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Revisiting Depression Contagion as a Mediator of the Relation Between Depression and Rejection: A Speed-Dating Study

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Abstract

Interpersonal theories of depression postulate that depressed individuals' experience of social isolation is attributable, in part, to their tendency to behave in ways that elicit rejection from others. Depression contagion has been implicated as a factor that may account for the rejection of depressed individuals. In the current study, we revisit this hypothesis by using a controlled, but realistically motivated, setting: speed dating. Approximately 2 weeks before the speed-dating event, participants' depression levels were assessed. During the event, participants had 4-min "dates" with opposite-sex partners. After each date, they responded to items that measured their affect and romantic attraction. At the end of the evening, participants indicated which partners they wanted to see again. Our results did not support depression contagion: After 4 min of interaction with partners with high levels of depressive symptoms, participants did not experience increased negative affect; instead, they experienced reduced positive affect, which led to the rejection of these partners.

Keywords

depression, interpersonal processes, rejection, depression contagion

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Depression is a debilitating mood disorder with enormous personal and societal costs. In fact, depression is the second leading cause of disability in the world (Ferrari et al., 2013). Given this alarming statistic, it is critical that we work to understand and prevent the development of depression.

One factor that has been implicated in the development of depression is social isolation (Cacioppo, Hughes, Waite, Hawkley, & Thisted, 2006). Interpersonal theories of depression posit that the experience of social isolation of depressed individuals is attributable, in part, to their tendency to behave in ways that elicit rejection from others (Coyne, 1976; Hames, Hagan, & Joiner, 2013). Indeed, several studies have supported this postulation: People tend to reject depressed individuals after interacting with them (depression-rejection relation; see reviews by Marcus & Nardone, 1992; Segrin & Dillard, 1992).

Coyne (1976) proposed that depression contagion may account for the rejection of depressed individuals by those with whom they interact; specifically, Coyne postulated that the rejection experienced by depressed individuals may be due to the negative affect they induce in others. Thus, not only do individuals with depressive symptoms experience the debilitating effects of their own depression but they may also induce negative affect and other depressive symptoms in people with whom they interact. Indeed, a meta-analysis by Joiner and Katz (1999) has provided support for the formulation that individuals report higher levels of negative affect and depressive symptoms after interacting with depressed persons. Moreover, theorists have posited that this induction of negative mood and depressive symptoms leads people to

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avoid or even ultimately reject depressed individuals (Hames et al., 2013).

Our goal in the present study was to test whether depression contagion explains the rejection of depressed individuals by those with whom they interact. Specifically, we examined whether the negative affect induced in people through interactions with individuals who are experiencing depressive symptoms could explain the rejection of the depressed individuals. In conceptualizing depression contagion, we do not mean to imply that individuals "catch" the depressive symptoms of depressed partners. Instead, it is more likely that depressed partners behave in specific ways that induce negative affect in others (Hames et al., 2013). For example, depressed individuals tend to have poor social skills (Segrin, 2000); these behaviors may then act as conduits for the relation between depression and induced negative affect in, and rejection by, others. Although the behaviors by which depressed individuals may induce negative affect in others have not been elucidated, it is critical for the concept of depression contagion that people experience a change in negative affect after interacting with individuals with depressive symptoms. In other words, we posit that interacting with depressed individuals influences the negative affect experienced by others.

It is important to note here that previous studies have failed to support the hypothesis that rejection of depressed individuals is due to induced negative affect (see Gurtman, 1986, for a review). For example, although Joiner, Alfano, and Metalsky (1992) found evidence for both rejection of depressed persons and the contagion effect in a naturalistic study of college roommates, they did not find that contagion mediated the relation between depression and rejection. The failure to find such a mediating effect, however, may be attributable to other factors, such as shared common history and familiarity (Joiner & Katz, 1999). That is, it is possible that, over time, people become accustomed or immune to the negative affect or the depressive symptoms of their depressed partners and, therefore, do not use these characteristics in making decisions about how much they like their partner (Joiner & Katz, 1999). In contrast, however, when individuals make decisions about how much they like a stranger after a brief interaction, the lack of shared history with, or knowledge about, their interaction partner might lead them to rely more strongly on their affect as a basis for their decisions.

