

RELATIONSHIP DIFFICULTIES IN SOCIAL ANXIETY DISORDER

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ABSTRACT

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Little is known about the quality of socially anxious individuals' romantic relationships. Because social anxiety is associated with negative perceptual biases toward one's own interpersonal interactions, research on this topic needs to move beyond self-report. The present research was aimed at better understanding of the romantic relationships of the socially anxious, with a focus on social support and perceived criticism as assessed from multiple perspectives. In Chapter 1, we examined longitudinal associations between social anxiety, social support, and relationship dissolution and compared levels of support behavior between couples high and low in social anxiety during a laboratory-based interaction. Men's social anxiety and low perceived, but not received, support predicted higher rates of break-up one year later. Although individuals high in social anxiety reported lower levels of support during the interaction task than those low in social anxiety, the two groups did not differ on partner- or observer-rated measures of support. In Chapter 2, we examined associations between social anxiety, perceived and expressed criticism, and reactions to criticism. Social anxiety was unrelated to perceived criticism, but was associated with greater self-reported global expressed criticism of one's partner. Among women social anxiety was related to being more upset when criticized by a partner. High and low social anxiety couples did not differ in criticism during a laboratory-based problem-solving task, though high social anxiety participants tended to

be more upset by criticism. In Chapter 3, we compared levels of perceived and expressed criticism and reactions to criticism among individuals with social anxiety disorder, with other anxiety disorders, and with no psychiatric disorder. Individuals with anxiety disorders showed elevated levels of interaction-specific perceived criticism, expressed criticism, and upset and stress due to criticism relative to normal controls; however, the two anxious groups did not differ on any measures. Upset due to criticism mediated the association between diagnosis and relationship satisfaction. Collectively, results suggest that social anxiety is associated with difficulties even in established romantic relationships and point to perceptions of social support and criticism as fruitful targets for intervention in this population.

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Chapter 1: Social Anxiety and Social Support in Romantic Relationships

Abstract

Little is known about the quality of socially anxious individuals' romantic relationships. In the present study, we examine associations between social anxiety and social support in romantic relationships. In Study 1, we collected self-report data on social anxiety symptoms and received, provided, and perceived social support from 308 undergraduates and their romantic partners. Couples also reported whether they were still in a relationship one year later. Results indicated that men's social anxiety at Time 1 predicted higher rates of break-up at Time 2. Of the support variables, for both men and women only perceived support was significantly predictive of break-up. Social anxiety did not interact with any of the support variables to predict break-up. In Study 2, undergraduate couples with a partner high ($n = 27$) or low ($n = 27$) in social anxiety completed two 10-minute, lab-based, videorecorded social support tasks. Both partners rated their received or provided social support following the interaction, and trained observers also coded for social support behaviors. Results showed that socially anxious individuals reported receiving less support from their partners during the interaction; however, differences in support were not apparent by partner- or observer-report. High and low social anxiety couples did not differ in terms of the target's provided support. Taken together, results suggest that social anxiety is associated with difficulties even in the context of established romantic relationships. However, these differences appear to exist in large part in the eye of the socially anxious beholder, and may not be evident to the anxious individual's partner or to others.

Social anxiety disorder (SAD) is one of the most prevalent mental health problems in the United States, affecting 12.1% of the population (Kessler et al., 2005). Social anxiety symptoms are continuously distributed throughout the population with SAD at the severe end of the continuum (Ruscio, 2010). Past research has demonstrated that both SAD and symptoms of social anxiety are associated with interpersonal difficulties in interactions with strangers or acquaintances (Alden & Wallace, 1995; Baker & Edelmann, 2002; Fydrich, Chambless, Perry, Buergener, & Beazley, 1998; Meleshko & Alden, 1993; Stopa & Clark, 1993; Voncken & Bogels, 2008). Furthermore, SAD and symptoms of social anxiety are associated with difficulties in forming relationships: Socially anxious individuals report having smaller social networks (Montgomery, Haemmerlie, & Edwards, 1991; Torgrud et al., 2004), are more likely to report having no close friends (Furmark et al., 1999), and are less likely to marry than non-anxious individuals (e.g., Davidson, Hughes, George, & Blazer, 1994; Schneier, Johnson, Hornig, Liebowitz, & Weissman, 1992). However, little is known about the quality of socially anxious individuals' romantic relationships once they are established. Socially anxious individuals often evidence a negative bias toward their own interpersonal interactions, viewing these interactions in a more negative light than do observers or their interaction partners (e.g., Stopa & Clark, 1993). Thus, if socially anxious individuals report difficulties in their romantic relationships, it remains unclear whether these difficulties truly exist, whether they are the product of this negative interpersonal bias, or both. Therefore, to better study relationship functioning among

socially anxious individuals, researchers need to move beyond self-report measures to include partner- and observer-report measures.

