

## PERCEIVED PARTNER RESPONSIVENESS MEDIATES THE ASSOCIATION BETWEEN SOCIAL ANXIETY AND RELATIONSHIP SATISFACTION IN COMMITTED COUPLES

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Despite the inherent interpersonal nature of social anxiety (SA), a surprisingly sparse literature addresses the interpersonal processes occurring within the committed romantic relationships of SA individuals. The current study tested the hypothesis that the relational phenomenon of perceived partner (un)responsiveness (PPR; Reis, Clark, & Holmes, 2004), mediates the association between SA and poor relationship satisfaction. We used recently-developed actor-partner-interdependence mediational models with data from a 35-day dyadic diary study of 80 committed couples. Social anxiety was found to be tied to poor relationship satisfaction in the daily lives of both persons with SA (actors) and their partners. For the actors, this negative association was fully mediated by the actor's perception of poor partner responsiveness. In contrast, for the partners, this negative association was not attributable to PPR. The results remained essentially unchanged even when controlling for comorbid depressive symptoms and for prior relationship satisfaction.

*Keywords:* Social Anxiety, Perceived Partner Responsiveness, Romantic Relationships, Daily Diaries, Actor-Partner-Interdependence-Mediational-Model

Social anxiety (SA) involves a marked and persistent fear of social or performance situations in which the person is exposed to unfamiliar people or to possible scrutiny by others. Individuals with SA

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excessively fear social situations in which they may act in ways that embarrass or humiliate themselves, as well as ones that may lead to others' negative evaluation (American Psychiatric Association, 2013). Consequently, such feared situations are avoided or endured with excessive anxiety, and SA has been shown to be associated with significant functional impairments and diminished quality-of-life (e.g., Eng, Coles, Heimberg, & Safren, 2005; Schneier, Johnson, Hornig, Liebowitz, & Weissman, 1992).

Social anxiety (SA) is inherently interpersonal, and recent decades have seen the emergence of several models of the disorder which highlight this interpersonal nature. As outlined by Alden and Taylor (2010), these interpersonal models share some basic underlying tenets. Specifically, they adopt a developmental perspective, stressing the role of negative qualities of early social interactions with significant others (e.g., parental intrusiveness and control, or peer rejection; Wilde & Rapee, 2008) in shaping the expression of biological tendencies towards inhibition and anxiety. Among vulnerable individuals, these early negative experiences engender a self-view which comprises negative self- and relational-schemas (i.e., cognitive maps): the self is viewed as deficient/inadequate while others are viewed as critical/ignoring of oneself (Taylor & Alden, 2005).

These schemas then set in motion maladaptive interpersonal cycles which perpetuate both the schemas themselves and the resulting symptomology (Davila & Beck, 2002; Vöncken, Alden, Bögels, & Roelofs, 2008). Indeed, various interpersonal impairments have been documented among those suffering from SAD. For example, they have been found to have fewer and less satisfying social relationships (e.g., Eng et al., 2005; Hart, Turk, Heimberg, & Liebowitz, 1999), to have lower levels of perceived social support, and to be more socially and emotionally isolated (e.g., Mendlowicz & Stein, 2000). In two large epidemiological studies, a SAD diagnosis was tied to impaired friendship quality above and beyond perceived family relationship quality, diagnosis of other mental disorders, and a variety of demographic variables. Importantly, this tie was specific to SAD and was not true of other mental disorders (Rodebaugh, 2009; Rodebaugh, Fernandez, & Levinson, 2012; for similar findings of low perceived intimacy and closeness that are specific to SAD, see Weisman, Aderka, Marom, Hermesh, & Gilboa-Schechtman, 2011).

The interpersonal deficits appear to be embedded within maladaptive interpersonal cycles. Specifically, across various types of relationships (with unfamiliar people, friends, or close others), SA

individuals tend to inhibit their emotional expression or to limit their self-disclosure (e.g., Cuming & Rapee, 2010; Farmer & Kashdan, 2012; Gee, Antony, & Koerner, 2012; Sparrevoorn & Rapee, 2009). Additionally, they often fail to reciprocate openness (e.g., Heerey & Kring, 2007). As a result, other people are less willing to engage in future interactions with them (e.g., Alden & Wallace, 1995), a reaction which maintains the social and emotional isolation of SA individuals. As Alden and Taylor (2010) summarize, SA individuals are caught in a maladaptive cycle in which their social behaviors convey disaffiliative messages which engender negative reactions and disengagement from others; in this way, the development of close relationships is hampered and social isolation is maintained or worsened.

Despite the attention to the pernicious interpersonal cycles in SAD and particularly to impairments in social relationships, a surprisingly sparse literature addresses the processes occurring within the committed romantic relationships of SA individuals (i.e., Kashdan, Ferssizidis, Farmer, Adams, & McKnight, 2013). These relationships are of central importance in adulthood, and for most individuals, are tied to physical and mental health (e.g., Acevedo, Aron, Fisher, & Brown, 2012; Bodenmann & Randall, 2013; Kiecolt-Glaser & Newton, 2001), lower mortality (e.g., Rogers, 1995), life satisfaction, and wellbeing (e.g., Birditt & Antonucci, 2007). Moreover, there is growing recognition regarding the role of intimate relationships in the etiology and course of many forms of psychopathology (i.e., Bodenmann & Randall, 2013; Whisman & Baucom, 2012). This association between relationship quality and psychopathology is especially strong when it comes to affective disorders such as depression and anxiety.