In this study, we wanted to explore the possibility that, in addition to inducing negative affect (depression contagion), individuals with high levels of depressive symptoms may induce reduced positive affect in others. Indeed, depression is characterized not only by increased negative affect but also by reduced or blunted positive affect (anhedonia; e.g., Clark & Watson, 1991). Paralleling the concept of depression contagion, we hypothesize that depressed individuals behave in ways that reduce positive affect in others, which then leads to rejection.

To examine whether increased negative affect and reduced positive affect would mediate the relation between depression and social rejection after interactions with partners who have high levels of depressive symptoms, we used a methodology that allowed us to observe short-term interactions among strangers in a controlled, but realistically motivated, setting: speed dating. In a speed-dating event, men and women are given an opportunity to talk to several potential partners in a series of 4-min "dates" before deciding whether they would like to pursue a possible relationship with a person with whom they interacted (Finkel, Eastwick, & Matthews, 2007; Todd, Penke, Fasolo, & Lenton, 2007). Two weeks before participants attended the speed-dating event, we asked them to complete a questionnaire that assessed their depressive symptoms. This allowed us to examine whether the depression scores of partners (who were also participants in the study) were associated with participants' affect and romantic attraction to them after a relatively short dyadic interaction.

We predicted that after a brief interaction with partners with high levels of depressive symptoms, participants would experience more negative affect (depression contagion) and less positive affect and would be less romantically attracted to these partners (depression-rejection relation). We also hypothesized that participants' negative and positive affect would be related to their level of romantic attraction to their partners, such that lower negative affect and higher positive affect would be correlated with higher levels of romantic attraction. Finally, and critical to our investigation, we predicted that the depression-rejection relation would be accounted for (i.e., mediated) by the negative affect and positive affect participants experienced after the interaction with their partners.

Method

Participants and procedure

We conducted six speed-dating sessions for 136 single heterosexual individuals who were recruited within and outside Leuven, Belgium, by using posters, advertisements, Facebook and Web site posts, and mailing lists. Sessions were separated by age-group: ages 21 to 26 (four sessions) and ages 27 to 32 (two sessions). Approximately 2 weeks before the event, participants signed the consent form and responded to online questionnaires that assessed their levels of depressive symptoms, among other constructs. When participants arrived at the event, they first responded to a baseline emotion questionnaire. Participants were given 4 min

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to interact with each of their 10 to 12 interaction partners. After each date, participants immediately completed a 2-min interaction record that assessed their emotions and their evaluation of their current interaction partner. At the end of the evening, they were given a sheet of paper with the photographs of their interaction partners and were asked to indicate, by checking "yes" or "no," whether they wanted to meet their interaction partner again. They were informed that, in the case of a match, the mutual contact details of the participants would be made available to them.

Materials

Severity of depressive symptoms. We measured depressive-symptom severity by using the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), in which participants rated how frequently they experienced a range of depressive symptoms (e.g., "I had crying spells") during the past week on a 4-point scale ranging from 0 (*rarely or none of the time*) to 3 (*most or all of the time*). The sum of the CES-D items was used to index severity of depressive symptoms (Cronbach's $\alpha = .86$).

Affect. On each interaction record, using a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), participants responded to a 10-item measure that assessed their current affect ("After my last interaction, I now feel . . ."). Composite scores of positive and negative affect were created by computing the mean of the positive-emotion items (interested, happy, excited, relaxed, in love; between-subject reliability = .98)[1] and the negative-emotion items (sad, irritated, bored, nervous, anxious; between-subject reliability = .94), respectively.

Romantic attraction. On each interaction record (adapted from Eastwick & Finkel, 2008), using a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), participants responded to a three-item measure of romantic attraction ("I felt attracted to my partner," "I found my interaction partner physically attractive," "I would like to see my interaction partner again"). A single romantic-attraction score was obtained by computing the average rating across these three items (between-subject reliability = .97).

Actual choice. At the end of the evening, participants were given a sheet of paper with the photographs of their interaction partners and were asked to rate "yes" or "no" (coded as 1 and 0, respectively) to indicate whether they wanted to meet each interaction partner again.