One important function of romantic relationships is the provision of social support. Social support has been defined as the “provision of psychological and material resources intended to benefit an individual’s ability to cope with stress” (Cohen, 2004, p. 676). Support from one’s partner is associated with a number of beneficial future outcomes, including improved physical (Reblin & Uchino, 2008) and psychological health (Conger, Rueter, & Elder, 1999), greater satisfaction with the relationship (Dehle, 2007; Pasch & Bradbury, 1998; Saitzyk, Floyd, & Kroll, 1997), and decreased likelihood of divorce (Pasch & Bradbury, 1998). Indeed, Pasch and Bradbury found that observer ratings of wives’ supportive behaviors during a 10-minute social support interaction were predictive of marital satisfaction and outcome two years later, even after they controlled for conflict behaviors.

In studying social support, it is useful to distinguish between perceived vs. received social support. Perceived support is defined as the extent to which an individual perceives support to be available, whereas received support constitutes the frequency with which an individual is the recipient of specific support behaviors. A number of studies suggest that perceived support is typically more strongly predictive of positive outcomes such as psychological adjustment than is received support (e.g., Cohen, 2004; Prati & Pietrantoni, 2010). Given their negative interpretation bias of interpersonal relationships, socially anxious people might be especially likely to report less perceived support from their partners, in that such perceptions lack specific behavioral referents.

In the present study, we sought a better understanding of social support, both perceived and received, in the romantic relationships of socially anxious individuals. Several studies have demonstrated that social anxiety is associated with decreases in perceived availability of support from one's romantic partner (Cuming & Rapee, 2010; Rapee, Peters, Carpenter, & Gatson, 2015), though this association only reached significance among women in one of these two studies. To date, only two studies have examined the relationship between social anxiety and received social support from a romantic partner.¹ Beck, Davila, Farrow, and Grant (2006) compared social support behaviors among female targets selected to be high or low in social anxiety and their male partners as the partners helped targets prepare for a surprise speech task. Observers then coded videorecordings of the 5-minute interactions prior to the speech task for support behaviors. The authors found no differences between the support behaviors of the partners of high and low social anxiety targets or between the support receipt behaviors of high and low social anxiety targets themselves.

In contrast, Porter and Chambless (2014) found some evidence that social anxiety is associated with difficulties with social support. The authors asked undergraduate couples unselected for social anxiety to complete measures of received, provided, and desired social support, as well as other relationship constructs. They found that among women, social anxiety was associated with decreased received, provided, and desired

¹ Kashdan, Ferssidiz, Farmer, Adams, and McKnight (2013) examined the associations between social anxiety and support capitalization in romantic relationships. However, we do not review this study in detail because it focused on supportive responses to good news, whereas the present study focuses on support provision in response to a problem or a stressful life event.

support in the relationship by self-report, but not partner report. Further, socially anxious women desired less support from their partners despite the fact that they were less satisfied with their relationships and that low levels of received support mediated the relationship between social anxiety and low relationship satisfaction. Among men, social anxiety was unrelated to social support. The authors found no evidence that the more socially anxious individuals systematically misperceived the amount of support they provided to their partners or received from them. Thus, these results suggest that social anxiety may be associated with difficulties in social support, at least among women. However, given that the effects of social anxiety on support emerged only on self-report measures, it remains unclear whether socially anxious individuals truly receive less support from and provide less support to their partners, or whether these findings reflect socially anxious individuals' tendencies to perceive their interpersonal interactions and relationships in a negative light.

