95 % CI [0.59, 1.77]; for girls’ depression, odds ratio=1.36, 95 % CI [0.80, 2.31]; for boys’ negative emotions, odds ratio=1.20, 95 % CI [0.55, 2.62]; for girls’ negative emotions, odds ratio=0.61, 95 % CI [0.31, 1.17]). Relationship break-up did not relate to depressive symptoms in boys and in girls at T₂ (for boys, β =0.09, *p*=0.29; for girls, β =-0.04, *p*=0.71). An identical pattern was found in the model involving positive emotions. Depressive symptoms and positive emotions of boys and of girls at T₁ did not predict relationship break-up at T₂ (for boys’ depression, odds ratio=0.93, 95 % CI [0.56, 1.55]; for girls’ depression, odds ratio=1.25, 95 % CI [0.77, 2.02]; for boys’ positive emotions, odds ratio=0.89, 95 % CI [0.49, 1.61]; for girls’ positive emotions, odds ratio=0.84, 95 % CI [0.46, 1.54]). Relationship break-up did not relate to depressive symptoms in boys and in girls at T₂ (for boys, β =0.08, *p*=0.79; for girls, β =-0.05, *p*=0.68). Thus, the predictive value of expressions of positive and negative emotions during the conflict discussion did not change when controlling for relationship break-up.

Discussion

This observational study tested the hypothesis that emotional expressions during conflict within adolescent romantic relationships are associated with increases in depressive symptoms over a 2-year period for some youth. The videotaped discussions of conflict were coded using a well-established system used in previous studies of intimate adult relationships (Capaldi and Crosby 1997; Gottman and Notarius 2000). In general, we found support for actor effects. As expected, we found that for girls their own negative emotions expressed in the conflict discussions were associated with their depressive symptoms over time. For boys, their negative emotions and those of their partner were related to their levels of depressive symptoms at T2 (partner effect). Unexpectedly, we did not find that duration of positive emotion during conflict discussions to be a sign of mental health among adolescents. We found actor effects for boys and for girls of positive emotions on depressive symptoms. Specifically, the expression of positive emotions during conflict discussions predicted increases in their own depressive symptoms in the ensuing 2 years.

This observational study extends findings from previous questionnaire-based studies that have shown a connection between involvement in romantic relationships and depressive symptomatology (e.g., Joyner and Udry 2000). Similar results have been found among married couples (Gottman et al. 1999), young adult couples (Capaldi and Crosby 1997), and adolescent friendships (Allen et al. 2006). More importantly, these findings are in line with interpersonal theories that have stressed the importance of the interpersonal context as a risk factor for depressive symptoms. Similar to results from previous studies that indicated covariation in depressive symptoms among adolescent friends (Coyne 1976; Hogue and Steinberg 1995), our study findings revealed that adolescents involved in romantic relationships have depressive symptoms that correspond to those of their partner.

Moreover, our study results indicate that romantic relationship conflict may present an enormous self-regulation challenge in adolescence, as evidenced by the expression of both positive and negative emotions. These findings are potentially consistent with stress generation theory (Hammen 2009; Rudolph et al. 2000), in that emotional reactions to conflict are prognostic of a person's future depression, regardless of break-up or satisfaction with the relationship. It is possible that an adolescent's depression creates a stressful situation that impairs his or her interpersonal problem-solving skills (Ha et al. 2012). The inability of adolescents with depressive symptoms to handle conflicts, characterized by manifestations of negative emotions such as whining and contempt, may reflect an interaction pattern that predisposes adolescents to an unstable relationship or at worst, a destructive relationship. Alternatively, it is possible that adolescents with depressive symptoms are more affected by the conflict situation and

experience it as more stressful than do adolescents with less depressive symptoms. Consequently, the conflict situation induces the use of more negative emotions in depressive adolescents. These relationship experiences potentially undermine emotional well-being (Hammen 2009).

The interrelations between depressive symptoms and negative emotions relating to depressive symptoms over time seem to be particularly salient for girls. Girls' levels of depressive symptoms related to more negative emotions during conflict, which was in turn associated with higher levels of their own and partners' depressive symptoms at T2. On the contrary, levels of boys' negative emotions were not related to their own levels of depressive symptoms at the time of the interactions, nor did they relate to depressive symptoms at T2. This potential gender difference is to be interpreted with caution because the difference was only a trend and not statistically significant. The patterns revealed in the findings, however, are plausible given the existing literature on gender differences (Hammen 2009). These results may imply that girls' emotional reactions might contribute to dyadic levels of stress and thus to difficulties in the interpersonal context (Rudolph and Hammen 1999).