Statistical models

To test our predictions, we used a cross-classified multilevel model; this model was recommended by Kenny and Kashy (2010) to analyze data with a social-relations-model (SRM) design (round-robin). By using this model, we were able to take into account the nonindependence of observations when we analyzed our speed-dating data. That is, (a) each observation is nested within both partner and participant, (b) participants encounter different partners and vice versa, and (c) there is a correlation between the two scores from members of the same dyad.

Of particular interest is the examination of individual differences in partners' depressive symptoms as a predictor of romantic attraction. To conduct this analysis, we added partners' depressive symptoms (participant-mean centered) as a fixed-effects predictor of participant's romantic attraction in the SRM. We conducted similar SRMs to test other relations. For the contagion effect, we regressed participants' negative affect on partners' depressive symptoms. We conducted a similar model for positive affect. To examine whether participants' affect was associated with romantic desire, we regressed romantic desire on participants' negative (or positive) affect. Again, all predictors were participant-mean centered. All analyses were conducted using SAS PROC MIXED.

A similar set of analyses was also conducted with actual choice as a dependent variable. We used a logistic model, however, because of the binary nature of the outcome variable. Analyses were conducted using SAS PROC GLIMMIX.

Within-subject mediation analysis. We used the multiple-mediator model recommended by MacKinnon (2008) to examine whether the effect of partners' depressive symptoms on participants' romantic attraction was mediated by participants' positive and negative affect. To estimate the relations at the within-subject level that are not confounded by between-subject differences, we first participant-mean centered all the predictors in the model. To take into account the cross-classified structure of the data, we estimated each relevant path for the mediation test within the cross-classified multilevel SRM. Specifically, we first regressed participants' romantic attraction on partners' depressive symptoms. Then we regressed participants' romantic attraction on participants' positive affect (b_1) and negative affect (b_2) while we controlled for partners' depression scores (c'). Next, we regressed positive affect on partners' depression scores (a_1). Finally, we regressed participants' negative affect on partners' depression scores (a_2). Analyses were conducted using SAS PROC MIXED. Support for mediation was found when the indirect paths (a_1b_1 or a_2b_2) were significant (see also MacKinnon, Fairchild, & Fritz, 2007).

To test whether the indirect paths were significant, we estimated the 95% confidence intervals (CIs) of the indirect effects (a_1b_1 or a_2b_2) by using the distribution-of-the-product method (MacKinnon, Lockwood, Hoffmann, West, & Sheets, 2002). This method has been demonstrated to be

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more accurate in estimating CIs for specific mediated effects than are other methods (Tofighi & MacKinnon, 2011). The indirect effect is statistically significant when the CI does not include the value of 0. These tests were conducted using the PRODCLIN option from the R package RMediation (Tofighi & MacKinnon, 2011).

To examine whether the effect of partners' depressive symptoms on participants' actual choice at the end of the evening was mediated by positive or negative affect, we conducted a similar analysis to that described earlier but with actual choice specified as a binary outcome variable. Analyses were conducted using SAS PROC GLIMMIX.

Results

Participant characteristics

Participants had a mean age of 25 years (SD = 3.24). There were approximately equal numbers of males (n = 67) and females (n = 69) in the study. The average level of severity of depressive symptoms on the CES-D was 11.17 (SD = 6.50), and 29 of the participants (15 females, 14 males) scored at or above the clinical cutoff score of 16 proposed by Radloff (1977). There were no gender, $t(134) = -0.72$, $p = .47$, $d = -0.12$, or age, $r = -.01$, $p = .93$, differences in the severity of depressive symptoms.

Relations among partners' depressive symptoms, participants' affect, and participants' ratings of partners' attractiveness

Table 1 presents the associations among partners' depression levels, participants' romantic attraction, actual choice, and levels of negative and positive affect (see slope estimates). We found partial support for the hypothesis that partners' depressive symptoms would be directly associated with rejection. We found that the higher the depressive symptoms of the interaction partner, the less romantically attracted participants were to their partners after the interaction (see Partners' depressive symptoms → Participants' romantic attraction in Table 1); this was not the case, however, for actual choice at the end of the evening (see Partners' depressive symptoms → Participants' actual choice in Table 1).