The limited empirical work which exists regarding the committed romantic relationships of SA individuals suggests that these relationships are indeed characterized by impaired functioning. For example, SA individuals are less likely to form committed bonds (e.g., Schneier et al., 1992), tend to perceive themselves to be less desirable mates, and expect to engage less attractive partners (Wenzel & Emerson, 2009). Even when SA individuals succeed in forming romantic relationships, these tend to be at high risk for impairment. Specifically, SA individuals tend to adopt avoidant and dependent relational styles (e.g., Davila & Beck, 2002), be more blaming of their partner (Wenzel, 2002), engage in negative or self-protective communication and in limited self-disclosure (e.g., Cuming & Rapee,

2010), and tend to devalue their partner when confronted with possible rejection (Afram & Kashdan, 2015). Consequently, they experience less intimacy (e.g., Sparrevohn & Rapee, 2009).

In this work, we hypothesize that the relational phenomenon of perceived partner (un)responsiveness (Reis, Clark, & Holmes, 2004) plays a central role in the reduced relationship satisfaction of SA individuals. Specifically, we propose that SA individuals tend to perceive their partners as less responsive to their important personal needs, and as a result experience less satisfaction within their intimate relationships.

Perceived responsiveness from one's partner (PPR) has been proposed as a core principle or central theme for relationship research as a whole, one which could help organize and explain how various theoretical relational constructs (e.g., attachment, social support, or intimacy) interconnect (Reis et al., 2004). PPR refers to the perception of behaviors that communicate understanding, valuing, and caring for one's core self and/or for important personal needs and goals. It has been shown to be a central determining aspect of relationship functioning and satisfaction (e.g., Gable, Gonzaga, Strachman, 2006; Maisel & Gable, 2009), and to moderate or mediate the effects of relationship behaviors (e.g., support, sexuality) on various outcomes (e.g., Bar-Kalifa & Rafaeli, 2013; Fekete, Stephens, Mickelson, & Druley, 2007; Gadassi et al., 2015; Selcuk & Ong, 2013). For example, within relationships characterized by responsiveness, partners show a reduced need for defensive reactions to real or potential failure (Caprariello & Reis, 2011) and an increased likelihood of self-disclosure (Maisel, Gable, & Strachman, 2008). Similarly, dyadic support has been found to be emotionally (Maisel & Gable, 2009) or physically (Selcuk & Ong, 2012) beneficial only when it was perceived as responsive. In addition, the harmful effects of support that mismatches one's needs were found to be mediated through low PPR (Bar-Kalifa & Rafaeli, 2013).

Responsive interaction sequences begin when one (a) elicits responsiveness by expressing (verbally or not) a need, a desire, an accomplishment, or some other core aspect of oneself. This provides an opportunity for the partner to (b) act in a responsive way. Often, the sequence will progress with the recipient (c) perceiving their partner's responsiveness; this unfolding sequence influences both partners' outcomes (Reis et al., 2004; Reis & Clark, 2013).

Because individuals with SA are characterized by the maladaptive interpersonal cycles described above (e.g., inhibited emotional

expression, diminished intimacy reciprocation), we propose that SA individuals face difficulties in traversing this responsiveness sequence successfully. Specifically, in light of the sparse literature on the intimate relationship of SA individuals, we base this prediction on some early and indirect findings indicating that SA individuals (a) elicit less responsive behaviors from their partners, (b) receive less responsive behaviors from their partners, and (c) are negatively biased to perceive their partners' behavior as less responsive. Notably, because responsiveness processes are reciprocal in nature (Reis et al., 2004), the partners of SA individuals may also experience low PPR, and as a result be less satisfied in their relationships.

### REDUCED ELICITATION OF RESPONSIVENESS

Responsive interaction sequences commence when one party expresses, explicitly or implicitly, needs or desires. These expressions, like all forms of self-disclosure, inherently involve the risk of rejection (e.g., Kashdan et al., 2007; Moscovich, Rodebaugh, & Hesch, 2012; Murray, Holmes, & Collins, 2006). SA individuals are particularly sensitive to such rejection, have a self-protective communication style (Davila & Beck, 2002), and consequently, limit self-disclosure and tend to be inhibited in interpersonal encounters (Leary & Atherton, 1986). This general pattern of interpersonal behavior appears to also occur specifically within the committed romantic relationships of these individuals (e.g., in sub-clinical SA: Cuming & Rapee, 2010; in clinical SA: Sparrevohn & Rapee, 2009). Moreover, rather than relying on emotional expression to increase closeness, SA individuals (or at least women) seem to rely more on emotional and behavioral inhibition attempts to create interpersonal closeness (Kashdan, Volkmann, Breen, & Han, 2007). Unfortunately, their inhibition in eliciting responsiveness inevitably limits their partners' opportunities to detect their needs or desires, and results in lower actual responsiveness.