In the present study, we sought to clarify the association between social anxiety and social support in romantic relationships. In Study 1, we examined the effects of social anxiety and perceived and received social support on relationship dissolution one year later. Specifically, we were interested in whether the effects of social support, a known predictor of relationship dissolution, were moderated by social anxiety, given our previous findings that socially anxious women desire less support. Previous work by Kashdan et al. (2013) found an interaction between a related construct, capitalization support (i.e., supportive, constructive responding to good news), and social anxiety to predict break-up among couples 6 months later: The combination of a partner's being

both socially anxious and perceived by their partner as providing less capitalization support predicted a greater likelihood that the couple would break up. We were also interested in whether the main effect of social anxiety was predictive of break-up. We speculated that on one hand, social anxiety may put a strain on romantic relationships. Consistent with this notion, Kashdan et al. (2013) found that social anxiety conferred a greater likelihood of break-up. On the other hand, socially anxious individuals may be more inclined to stay in a less than optimal relationship for fear of having difficulty finding a new partner if they were to end the relationship. Consistent with this, Gordon, Heimberg, Montesi, and Fauber (2012) found that among individuals in romantic relationships, social anxiety was associated with greater endorsement of a sense of relief that, given this relationship, they no longer needed to date. Given the relative lack of data on this topic, we treated these research questions as exploratory.

In Study 2, we sought to better understand the associations between social anxiety and support receipt and provision by comparing support in couples high and low social anxiety during two 10-minute laboratory tasks. We extended Beck et al.'s (2006) work by utilizing a mixed gender sample of high social anxiety targets, measuring support using target- and partner-reports in addition to observer measures, and examining support when targets are in the helper, as well as the helpee, role. We hypothesized that high social anxiety targets would report receiving and providing less support to their romantic partners relative to low social anxiety targets. However, we were uncertain as to whether differences between high and low social anxiety targets would emerge on partner-report and observer-rated measures of support, and thus we treated this as an open question. We

also sought to determine whether social anxiety was associated with systematic biases of support perception in our sample; that is, would high social anxiety targets consistently underestimate the amount of support they received or provided relative to observer ratings? As noted, Porter and Chambless (2014) previously tested whether social anxiety was associated with systematically misperceiving the amount of support provided or received by one's partner, according to the partner's report, and found no evidence for this hypothesis. However, they did not utilize observer-rated measures of support in their study, and reports of support reflected behavior over a month-long period rather than a brief 10-minute interaction, the former of which may result in lower levels of agreement on support. Thus, our research question regarding systematic biases in support perception in the current study was treated as exploratory.

Social anxiety and depression often co-occur (Ohayon & Schatzberg, 2010), and a number of studies have linked the presence of depression to difficulties in romantic relationships (see Mead, 2002 for a review). Thus, to determine whether any significant results were specific to social anxiety, we reran the analyses controlling for depressive symptoms.

Study 1

Method

Participants. Participants were University of Pennsylvania undergraduates ages 18-23 ($n = 543$) and their romantic partners ($n = 355$).² All participants were fluent in

² Of the 308 couples included in the final sample, 163 (52.9%) were also included in Porter and Chambless's (2014) sample. However, Porter and Chambless (2014) reported only Time 1 data and did not conduct longitudinal analyses.

English, and all couples were in an exclusive relationship of at least three months duration at the time of their participation in the study. We excluded same sex couples and those who were married or engaged to increase sample homogeneity.

Measures.

Time 1. Participants provided basic demographic information about themselves, as well as information about the duration of the relationship and whether the relationship was long distance.

Social Interaction Anxiety Scale (SIAS). The SIAS (Mattick & Clarke, 1998) is a 20-item measure of anxiety in social and interpersonal situations. The reliability and validity of the SIAS have been demonstrated in clinical, student, and community samples (Heimberg, Mueller, Holt, Hope, & Liebowitz, 1992; Mattick & Clarke, 1998). In light of research demonstrating the greater validity of the SIAS if only the 17 straightforwardly worded items are included (Rodebaugh, Woods, Heimberg, Liebowitz, & Schneier, 2006; Rodebaugh, Woods, & Heimberg, 2007), we used the straightforward item total in the present study. Internal consistency was excellent for this version in the present sample ($\alpha = .91$).

Depression Anxiety Stress Scales-21 (DASS-21). The DASS-21 (Lovibond & Lovibond, 1995) is a 21-item measure of past-week symptoms of depression, anxiety, and stress. The DASS-21 has demonstrated high internal consistency in both clinical and nonclinical samples and good convergent and criterion-related validity (Antony, Beiling, Cox, Enns, & Swinson, 1998). Only the Depression subscale of the DASS-21 was used in the present analyses. Internal consistency of the subscale was good ($\alpha = .83$).