We did not find support for the depression-contagion hypothesis, given that the depressive symptoms of the interaction partner did not significantly predict participants' negative affect (see Partners' depressive symptoms → Participants' negative affect in Table 1). We did find, however, that higher levels of depressive symptoms in the interaction partner were related to lower levels of positive affect in participants after the interaction (see Partners' depressive symptoms → Participants' positive affect in Table 1). Thus, although partners' depressive symptoms did not increase participants' negative affect, they appear to have dampened participants' positive affect.

We also found significant associations between participants' affect and their romantic attraction to and actual choices of partners, as shown in the Participants' negative (or positive) affect → Participants' romantic attraction (or actual choice) sections of Table 1. Participants who experienced lower negative and higher positive affect after interacting with their partner reported being more attracted to their interaction partner and were more likely to choose their partner at the end of the evening.[2,3]

Mediating effect of participants' affect on the relation between partners' depressive symptoms and participants' rating of partners' romantic attractiveness

Figure 1 displays the effect of partners' depressive symptoms on participants' rating of romantic attraction, and participants' actual choice, mediated by participants' levels of positive and negative affect after interacting with their partners. Positive affect was a significant mediator of the relation between depressive symptoms and level of romantic attraction ($a_1b_1 = -0.18$, $SE = 0.06$, 95% CI = [–0.30, –0.06]); this was not the case with negative affect ($a_2b_2 = -0.00$, $SE = 0.00$, 95% CI = [–0.01, 0.00]; see Fig. 1, top panel). A similar pattern of results was found for actual choice. Positive affect significantly mediated the relation between depressive symptoms and actual choice ($a_1b_1 = -0.49$, $SE = 0.17$, 95% CI = [–0.85, –0.17]), whereas negative affect did not ($a_2b_2 = -0.02$, $SE = 0.02$, 95% CI = [–0.05, 0.01]; see Fig. 1, bottom panel). Participants reported lower levels of positive affect after they interacted with partners who reported higher levels of depressive symptoms. Furthermore, participants' experience of reduced positive affect was associated with less romantic attraction to, and higher likelihood of rejecting, interaction partners with higher levels of depressive symptoms.

Discussion

Interpersonal theories of depression posit that individuals who are experiencing depressive symptoms induce negative affect in others (depression contagion), which leads them to be rejected (Coyne, 1976; Segrin & Dillard, 1992). In this study, we tested this hypothesis by using a speed-dating methodology, which allowed us to examine how individuals with varying levels of depressive symptoms interact with strangers in a controlled, but realistically motivated, setting (Finkel et al., 2007; Todd, et al., 2007).

First, with respect to the direct relation between depression and rejection, we found that participants

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Table 1. Associations Among Partners' Depressive Symptoms, Participants' Positive and Negative Affect, and Participants' Romantic Attraction to the Interaction Partner

Measure	β	*df*	*t*	*p*	95% CI
Partners' depressive symptoms → Participants' romantic attraction					
Intercept	2.88 (0.06)	200	44.96	< .01	[2.75, 3.01]
Slope	–0.46 (0.18)	122	–2.57	.01	[–0.81, –0.10]
Partners' depressive symptoms → Participants' actual choice					
Intercept	–0.65 (0.15)	144	–4.24	< .01	[–0.95, –0.34]
Slope	–0.60 (0.41)	103.7	–1.48	.14	[–1.41, 0.20]
Partners' depressive symptoms → Participants' negative affect					
Intercept	1.26 (0.02)	146	60.68	< .01	[1.22, 1.30]
Slope	0.03 (0.02)	124	1.43	.16	[–0.01, 0.08]
Partners' depressive symptoms → Participants' positive affect					
Intercept	2.65 (0.05)	162	55.56	< .01	[2.55, 2.74]
Slope	–0.18 (0.06)	118	–2.95	< .01	[–0.29, –0.06]
Participants' negative affect → Participants' romantic attraction					
Intercept	2.87 (0.06)	200	44.56	< .01	[2.74, 2.99]
Slope	–0.44 (0.08)	1,315	–5.72	< .01	[–0.58, –0.29]
Participants' positive affect → Participants' romantic attraction					
Intercept	2.88 (0.05)	216	55.20	< .01	[2.78, 2.98]
Slope	1.02 (0.04)	1,360	25.65	< .01	[0.94, 1.10]
Participants' negative affect → Participants' actual choice					
Intercept	–0.71 (0.15)	145.4	–4.57	< .01	[–1.01, –0.40]
Slope	–1.40 (0.28)	1,313	–4.97	< .01	[–1.95, –0.85]
Participants' positive affect → Participants' actual choice					
Intercept	–0.75 (0.15)	140	–5.05	< .01	[–1.04, –0.45]
Slope	2.86 (0.20)	1,441	14.57	< .01	[2.48, 3.25]