These partners of SA individuals are also likely to elicit less responsiveness. After all, self-disclosure is built on mutuality and reciprocation (e.g., Laurenceau, Barrett, & Pietromonaco, 1998; Reis & Patrick, 1996); since SA individuals limit their own self-disclosure, their partners may also feel less comfortable in sharing their emotions, needs, or desires (e.g., Alden & Wallace, 1995). This possible partner effect has received little empirical attention to date.

## REDUCED RECEIPT OF RESPONSIVENESS

Although many studies (e.g., Vöncken et al., 2008) have documented the negative responses that arise in strangers or acquaintances when interacting with SA individuals, little is known about the responsiveness of the behaviors enacted towards SA individuals within their committed romantic relationships. However, a recent study provides some indication that this responsiveness is lacking (Kashdan et al., 2013). Specifically, SA individuals and their partners were found to receive (and enact) less responsiveness from (or towards) their intimate partners during/following shared positive events. Thus, it seems that SA individuals receive and enact less responsiveness in their romantic relationships.

## BIASED PERCEPTION OF RESPONSIVENESS

As several studies (including Kashdan et al., 2013, noted above) demonstrated, SA individuals are also biased to perceive their partners' behaviors as less responsive than they actually are. For example, SA individuals have been found to attend to negative (verbal and nonverbal) social cues and behaviors while ignoring positive ones (e.g., Johnson, Johnson, & Petzel, 1992; Spokas, Rodebaugh, & Heimberg, 2007; Winton, Clark, & Edelman, 1995), to make quicker and more negative evaluations (Gilboa-Schechtman, Presburger, Marom, & Hermesh, 2005), to interpret ambiguous behaviors negatively (Ledley & Heimberg, 2006; Taylor & Alden, 2005), to rate favorable evaluators as less perceptive (Lake & Arkin, 1985), and to fail to discriminate between neutral and positive conversational partners (e.g., Taylor & Alden, 2005). These perceptual biases are very relevant to PPR as the perception of partner responsiveness is highly susceptible to biases and projections (e.g., Lemay, Clark, & Feeney, 2007).

Through processes that are far from fully explored, the perceptions of those interacting with SA individuals may also become tinged with global negative features. For example, SA individuals were viewed as less warm, less competent, and less likable by objective interviewers and, even more significantly, by their best friends (Gough & Thorne, 1986). To our knowledge, no empirical work has examined the perceptions of the committed romantic partners of SA individuals regarding their partner's responsiveness.

## THE PRESENT STUDY

In sum, the interpersonal difficulties (e.g., Alden & Taylor, 2010) characteristic of those who suffer from SA seem to also include impairments within the context of their committed romantic relationships, though the literature regarding these is only beginning to emerge (e.g., Kashdan et al., 2013). In the current study, we propose a mechanism through which SA may exert pernicious effects on both partners' relationship satisfaction. Specifically, we hypothesize that SA will predict low PPR, which in turn will predict low relationship satisfaction in couples' daily life. The findings regarding the impairment of PPR processes among the partners of SA individuals is even more limited, but since these processes are inherently reciprocal an exploratory analysis will test whether partners' SA predicts partners' low PPR and, through it, partners' low relationship satisfaction as well.

The current study utilized longitudinal dyadic daily diary data obtained from romantically-committed couples to test the processes described above. Specifically, it used the Actor-Partner-Interdependence-Mediational-Model (APIMeM; Ledermann, Macho, & Kenny, 2011) to test 2 dyadic mediational models. In the first, pre-diary SA was used to predict daily variations in PPR, which in turn predicted daily variations in relationship satisfaction; this model capitalized on the rich ecologically-valid monitoring of both PPR and relationship satisfaction. In the second, pre-diary SA was used to predict average daily levels of PPR, which in turn predicted post-diary relationship satisfaction; this model allowed us to test the temporality of the mediational process.

In the current study we wished to examine whether the patterns specified above are specific to SA, above and beyond the related and highly comorbid condition of depression (e.g., Stein et al., 2001). Depression too has its characteristic interpersonal cycles (e.g., Beach, Sandeen, & O'Leary, 1990; Coyne, 1976; Hammen, 1991) which have been extensively studied in the context of committed romantic relationships (Rehman, Gollan, & Mortimer, 2008; Whisman & Baucom, 2012). However, several SA studies have demonstrated interpersonal effects that are specific to the disorder after controlling for depression (e.g., Rodebaugh 2009; Davila & Beck, 2002; Weisman et al., 2011). Moreover, prospective studies found that some of the maladaptive interpersonal features which are at the core of social



anxiety (e.g., avoidance of expressing emotions; Grant, Beck, Farrow, & Davila, 2007) may also serve the mechanisms responsible for the development of depression. To disentangle the relational consequences of SA from those of depression, we adjusted for depression levels in all our analyses.