Support in Intimate Relationship Rating Scale–Revised (SIRRS-R). The SIRRS-R (Barry, Bunde, Brock, & Lawrence, 2009) is a 25-item measure of received social support within a romantic relationship. Individuals are asked to rate on a 5-point Likert scale how frequently their partner has performed various social support behaviors in the past month. The SIRRS-R has good construct validity and high internal consistency (Barry et al., 2009). In the present sample, internal consistency was excellent ($\alpha = .93$).

Support in Intimate Relationship Rating Scale–Revised–Support Provided (SIRRS-R-SP) Scale. The SIRRS-R-SP was developed by Porter and Chambless (2014) as a measure of support provided by a romantic partner. Participants rate how often they provided support to a romantic partner over the past month. Instructions and item wording are identical to those of the original SIRRS-R, except that participants are asked to indicate how often they themselves performed each behavior. Internal consistency was excellent in both Porter and Chambless's (2014) sample ($\alpha = .91$) and in the present sample ($\alpha = .93$).

Modified Version of the Multidimensional Scale of Perceived Social Support (MSPSS). The MSPSS (Zimet, Dahlem, Zimet, & Farley, 1988) is a 12-item measure of perceived social support from friends, family, and a romantic partner. Respondents are asked to rate their agreement with statements about the perceived availability of social support on a 7-point Likert scale. The original MSPSS has been shown to have high internal consistency and test-retest reliability, and good construct validity (Zimet et al., 1988). We made two important modifications to the MSPSS for the present study. First, because all items on the Significant Other subscale of the MSPSS capture emotional

support, we added two additional items to the measure to better capture the extent to which respondents perceived instrumental support to be available from their romantic partner (“I can count on my significant other to help me with my responsibilities when I am stressed” and “I can rely on my significant other to give me advice about my problems”). Second, we made slight changes to the wording of items on the original MSPSS Significant Other subscale to clarify that these questions were inquiring about perceived support from a romantic partner. Only the 6-item Significant Other subscale, which included four items from the original MSPSS and the two items we developed for the present study, was used in the present analyses. Internal consistency was excellent ($\alpha = .90$).

Time 2.

Relationship dissolution. Participants were asked to indicate whether they were still in a relationship with the individual they listed as their romantic partner at Time 1.

Procedure. Students were recruited primarily via the psychology department subject pool. These subjects provided contact information for their romantic partner, and then completed a battery of questionnaires which included the Social Interaction Anxiety Scale (SIAS; Mattick & Clark, 1998). All received course credit for their participation. A minority of students were instead recruited via flyers placed around campus. These subjects also provided contact information for their romantic partner and completed the SIAS, but did not complete the rest of the questionnaire battery until completion of the laboratory portion of the study (further described under Study 2, Method). Participants

recruited via flyers were paid \$15 total for completion of the questionnaires and the laboratory visit.

Romantic partners were emailed a study description and a hyperlink to the study questionnaires. Of romantic partners contacted, 66.6% participated in the study. For their participation, romantic partners of participants recruited through the subject pool were entered into a raffle for a \$200 gift certificate; additionally, students recruited through the subject pool whose partners participated were also entered into a raffle for a \$100 gift certificate. Romantic partners of participants recruited via flyers were paid \$15 total for completion of the questionnaires and the laboratory visit.

All participants provided informed consent. Questionnaires included those listed above, as well as additional measures of relationship quality not pertinent to the present study. Order of questionnaires was randomized for each participant. All study procedures were approved by the Institutional Review Board at the University of Pennsylvania.

Approximately 12 months after completion of the initial questionnaire battery, all participants were contacted to ascertain whether they were still in a romantic relationship with the same romantic partner and to complete questionnaires not pertinent to the present study. All participants were entered into a raffle for a \$50 gift certificate in exchange for their participation.

Of the sample of 355 couples, 320 had been contacted for 12-month follow-up data prior to preparation of this manuscript and were thus eligible for the present study. Of these, we excluded 12 couples because one partner failed to provide data on the Social Interaction Anxiety Scale (Mattick & Clark, 1998), one of the key measures of interest.

Thus, the final sample consisted of 308 couples. Of these, we were able to obtain data on relationship status at 12-month follow-up from 242 couples (78.6%). Data for the remaining 66 couples was imputed with multiple imputation in SPSS version 23.