Note: Standard errors are shown in parentheses. CI = confidence interval.

were less romantically attracted to, but not necessarily more likely to reject, interaction partners with high levels of depressive symptoms. Second, with regard to the depression-contagion hypothesis, participants did not experience increased negative affect after interacting with partners with high levels of depressive symptoms; instead, they experienced reduced positive affect after interacting with partners with high levels of depressive symptoms. More important, however, we found a consistent mediating effect of reduced positive affect on the depression-rejection relation. Specifically, after brief 4-min interactions, individuals with high levels of depressive symptoms induced lower positive affect (but not higher negative affect) in others, which led them not only to be rated as less romantically attractive immediately after the interaction but also to be rejected at the end of the evening.

These findings are not precisely what Coyne (1976) originally suggested; that is, we did not find support specifically for the depression-contagion hypothesis. Participants' negative affect did not increase after interacting with partners with high levels of depressive symptoms. Instead, participants' positive affect declined after interacting with partners with high levels of depressive symptoms, and this decreased positive affect mediated the relation between depression and rejection. Although these findings do not support the depression-contagion hypothesis in the strictest sense, they do demonstrate that participants tend to not enjoy their interactions with partners with high levels of depressive symptoms, which increases the likelihood that they will reject these partners at the end of the evening.

Given the short-term nature of the dyadic interactions in this study, these findings suggest that decreased positive affect (and not necessarily increased negative affect) is one of the first indicators of rejection. Indeed, this proposition is consistent with Baumeister and Leary's (1995) theory concerning people's motivation to form and maintain relationships. Their theory posits that the formation of social bonds is specific to the experience of positive, but not of negative, affect. Several studies have provided additional support for this possibility: Decreases in positive affect (but not increases in negative affect) have been shown to be associated with less attraction and social activity (Berrios, Totterdell, & Niven, 2015; Vittengl & Holt, 2000; Watson, Clark, McIntyre, & Hamaker, 1992). This implies, therefore, that strangers who experienced reduced positive affect after an