## METHOD

### PARTICIPANTS

Both print and online flyers invited participants to a couples' study in exchange for \$100 per couple and inclusion in a raffle for a gift worth \$200. Participants were 86 Israeli couples who have been cohabiting for a minimum of 6 months, and were at least 18 years old. Six couples (7%) dropped out during the study period. Among the remaining couples the mean age was 26.7 ( $SD = 3.9$ ) for women and 29.3 ( $SD = 4.4$ ) for men. All participants had completed high school, with an average of 2.5 years ( $SD = 2.3$ ) of post-secondary education; most (61.6%) had also completed a Bachelor's degree. The average relationship duration was 4.6 years ( $SD = 2.9$ , range = 1–17 years). The average length of cohabitation was 3.0 years ( $SD = 2.5$ , range = 6 months – 15 years). Fifty-six couples (70.0%) were married, and 21 (26.3%) were parents.

### PROCEDURE

In an initial lab session, participants gave informed consent, completed background questionnaires, were introduced to the web diary and instructed in its use, and received a personal password to access a secure online data collection site ([www.qualtrics.com](http://www.qualtrics.com)). Each evening, for 35 days, participants received a link to the diary questionnaire in their personal e-mail, and were asked to complete it 1 hour before going to sleep. Participants were asked not to discuss their responses with their partner. If participants had not answered the diary for two consecutive days, a research assistant contacted them and emphasized the importance of adherence. Participants completed an average of 34.8 ( $SD = 0.6$ , range = 32–35) diary entries. Following the diary period, participants visited the lab



again to participate in a dyadic interaction and complete another batch of questionnaires.

## MEASURES

### SOCIAL ANXIETY

In the first lab visit, participants completed the Social Phobia Inventory (SPIN; Connor et al., 2000). The SPIN is a 17-item self-report questionnaire measuring a wide range of SA symptoms (i.e., fear in social situations, avoidance of performance or social situations, and physiological discomfort in social situations). Participants were asked to rate the frequency of each symptom on a scale ranging from 0 (not at all) to 4 (extremely) during the past week. SA symptom level was obtained by summing these answers; the possible range of scores is thus 0-68. In the current study, men's and women's average scores were 13.76 ( $SD = 10.35$ ) and 17.14 ( $SD = 10.99$ ), respectively, with a significant gender difference,  $t(79) = -2.11$ ,  $p = 0.038$ . The internal reliability of the measure was high (Cronbach's  $\alpha = 0.90$  and  $0.88$  for men and women, respectively).

### DEPRESSION

Since there is a high comorbidity between SA and depression (Regier, Rae, Narrow, Kaelber, & Schatzberg, 1998), we assessed depressive symptoms during the first lab visit to account for its shared variance. Specifically, we administered the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), which uses 20 items to assess the experience of depressive symptoms over the previous week. Items are scored on a scale ranging from 0 (never/rarely) to 3 (most/all the time). Depressive symptom level was obtained by summing these answers; the possible range of scores is thus 0-60. In the current study, men's and women's average scores were 9.06 ( $SD = 7.84$ ) and 11.59 ( $SD = 8.41$ ), respectively, with a trend level gender difference,  $t(79) = -1.96$ ,  $p = 0.053$ . The internal reliability of the measure was high (Cronbach's  $\alpha = 0.89$  for both men and women).

## DAILY PERCEIVED PARTNER RESPONSIVENESS

Participants' daily PPR was assessed using Maisel and Gable's (2009) brief daily measure of PPR. Each day, participants were asked to rate 3 items (my partner understood me; my partner made me feel like he/she valued my abilities and opinions; and my partner made me feel cared for) on a scale ranging from 1 (not at all) to 6 (very much). These items were averaged each day to create a daily measure of PPR, which was then averaged across the entire diary period. In the current study, men's and women's average scores were 5.06 ( $SD = 0.88$ ) and 5.10 ( $SD = 0.87$ ), respectively, with no significant gender difference,  $t(79) = -0.48$ ,  $p > 0.250$ . The between- and within-person reliabilities were computed using procedures outlined in Cranford et al. (2006) for estimating reliability for diaries indexes, and were 0.91 and 0.88, respectively.

## RELATIONSHIP SATISFACTION

Couples' relationship satisfaction was assessed (a) at the first lab-visit (b) each day during the diary period, and (c) at the second lab-visit. Specifically, at the first lab-visit relationship satisfaction was assessed using the 16-item version of the Couple Satisfaction Index (CSI; Funk & Rogge, 2007). This version has 1 item rated on a scale ranging from 0 to 6, and 15 items rated on a scale ranging from 0 to 5. Relationship satisfaction levels were obtained by summing these answers; the possible range of scores is thus 0–81. In this assessment, men's and women's average scores were 71.89 ( $SD = 7.20$ ) and 69.99 ( $SD = 9.12$ ), respectively, with a significant gender difference,  $t(79) = -2.09$ ,  $p = 0.040$ . The internal reliability of the measure was high (Cronbach's  $\alpha = 0.94$  for both men and women).