More thought provoking, however, is the finding of actor effects from observations of positive emotions on later depressive symptoms. These findings are inconsistent with those of studies that have examined positive emotions in the face of conflict in married adult couples. Several previous observational studies among adult couples have even shown that positive emotions buffer against depressive symptoms (Gottman and Levenson 1986; Laurent et al. 2009; Yuan et al. 2010). Our findings give pause to the assumption that adolescent romantic relationships are similar to adult marriages with respect to the function of positive emotions during conflict. It is tempting to conclude that better quality romantic relationships are paradoxically associated with increases in depressive symptoms. This may not be the case, however. Positive emotions in the context of conflict may not be indicative of romantic relationship quality, but rather conflict avoidance and denial of problems.

Romantic relationships are much more short-lived than are adult relationships; break-up is therefore likely to occur more often in adolescent romantic relationship than in adult relationships. Consequently, the emphasis in adolescent romantic relationships might be more about feeling connected to, and interdependent with, their romantic partners (Connolly et al. 1999; Connolly and McIsaac 2009) during conflict than about skillfully resolving conflict, especially when they are invested in and committed to the relationship (Seiffge-Krenke 2011). Putting adolescents in a context where they are expected to discuss a problem in their relationship likely disrupts feelings of connection and closeness and therefore leads to high levels of compensatory positive emotions. In other words, couples may be upregulating positive emotions to deal with a difficult

situation. This is likely to be a short-term solution; problems will inevitably arise in the relationship, and pretending that no issues exist is a passive way of coping. Previous studies have shown that adolescents who are better adjusted are better able to actively cope with complex interpersonal stressors (Compas et al. 2001).

Perusal of the videotaped discussions shed some light on these findings. It appeared that some adolescents responded to the conflict by drawing closer to one another and displaying high levels of affection. It was as if the affection functioned to reduce the likelihood that the partner would become upset. Although these findings are important and provocative, there is a clear need for future research. One way to identify conflict avoidance in dyadic interactions is to code both the content of what is being discussed and the extent to which the content moderates the impact of the emotional expressions. This approach, previously used to understand deviancy training in adolescent friendships (Dishion et al. 2004), could be extended to study conflict avoidance or compensatory positive emotions in adolescent romantic relationships. An additional dimension that would be important for future studies to capture is adolescents' perception of their relationship. Adolescents might perceive that they are in high quality relationships while they are not.

Although this study has many strengths, including the use of microlevel observations to gain insight into negative and positive emotions of adolescent romantic relationships, some limitations should be addressed in future research. First, the sample size is relatively small, especially for the analysis of subgroups of romantic relationships. Although break-up was included as a covariate, we could not investigate whether processes were different for relationships that survive or that end in conflict and those that are brand new and have had little opportunity for conflict to emerge. Moreover, break-up during adolescence seems to be a dynamic variable; stable couples also experienced break-ups, and adolescents who broke up with their partner at T1 had experienced break-ups with other partners. Although previous studies have shown that number of break-ups is related to emotional maladjustment (Ayduk et al. 2001; Monroe et al. 1999), it is important that future studies investigate these multiple forms of break-ups as well. In our study, we did not find that diverse forms of break-up correlated with depressive symptoms. However, the recruitment method used may have resulted in a relatively well-functioning sample of adolescents who were capable of maintaining stable relationships for a substantial amount of time, which has been hypothesized to be normative for this developmental period (Collins et al. 2009). In contrast, adolescents in high-risk samples are likely to be involved in many relationships, indicating an overinvolvement in dating. Intimate relationships in which the stakes are high (e.g., one partner committed, the other not), break-up is more likely to be associated with depression.

In addition, a larger sample size would allow the investigation of dyadic effects in the APIM models (Cook and Kenny 2005). Previous studies of adolescent friendships have shown that friends who had the most discrepant views of their conflicts were least emotionally adjusted (Burk and Laursen 2005). Relatedly, it would be interesting to investigate whether couples who are most different in their emotional expressions during conflict are most at risk for high levels of depressive symptoms. The 2-year follow up is a strength of the study, but it would be helpful in the future to periodically assess the adolescents to study the ebb and flow of relationship stressors, couple coping, and changes in depression. Experience-sampling methods could be used in which both partners report their emotions during or after conflictual situations. Moreover, factors outside the relationship could have also contributed to heightened levels of depressive symptoms (Hammen 2009). It is possible that the dynamics in adolescent romantic relationships could also create other stressful events, such as loss of friendship, failure in achievement, and conflict with parents. These events may be a product of the intense relationship or unique predictors of adjustment (Davila 2008).

The study supports the hypothesis that romantic relationships are a challenge to emotional regulation in adolescence, and as such, potentially have an amplifying role in psychopathology for some youth. It is critical to extend this research to the study of multiple relationships over time to better understand their long-term developmental significance. For example, as suggested by the longitudinal research of Shortt and colleagues (2012), each new romantic relationship is a unique learning experience. Or alternatively, adolescents may carry forward an interpersonal style that predictably relates to subsequent emotional adjustment. Stability of emotional expressions despite changing relationships would indicate the value of teaching adolescents early about how to navigate conflicts in romantic relationships. Future research would do well to consider the link between individual adjustment, relationship dynamics, and long-term adjustment outcomes.

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