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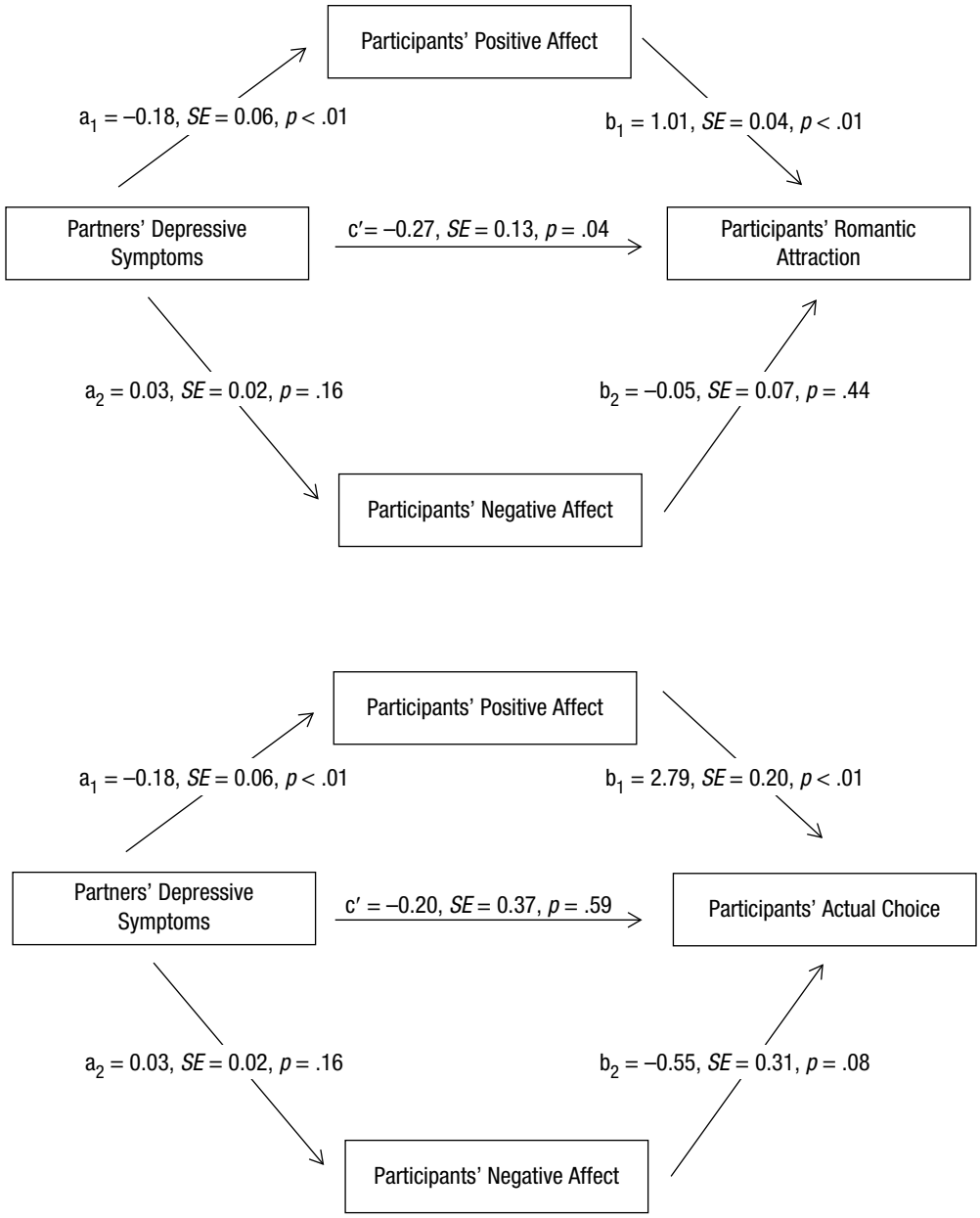

Fig. 1. Mediating effect of participants' affect on the relation between partners' depressive symptoms and participants' attraction to interaction partner. The top panel shows the relation between partner's depressive symptoms and participants' romantic attraction mediated by participants' positive and negative affect. The bottom panel shows the relation between partners' depressive symptoms and participants' actual choice mediated by participants' positive and negative affect.

interaction would be less inclined to form a relationship with their interaction partner. Because individuals with depressive symptoms tend to induce lower levels of positive affect in strangers with whom they interact, the likelihood that they will be rejected is increased.

There are some features of this work that limit the conclusions we can draw about the mediating role of reduced positive affect in explaining the depression-rejection relation. First, this study is correlational; therefore, we cannot make causal claims about the relations among depressive symptoms, affect, and romantic attraction. Second, given that our findings are based on individuals' self-reports about their levels of depressive symptomatology prior to participation in the speed-dating event, we cannot generalize our findings to clinically depressed individuals or to individuals experiencing other clinical disorders. Third, levels of depressive symptomatology were assessed 2 weeks before the speed-dating event and, thus, may not reflect participants' levels of depressive symptomatology during the day of the event itself. It is important to note, however, that the time interval between these two measurements

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could only add noise to the estimated relation. The fact that we still find evidence for the relation between individuals' depressive symptoms (assessed 2 weeks before) and their partners' positive affect (after a brief interaction) underscores the strength of this finding.