Participants' daily relationship satisfaction was assessed using Rafaeli, Cranford, Green, Shrout, and Bolger (2008) brief daily measure of relationship satisfaction. Each day, participants were asked to rate the extent to which they were experiencing (a) contentment and (b) satisfaction within their relationship with their partner at the moment, on a scale ranging from 0 (not at all) to 5 (extremely). These items were averaged each day to create a daily measure of

TABLE 1. Descriptive Statistic and Zero-Order Correlations

Variable	2	3	4	5	Mean	SD
1. SA (SPIN)	-0.32***	-0.24**	-0.27***	-0.14 <sup>†</sup>	15.45	10.77
2. PPR		0.54***	0.78***	0.58***	5.08	0.87
3. Pre-Diary Satisfaction (CSI)			0.55***	0.64***	70.94	8.25
4. Diary Satisfaction				0.53***	3.05	0.60
5. Post-Diary Satisfaction (CSI)					69.41	8.87

Notes. \*\*\* $p < 0.001$ ; \*\* $p < 0.01$ ; \* $p < 0.05$ ; <sup>†</sup> $p = 0.08$

relationship satisfaction, which was then averaged across the entire diary period. In the current study, men's and women's average scores were 3.03 ( $SD = 0.60$ ) and 3.08 ( $SD = 0.64$ ), respectively, with no significant gender difference,  $t(79) = -0.71$ ,  $p > 0.250$ . The between- and within-person reliabilities were 0.79 and 0.77, respectively.

During the second lab-visit, relationship satisfaction was assessed again using the 16-item version of the CSI. In this assessment, men's and women's average scores were 69.16 ( $SD = 8.63$ ) and 69.65 ( $SD = 9.15$ ), respectively, without a significant gender difference,  $t(79) = -0.42$ ,  $p = 0.678$ . The internal reliability of the measure was again high (Cronbach's  $\alpha = 0.93$  for both men and women).

## RESULTS

Table 1 presents the descriptive statistics of the study's variables, as well as their correlations. We were interested in testing the hypothesis that the association between one's SA and lower relationship satisfaction is mediated by low PPR. Since our data were hierarchically nested within dyads, and thus contained nonindependent observations, we followed Ledermann, Macho, and Kenny's (2011) approach for examining mediation with dyadic data. This Actor Partner Interdependence Mediation Model (APIMeM) is presented in Figure 1. According to this approach, the effect of the independent variables (SA) on men's and women's own outcomes (relationship satisfaction; i.e., the total actor effect) may be mediated by two indirect paths: (i) through the actor's own mediator variable (i.e., the actor's daily PPR;  $A1*B1$ ) or (ii) through their partners' mediator variable (i.e., the partner's PPR;  $A2*B2$ ). Similarly, the effect of the independent variables on the partner's outcome (the partner's

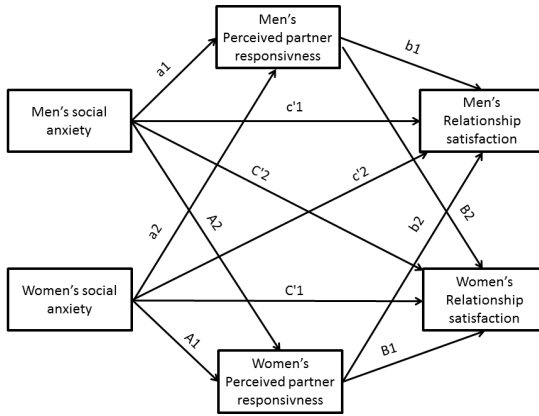


FIGURE 1. Proposed actor-partner-interdependence mediational model (APIMeM). Upper-case letters denote effects for women; lower-case letters denote effects for men.

relationship satisfaction; i.e., the total partner effect) may be mediated by two indirect paths: (iii) through the actor's own mediator variable (i.e., the actor's daily PPR;  $A1*B2$ ) or (iv) through their partners' mediator variable (i.e., the partner's daily PPR;  $A2*B1$ ).

We were particularly interested in the  $A1*B1$  mediation pathways that involve the actor's SA, actor's daily PPR, and actor's relationship satisfaction. However, as responsiveness processes are reciprocal in essence, we examined the mediational paths which involve the partner's effects as well. As relationship satisfaction was measured both daily (during the diary period) and again in the second lab visit (after the diary period), we could examine two mediational models using these different assessments.

### LEVEL 2 – LEVEL 1 – LEVEL 1 MEDIATIONAL MODEL

Using SAS PROC MIXED, we first tested a 2-1-1 dyadic multi-level mediational model in which daily PPR (a Level-1 variable) was examined as a mediator of the association between pre-diary SA levels (a Level-2 variable) and daily relationship satisfaction (a Level-1 variable). Following Zhang, Zyphur, and Preacher (2009), the A paths in Figure 1 (i.e., associations between SA levels and daily PPR) were estimated with the following mixed model:

$$PPR_{ijt} = (\gamma_{00} + \gamma_{01} * \text{Actor's } SA_{ij} + \gamma_{02} * \text{Partner's } SA_{ij} + u_{0ij}) + r_{ijt}$$

Where the PPR of subject  $i$  in couple  $j$  on day  $t$  is predicted by an intercept ( $\gamma_{00}$ ), actor's SA ( $\gamma_{01}$ ), partner's SA ( $\gamma_{02}$ ), a between-subject random effect in intercepts ( $u_{0ij}$ ) and a within-subject residual ( $r_{ijt}$ ).