Power analysis. A power analysis conducted with G*Power (Erdfelder, Faul, & Buchner, 1996) indicated that in a logistic regression with a sample of 308 couples and an estimated base rate of 50% of couples remaining together at Time 2, there was 93% power to detect a change of 10 percentage points in break-up rate associated with each one standard deviation increase on the SIAS.

Results and Discussion

Description of the sample. Sample demographics and mean scores on study measures are presented in Table 1.1. At Time 1, mean relationship length was 1.29 years ($SD = 1.04$, range = 3 months to 6 years), and over a third of couples (37.7%) indicated that they were in a long distance relationship. Using multiple imputation, we estimated that 183 couples (59.4%) were still together at Time 2. Table 1.2 displays the zero-order correlations between study measures.

Social anxiety as a predictor of Time 2 relationship status. We conducted a logistic regression predicting Time 2 relationship status (coded as 0 = no longer together, 1 = still together) as a function of both partners' SIAS scores. We included relationship length and long distance status as covariates, as we expected these variables to be predictive of break-up. Furthermore, we also included the interactions between relationship length and SIAS scores and the interactions between long distance status and SIAS scores as covariates in the model in light of our previous findings that these

variables interacted to predict perceptions of risk in intimacy (Porter & Chambless, 2014). To conserve power, non-significant interaction terms ($p \geq .10$) were dropped from the regression model, and the model was rerun without these interactions. Here, we report the results of the final logistic regressions only. In accordance with the recommendations of Aiken and West (1991), all predictor variables were mean centered to reduce multicollinearity. Diagnostic statistics including dfbetas, condition indexes, and residuals were checked to ensure the data did not violate the assumptions of regression.

Predictors in the final model included men's and women's SIAS, relationship length, long distance status, and the interaction between men's SIAS and relationship length. Unsurprisingly, both relationship length and long distance status were highly predictive of relationship status at Time 2, such that couples in longer relationships at Time 1 were more likely to remain together at Time 2 (OR = 1.42, 95% CI [1.08, 1.89], $p = .01$) and couples in long distance relationships at Time 1 were less likely to remain together at Time 2 (OR = 0.39, 95% CI [0.23, 0.67], $p = .001$). Men's SIAS at Time 1 also predicted a decreased likelihood of the couple's remaining together at Time 2 (OR = 0.97, 95% CI [0.94, 0.99], $p = .006$), and there was a marginally significant interaction between men's SIAS and relationship length (OR = 0.98, 95% CI [0.96, 1.00], $p = .09$). Following the recommendations of Aiken and West (1991), we probed the interaction using simple slopes analyses. Results indicated that in shorter relationships men's SIAS was not predictive of Time 2 relationship status (OR = 0.99, 95% CI [0.96, 1.02], $p = .37$), whereas in intermediate length and longer relationships, more socially anxious men were less likely to remain with the same partner one year later (OR = 0.97, 95% CI [0.94,

0.99], $p = .006$ and $OR = 0.95$, 95% CI [0.91, 0.98], $p = .003$, respectively). In contrast, women's SIAS was not predictive of Time 2 relationship status ($OR = 1.01$, 95% CI [0.99, 1.04], $p = .31$).

To determine whether these effects were specific to social anxiety, we reran the model controlling for men's and women's DASS depression scores. In this new model, men's depression was not predictive of relationship status ($OR = 0.94$, 95% CI [0.86, 1.02], $p = .14$), whereas women's depression predicted a decreased chance that the couple would remain together at Time 2 ($OR = 0.92$, 95% CI [0.85, 0.99], $p = .02$). With depression controlled, men's SIAS continued to predict Time 2 relationship status, although at a trend level ($OR = 0.97$, 95% CI [0.95, 1.00], $p = .08$), and the interaction between men's SIAS and relationship length continued to be significant at a trend level in this model ($OR = 0.98$, 95% CI [0.96, 1.00], $p = .08$). In contrast, with depression controlled, women's SIAS was marginally predictive of Time 2 relationship status such that more socially anxious women at Time 1 were *more likely* to remain with the same partner at Time 2 ($OR = 1.03$, 95% CI [1.00, 1.06], $p = .08$).