Finally, individuals may have experienced reduced positive affect after interacting with depressed partners because their partners behaved in ways that were perceived to be unattractive. For example, researchers have shown that depressed people tend to have poor social skills (Hames et al., 2013; Segrin, 2000); it is possible, therefore, that the poor social skills of partners with depressive symptoms made them less attractive and caused individuals to experience reduced positive affect after interacting with them. Future research is needed not only to clarify this relation but also to identify which behaviors of depressed individuals lead to reduced positive affect in others and increase their likelihood of being rejected.

One may also wonder whether the fact that participants had to make an explicit choice concerning whom they wanted to see again after a speed-dating interaction represents what occurs in real life. We contend that it does. In real life, individuals often make immediate and private judgments concerning whether they like someone (Willis & Todorov, 2006). We simulated these private judgments in the speed-dating procedure by telling participants that the choices they would make at the end of the evening would be kept confidential (and, therefore, private). Therefore, we do not think that participants' responses during the speed-dating event would differ from the private judgments they would make in a real-life setting. This argument is speculative, however, and should be tested explicitly in future research.

To date, a significant amount of research has been conducted on interpersonal processes in depression. To move the field forward, however, researchers should use situations that allow them to examine interactions of depressed individuals in a controlled, but ecologically valid, setting. For example, researchers in previous studies have used college roommates to examine depression contagion (Howes, Hokanson, & Loewenstein, 1985; Joiner et al., 1992). In the current study, we add to this body of work by examining depressed individuals' brief encounters in a speed-dating event. Brief interactions play a significant role in broadening one's social support system. Individuals tend to gather information from such interactions, and this information is often used to decide whether to continue or stop a potential relationship (Miller & Todd, 1998). Being rejected at such an early part of the process undoubtedly results in a lower probability of starting a new relationship. By gaining a better understanding of the behaviors of depressed individuals during brief encounters, researchers can provide them with tools to improve their interpersonal skills, which may then help them to increase their chances of broadening their social support system.

In conclusion, our findings demonstrate that the interpersonal problems of individuals with high levels of depressive symptoms extend beyond interactions with their significant others. Rejection by strangers likely contributes to their sense of social isolation by preventing them from forming new relationships and developing a broader social support system. The experience of rejection not only by their significant others (Gotlib & Lee, 1989) but also by strangers, in this case potential mates, may exacerbate individuals' symptoms (including feelings of social isolation) and increase their risk of developing clinically significant depression.

Author Contributions

M. L. Pei, I. H. Gotlib, and P. Kuppens contributed to the study concept. M. L. Pei coordinated the data collection and helped collect the data. M. L. Pei analyzed the data with help from W. Van Den Noortgate. M. L. Pei, P. Kuppens, and I. H. Gotlib interpreted the results. M. L. Pei drafted the manuscript. P. Kuppens, W. Van Den Noortgate, and I. H. Gotlib critically revised the manuscript. All authors approved the final version of the manuscript for submission.

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Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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Notes

1. All between-subject reliability estimates were calculated using the recommendation of Shrout and Lane (2012).
2. In conducting these analyses, we also controlled for several possible confounding variables. First, we controlled for participants' own depressive symptoms by including their depressive symptoms (CES-D scores were group-mean centered) as a fixed predictor in all the models; all results remained the same. Second, we controlled for possible carryover effects of positive and negative affect from previous interactions by including positive (or negative) affect at Time $t - 1$ as a covariate (participant-mean centered) when predicting current positive (or negative affect); all results remained the same. Third, we controlled for possible time effects when predicting positive or negative affect by including time in the analyses (centered at Time Point 7;

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total of 13 time points); all results remained the same. Finally, we controlled for initial levels of positive (or negative) affect when predicting current positive (or negative affect); again, all results remained the same.

3. We also examined whether gender moderated any of these associations by including gender and its interaction with the specific predictor of interest into the SRM. Males and females were coded as 0 and 1, respectively. Only the relations between participants' negative affect and participants' romantic attraction ($\beta = -0.55$, $SE = 0.15$, $t = -3.76$, $p < .01$) and positive affect and actual choice ($\beta = 1.05$, $SE = 0.40$, $t = 2.63$, $p < .01$) were significantly moderated by gender. Disentangling these significant interaction effects, we found a significant negative relation between negative affect and romantic attraction in females but not in males; the relation between participants' positive affect and actual choice was more strongly positively associated in females than in males.

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