The B paths (i.e., associations between daily PPR and daily relationship satisfaction) and C' paths in Figure 1 (i.e., associations between SA levels and daily relationship satisfaction) were estimated with the following mixed model:

Relationship Satisfaction $_{ijt}$  =

$$(\gamma_{10} + \gamma_{11} * \text{Actor's SA}_{ij} + \gamma_{12} * \text{Partner's SA}_{ij} + \gamma_{13} * \text{Average PPR}_{ij} + u_{1ij}) + (\gamma_{20} + u_{2ij}) * \text{Daily PPR}_{ijt} + r_{ijt}$$

Where the relationship satisfaction of subject  $i$  in couple  $j$  on day  $t$  is predicted by an intercept ( $\gamma_{10}$ ), actor's SA ( $\gamma_{11}$ ), partner's SA ( $\gamma_{12}$ ), subject's average level of PPR ( $\gamma_{13}$ ), a between-subject random effect in intercepts ( $u_{1ij}$ ), daily PPR ( $\gamma_{20}$ ), a between-subject random effect in the slopes of daily PPR ( $u_{2ij}$ ), and a within-subject residual ( $r_{ijt}$ ).

In these models residuals were allowed to correlate within couples, and first-order autoregressive structure was imposed on the covariance matrix for the within-person residuals. Following Zhang et al.'s (2009) recommendation for avoiding potential confounding in multilevel mediation models, we (a) person mean-centered the Level-1 variable (i.e., daily PPR); (b) grand mean-centered Level-2 variables (i.e., actors' SA, partners' SA, and mean-level PPR); and (c) estimated both the effect of within-person and between-person PPR on relationship satisfaction. To assess confidence interval for indirect effects, these two mixed models were run simultaneously (Bauer, Preacher, & Gil, 2006), and Monte Carlo simulations were used (Selig & Preacher, 2008). As we found no gender differences in all of the effects involved in the mediational paths, we used mediation for indistinguishable dyads as recommended by Ledermann et al. (2011). To obtain standardized effects, each variable was standardized prior to the analysis using standard deviation calculated across all participants, as recommended by Kenny, Kashy, and Cook (2006, p. 179).

Table 2 presents the results of this APIMeM. As the table shows, higher levels of actors' SA predicted lower levels of actors' PPR during the diary period (A1), which in turn predicted actors' reports of

TABLE 2. 2-1-1 APIMeM

Effect	Simple Effects Estimates		
	Estimate (SE)	Stand. Estimate	p value
a effects (X→ M)			
Actor effect (A1)	-0.025(0.005)	-0.232	<0.001
Partner effect (A2)	-0.005(0.005)	-0.050	0.298
b effects (M→ Y)			
Actor effect- Within (B1)	0.479(0.021)	0.413	<0.001
Partner effect- Within (B2)	0.124(0.018)	0.107	<0.001
Actor effect- Between (B1)	0.539(0.039)	0.537	<0.001
Partner effect- Between (B2)	0.061(0.039)	0.061	0.120
c' effects (X→ Y)			
Actor effect (c'1)	-0.000(0.003)	-0.002	0.957
Partner effect (c'2)	-0.005(0.003)	-0.058	0.068
Effect	Indirect Effects Estimates		
	Estimate	Stand. Estimate	95% CI
Actor Indirect Effects			
A1*B1 (actor-actor)	-0.013	-0.125	-0.019, -0.008
A2*B2 (partner-partner)	-0.000	-0.003	-0.001, 0.0003
Partner Indirect Effects			
A1*B2 (actor-partner)	-0.002	-0.003	-0.004, 0.0004
A2*B1 (partner-actor)	-0.003	-0.027	-0.008, 0.0025

Note. As SA (i.e., X) was measure only at Level-2, indirect effects could be estimated only for between-subject effects.

daily relationship satisfaction (B1) at both the within-level and the between level. In addition, and as was predicted, this indirect effect (A1\*B1) was significant (i.e., a significant actor-actor indirect effect). We also found a day-level association between partners' daily PPR and actors' daily relationship satisfaction (B2), but none of the indirect effects which involved partners' effects were significant.

Because of the high comorbidity between social anxiety and depression, we wanted to test whether the obtained actor-actor mediational effect holds even after controlling for depression symptoms. In addition, we wanted to control for initial between-subject differences in relationship satisfaction. To this end, we re-ran the APIMeM controlling for depression and relationship satisfaction levels reported before the diary period. Importantly, even after these

adjustments, the predicted actor-actor mediational effect remained significant (Estimate = -0.005, Standardized Estimate = -0.045, CI = -0.008, -0.001). Interestingly, in this adjusted model, the association between participants' SA and their partners' relationship satisfaction (i.e.,  $c'2$ ) became significant (Estimate = -0.007, SE = 0.002, Standardized Estimate = -0.081,  $p = 0.004$ ).