Thus, results indicate that men's social anxiety may be detrimental to relationships, particularly as relationship length increases. However, these effects are relatively small and some of the variance may be shared with depression. In contrast, women's social anxiety does not appear to have a detrimental effect on relationship maintenance; indeed, when women's depressive symptoms were controlled, women's social anxiety was marginally predictive of a slightly increased likelihood of remaining with the same partner. This suggests that all else being equal, more socially anxious

women may prefer to remain with the same partner to a greater extent than less socially anxious women. However, the effects were small relative to the impact of comorbid depressive symptoms, which conferred a greater likelihood of relationship dissolution.

Social anxiety as a moderator of the relationship between social support and Time 2 relationship status. We then ran three additional logistic regressions using the same procedures described above to examine whether social anxiety moderates the relationship between social support and relationship dissolution. In the first regression, predictors were the interactions between men's and women's SIAS and men's and women's received social support (SIRRS-R), as well as the main effects of men's and women's SIAS and SIRRS-R and the covariates listed above. In the second regression, predictors were identical, except that we examined the main and interactive effects of men's and women's provided support (SIRRS-R-SP) rather than men's and women's received support. In the third regression, we instead examined the main and interactive effects of men's and women's perceived support (MSPSS) as the relevant support measures.

When men's and women's received support were included in the model as predictors, men's received support was not predictive of relationship status at Time 2 ($OR = 1.01$, 95% CI [0.99, 1.03], $p = .22$), whereas women's received support predicted Time 2 relationship status at the trend level, such that women who reported receiving more support at Time 1 were marginally more likely to remain in a relationship with the same partner one year later ($OR = 1.02$, 95% CI [1.00, 1.04], $p = .06$). Similarly, when men's and women's provided support were included in the model as predictors, women's

provided support was not predictive of relationship status at Time 2 (OR = 1.01, 95% CI [0.99, 1.03], $p = .47$), whereas men's provided support tended to predict relationship status, such that men who reported providing more support at Time 1 were slightly more likely to remain in a relationship with the same partner one year later (OR = 1.02, 95% CI [1.00, 1.05], $p = .08$). When men's and women's perceived support were included in the model as predictors, however, both variables were significant predictors of relationship status such that both men and women who perceived social support to be more available from their partner at Time 1 were more likely to remain in a relationship with the same partner one year later (OR = 1.07, 95% CI [1.02, 1.14], $p = .01$ for men, and OR = 1.07, 95% CI [1.004, 1.15], $p = .04$ for women). There were no significant interactions between social anxiety and received, provided, or perceived support in any of the three models. Thus, social anxiety does not appear to moderate the relationship between support and break-up. Rather, low perceived support and social anxiety contribute independently to prediction of relationship dissolution, at least for men.

Study 2

Method

Participants. Participants were University of Pennsylvania undergraduates and their romantic partners who completed the SIAS as part of Study 1. We selected high social anxiety (HSA) couples and low social anxiety (LSA) couples from this pool of couples and invited them to participate in the laboratory portion of the study. HSA couples were defined as those in which at least one partner scored one standard deviation above the published mean on the full 20-item SIAS (score of > 34 ; Heimberg et al.,

1992). LSA couples were defined as those in which both partners scored below the mean on the SIAS (score of < 20; Heimberg et al., 1992). A total of 27 HSA and 34 LSA couples participated in the laboratory portion of the study. Two LSA couples did not follow instructions or complete the study tasks, and were therefore excluded from the analyses.

Because our research questions concerned how HSA and LSA targets and their partners differ from one another with regard to social support behavior, we designated one individual in each couple to serve as the HSA target or the LSA control to whom the HSA target's behavior would be compared. In HSA couples, the partner with the higher SIAS score was designated the target. We then randomly selected 27 LSA couples from the 32 LSA couples who completed the study tasks and determined which partner would serve as the target in each couple by yoking each LSA couple to an HSA couple on target sex. Thus, the final sample consisted of 27 HSA couples and 27 LSA couples with the same proportion of female targets in each group.³

Measures. In addition to the measures listed below, all participants also completed the measures listed above as part of Study 1, as well as other measures not pertinent to the present study.

Received social support. This 2-item measure was developed for the present study. Following each social support interaction, the helpee rated the emotional support ("My partner responded to me with empathy and warmth") and informational support

³ Of the 54 couples included in the present study, 14 (25.9%) were also included in Porter and Chambless's (2014) study. However, no laboratory interaction data were collected for the prior study.

(“My partner attempted to help me solve a problem by offering suggestions or feedback”) he or she received during the interaction on a 7-point Likert scale from 0 (*not at all*) to 6 (*very much so*).

Provided social support. This 2-item measure was developed for the present study. Following each social support interaction, the helper rated the emotional support (“I responded to my partner with empathy and warmth”) and informational support (“I attempted to help my partner solve a problem by offering suggestions or feedback”) he or she provided during the interaction on a 7-point Likert scale from 0 (*not at all*) to 6 (*very much so*).

Similarity to normal interactions. Following each interaction, both partners rated the similarity of the interaction to their normal interactions (“How similar was this interaction to your usual discussions with your partner outside the lab?”) on a 7-point Likert scale from 0 (*not at all*) to 6 (*very much so*).

Modified Partner Support Rating System Version 3 (PSRS). A team of four female undergraduates who were uninformed as to study hypotheses and couple social anxiety status coded helper behavior in all social support interactions using a modified version of the PSRS. On the original PSRS (Dehle, 1999), raters code for the presence of five different types of social support behaviors (informational, emotional, tangible, esteem, and social network support) as well as undermining behaviors on a 5-point Likert scale for each 1-minute interval of an interaction. The coding system includes extensive descriptions of what types of behavior warrant each rating. Ratings encapsulate both quality and quantity of support during each interval. An average score of support across

intervals is then calculated. Previous research indicates that the different behaviors can be rated reliably using the PSRS and that PSRS ratings of helper behavior account for a significant proportion of the variance in helpee marital satisfaction (Dehle, 2007).

The PSRS Version 3 was modified for the current study to reflect the four factor analytically derived types of social support reported by Barry et al. (2009) and reflected in the SIRRS-R (informational, emotional/esteem, tangible, and physical affection). Due to the relative infrequency of tangible support and physical affection in the interactions, we utilize ratings only for informational and emotional/esteem support in the present analyses. Two of the pool of four coders rated each interaction, and scores represented an average of their ratings. Coders were trained to a criterion of $r_1(1,1) = .80$ with the first author before coding study recordings. To prevent coder drift, the coding team met weekly with the first author to code recordings and discuss ratings. Interrater reliability was excellent ($r_1(1,2) = .97$) for both informational and emotional/esteem support). Due to technical problems with the recording, we were unable to obtain observer ratings of support for one interaction in which an HSA target served as the helper.

Problem significance. After viewing each interaction, coders rated the apparent importance of the problem topic to the helpee on a 5-point Likert scale from 1 (*not at all important*) to 5 (*very important*). Interrater reliability was good, $r_1(1,2) = .81$. Due to technical problems with the recording, we were unable to obtain observer ratings of problem significance for one interaction in which an HSA target served as the helper.

Procedure. All couples first provided written informed consent and then completed a 5-minute videorecorded warm-up discussion to get used to talking in front of

the camera. Participants then completed two social support interactions. Each partner served as the helper in one interaction and the helpee in the other. The order of the interactions was randomly assigned. Prior to each social support interaction, the partner playing the helpee role was instructed to select a personal problem that was important to him or her and that was not a source of conflict in the relationship. The helpee was then instructed to discuss this topic with his or her partner for 10 minutes, and the partner playing the helper role was instructed to be involved in the discussion and respond to the helpee in any way he or she wished. The couple was then left alone for 10 minutes to discuss the topic. All social support interactions were videorecorded. Following each social support interaction, the helpee completed a measure of received social support, and the helper completed a measure of provided social support. Both partners also rated how similar the interaction task was to their normal interactions. Following the social support interactions, couples also completed a 10-minute problem-solving interaction, which is not the focus of the present study. Participants recruited through the psychology subject pool and their romantic partners were offered a choice of course credit or entry into a raffle for a \$100 gift certificate in exchange for their participation. Participants recruited via flyers and their partners were paid \$15 for their participation in the laboratory visit and completion of the questionnaire battery. All study procedures were approved by the Institutional Review Board at the University of Pennsylvania.

Analytic strategy. Ratings of emotional and informational support were significantly correlated with one another (all r s > .40, all p s < .003) for every measure of support except observer ratings of the target's provided support ($r = .18, p = .20$).