## LEVEL 2—LEVEL 2—LEVEL 2 MEDIATIONAL MODEL

In the second mediational model, relationship satisfaction as measured during the second lab visit served as the outcome. Because in multilevel mediation analyses one variable cannot predict another variable measured at a higher level (Krull & MacKinnon, 2001), we raised daily PPR into a Level-2 variable, by creating an average score across the entire diary period. We then ran a single (level-2) APIMeM (Ledermann et al., 2011) using AMOS (Arbuckle, 2006). Indirect effects were assessed by calculating bias-corrected 95% confidence intervals with 5000 boot-strapped samples. Treating the dyads as indistinguishable did not worsen the model fit ( $\chi^2[6] = 7.22$ , *n.s.* NFI = 0.94, RMSEA = 0.05); thus, we used mediation for indistinguishable dyads as recommended by Ledermann et al. (2011).

Table 3 presents the results of this APIMeM. As the table shows, the pattern of results was similar to those obtained with the 2-1-1 mediational analysis. Specifically, higher levels of actors' SA predicted lower levels of actors' PPR during the diary period (A1), which in turn predicted actors' reports of lower relationship satisfaction (B1). In addition, and as was predicted, this indirect effect (A1\*B1) was significant (i.e., a significant actor-actor indirect effect). None of the simple partner effects or the indirect effects which involved the partners were significant.

As in the previous 2-1-1 mediational model, we wanted to test whether the obtained actor-actor mediational effect holds even after controlling for the association between SA and depression, and between initial between-subject differences in relationship satisfaction and post-diary relationship satisfaction. To this end, we regressed participants' social anxiety symptoms onto their depression symptoms, and participants' post-diary relationship satisfaction onto their pre-diary relationship satisfaction, and then used the obtained individuals' residual scores of these variables as the predictor and outcome, respectively. Importantly, and as with the 2-1-1 media-



TABLE 3. 2-2-2 APIMeM

Effect	Simple Effects Estimate		
	Estimate (SE)	Stand. Estimate	<i>p</i> value
a effects (X→ M)			
Actor effect (a1)	-0.026(0.006)	-0.328	<0.001
Partner effect (a2)	-0.004(0.006)	-0.054	0.468
b effects (M→ Y)			
Actor effect (b1)	6.399(0.767)	0.628	<0.001
Partner effect (b2)	0.048(0.766)	0.005	0.950
c' effects (X→ Y)			
Actor effect (c'1)	0.054(0.056)	0.066	0.330
Partner effect (c'2)	0.016(0.055)	0.019	0.773
Effect	Indirect Effects Estimates		
	Estimate	Stand. Estimate	95% CI
Actor Indirect Effects			
a1*b1(actor-actor)	-0.169	-0.206	-0.265, -0.085
a2*b2(partner-partner)	0.000	0.000	-0.017,0.012
Partner Indirect Effects			
a1*b2 (actor-partner)	-0.001	-0.002	-0.047,0.047
a2*b1 (partner-actor)	-0.028	-0.034	-0.109,0.054

tional model, even after these adjustments, the predicted actor-actor mediational effect remained significant (Estimate = -0.049, Standardized Estimate = -0.066, CI = -0.119, -0.014).

## DISCUSSION

Recent interpersonal models of SA stress the maladaptive interpersonal cycles which perpetuate both the negative schemas and the symptomatology of SA individuals (Alden & Taylor, 2010). Indeed, various interpersonal impairments have been documented among SA individuals. Surprisingly, little empirical work has focused on their committed romantic relationships, despite the documented importance of such relationships in adulthood. The current study aimed to help fill this gap.

Inspired by general interpersonal models of SAD, we predicted that low PPR serves as a maladaptive mechanism responsible for the reduced relationship satisfaction among SA individuals. Us-

ing data from the daily lives of romantically committed couples we indeed found that the negative association between one's SA and one's relationship satisfaction was fully mediated by one's daily PPR. Importantly, this was found when using both daily relationship satisfaction (i.e., 2-1-1 mediational model), which allowed us to use an ecologically valid and representative measure, and post-diary relationship satisfaction (i.e., 2-2-2 mediational model), which allowed us to be more confident regarding temporality.

The current paper has several strengths. First, it joins the few empirical studies which have begun to examine and characterize the deficiencies of the romantic relationships of SA individuals. Second, it used a dyadic design which allowed us to test the effects of both actor's and partner's social anxiety. Third, it utilized daily diaries over a long period (5 weeks), which allowed a glimpse into the role of social anxiety in couples' daily-life experiences. Fourth, it showed that the predicted pattern holds even after controlling for one's level of depression, a highly co-morbid disorder (Regier et al., 1998) which has its own well-documented interpersonal consequences (Hammen, 2006). Last but not least, it is the first to test a proposed mechanism for the reduced satisfaction experienced within the intimate relationships of SA individuals.

Several limitations of the current study are worth noting. First, though the reduced perception of partner responsiveness experienced by SA individuals can be a consequence of deficiencies in responsiveness (a) elicitation, (b) receipt, and/or (c) perception, the current study did not examine which of these factors is at work. Specifically, it is unclear to what extent the lower PPR obtained reflects reality vs. biased perception. For one, perceived responsiveness is to some extent grounded in actual social interactions. For example, in various lab observation studies, recipients' perceptions of responsiveness were associated with objective raters' observations of the partner's actual responsive behaviors (e.g., Collins & Feeney, 2000; Gable et al., 2006; Simpson, Rholes, & Nelligan, 1992). However, the perception of ambiguous psychologically significant events such as responsiveness is prone to interpretational biases. Striking examples of such biases have been documented by Lemay and his colleagues (2007; Lemay & Clark, 2008; Lemay & Neal, 2013; Lemay & Neal, 2014) who proposed that people project their own responsiveness onto their (perception of their) partner, and thus presume that their relationship is more reciprocal than it actually is. Indeed, this projection was found to be a stronger predictor of per-

ceived responsiveness than the partners' actual responsiveness (see also Bar-Kalifa, Rafaeli, & Sened, in press; Debrot, Cook, Perrez, & Horn, 2012). Based on previous findings, we proposed that the maladaptive interpersonal cycles involve impaired actual responsiveness behaviors as well as biased perceptions of responsiveness; still, future studies are needed to help clarify the relative contribution of elicitation, receipt, and/or perception impairments.

Second, recent models of psychiatric disorders stress the bidirectional path between psychiatric disorders and close relationship functioning. For example, Bodenmann and Randall (2013), posit that psychiatric disorders should not be conceptualized only as risk factor for romantic relationship dysfunction. Instead, based on biopsychosocial models, they argue that the etiological role of relationship discord in psychiatric disorder should also be considered. The current study tested the role of reduced PPR as a mediator of the path leading from SA to relationship dysfunction. Future studies could help clarify whether PPR processes take part in the complementary path from relationship dysfunction to SA.

Third, although PPR fully mediated the actor effect, it played no such role with regards to the partner effect; in other words, though one's partner's SA did predict one's relationship satisfaction (when relationship satisfaction was measured in the diary), neither the actor's nor the partner's PPR mediated this effect. Future work may be valuable in identifying other individual or relational mechanisms that are responsible for this effect. For example, it may be a result of SA individuals' inconsistent and ambivalent attitudes and behaviors in their romantic relationships. Specifically, whereas SA individuals tend to exhibit avoidance behaviors in nonintimate relationships, they tend to exhibit both avoidance behaviors as well as over-reliance behaviors in their close relationships, often treating them as social surrogates (see Boucher & Cummings, 2014; Darcy, Davila, & Beck, 2005; Grant et al., 2007). Relatedly, mixed defensive responses in the management of relational risks (e.g., rejection; Murray et al., 2006) could serve as another possible mechanism explaining the reduced relationship satisfaction of partners' of SA individuals. For example, a recent experimental study showed that SA individuals tended to devalue their romantic partners when coping with rejection concerns, but to *overvalue* them in neutral situations (Afram & Kashdan, 2015).

Fourth, the study sample consists of community couples who were not diagnosed as suffering from clinical levels of SA. Though there is empirical evidence that SA lies on a continuum and is not categorical in nature (Ruscio, 2010), future research using clinical samples will increase our confidence in the pattern of results obtained in our study. Finally, in the current study SA was operationalized as a trait-level characteristic. Future work operationalizing it as a state and examining its daily fluctuations could test the mediational process model presented here at the daily, and not just the aggregate, level.

Clinically speaking, our results are in line with recent models tying relationship functioning and psychopathology. As these models (e.g., Bodenmann & Randall, 2013; Whisman & Baucom, 2012) emphasize, mental health and relationship functioning are often intertwined. Clinicians interested in reducing psychopathology or increasing relationship satisfaction must attend to the fact that relationship discord hinders the efficacy of individual-oriented treatments and is not itself ameliorated by such interventions (Whisman & Baucom, 2012). As such, a *we*-disease intervention approach (Bodenmann & Randall, 2013) may provide a more efficacious method in the treatment of mental disorders. The results of the current study suggest that such an approach should target maladaptive responsiveness processes (including elicitation, receipt/provision, and perception) in the close relationships of SA individuals.

## SUMMARY

In summary, relationship functioning plays a crucial role in individuals' well-being and psychopathology. There is considerable knowledge about this role within depression (e.g., Hammen, 2006) but much less within (the widely prevalent) SA (e.g., Kashdan et al., 2013). In the current study, we found SA to be tied to poor relationship satisfaction in the daily lives of both persons with SA (the actors) and their partners. PPR was explored as a possible mechanism for understanding these associations. We found the actors' negative association to be fully mediated by their perception of poor partner responsiveness. Interestingly, the partner's negative association was not attributable to the same process.

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