Accordingly, to limit Type I error, we summed ratings of emotional and informational support for each measure. We examined results separately for observer ratings of the target's provided emotional and informational support; however, because the pattern of results did not differ from those based on the sum, we report the summed results.

We first conducted *t*-tests to compare the HSA and LSA groups on each of the six support measures (target and partner reports of received and provided support, and observer ratings of the target's and partner's provided support). We followed these *t*-tests with regressions predicting each of the six support measures from social anxiety status (coded as 0 = LSA, 1 = HSA), relationship length, and the interaction between social anxiety status and relationship length.⁴ The latter two predictors were included because in our previous work we found interactions between social anxiety and relationship length in the prediction of other relationship constructs (Porter & Chambless, 2014). Finally, we conducted a regression predicting the target's self-reported received support from observer ratings of the partner's provided support in the same interaction, the interaction between observer-rated support and social anxiety status, and the covariates listed above. Similarly, we computed a regression predicting the target's report of provided support from observer ratings of the target's provided support in the same interaction, the interaction between observer-rated support and social anxiety status, and the covariates listed above. We were interested in the interaction terms because significant interactions

⁴ We did not control for partner's SIAS in Study 2 because we believed that by doing so we would be controlling for meaningful variance in social anxiety status. The correlation between partner's SIAS and social anxiety status was large in Study 2 ($r_{pb} = .50$) compared to the small correlation between partners' SIAS scores in the unselected sample in Study 1 ($r = .12$), and we believe that this large correlation is an artifact of our inclusion criteria for Study 2.

would signal that the relationship between observer-rated support and target-rated support differed as a function of social anxiety status. Thus, the interaction terms constituted a measure of potential bias in support perception associated with social anxiety. A power analysis conducted with G*Power (Erdfelder, Faul, & Buchner, 1996) indicated that with a sample of 54 couples, there was 80% power to detect a medium effect size of $f^2 = .15$ in a multiple regression model with five predictor variables (the maximum number of predictors included in any model).

To conserve power, non-significant interaction terms ($p \geq .10$) were dropped from the regression model, and the model was rerun without these interactions. We also dropped relationship length from the model if it was a non-significant predictor after the regression was rerun without the interaction term: This main effect was not of interest but was included to permit its interaction with social anxiety in the model. In accordance with the recommendations of Aiken and West (1991), all predictor variables were mean centered to reduce multicollinearity. Diagnostic statistics including dfbetas, condition indexes, and residuals were checked to ensure the data did not violate the assumptions of regression. Target- and partner-reported received support scores were extremely negatively skewed with most participants reporting high levels of support, and an examination of the residuals showed evidence of heteroscedasticity. Thus, these variables were reverse scored, and these data were analyzed using negative binomial regression, which does not rely on the assumption that residuals are homoscedastic (Gardner, Mulvey, & Shaw, 1995).

Results and Discussion

Descriptive statistics. Sample demographics and mean scores on study measures are presented in Table 1.3. Overall, participants rated the social support interactions as moderately similar to their normal interactions, and observers rated the problem topics as seeming somewhat important to the helpee (see Table 1.3). The HSA and LSA groups did not differ significantly from one another on relationship length, similarity of the support interaction to their normal interactions, problem significance, or any demographic variables. However, partners of HSA targets scored higher on the SIAS than did LSA partners ($t(39) = -4.21, p < .001, d = 1.12$). In large part, this is likely the result of our inclusion criteria (LSA partners were required to score below 20 on the SIAS, whereas HSA partners were not), although assortative mating may have contributed somewhat to this finding: In Study 1, as in Porter and Chambless (2014), we found a significant but small correlation between partners' SIAS scores in a sample unselected for social anxiety (see Table 1.2). HSA targets and partners also evidenced higher levels of depressive symptoms than LSA targets and partners ($t(38) = -3.63, p = .001, d = 0.28$ for targets and $t(34) = -2.31, p = .03, d = 0.36$ for partners).

Table 1.4 displays the zero-order correlations between total scores on the support measures. As shown in Table 1.4, partners displayed moderate levels of agreement about the amount of support present in a given interaction, whereas observer ratings of support were inconsistently related to the couple's ratings of support in the same interaction.

***t*-tests.** For interactions in which the target was the helpee, HSA targets reported that they received significantly less support from their partners than did LSA targets ($t(52) = 2.40, p = .02, d = 0.66$). However, partners of HSA and LSA individuals did not

differ significantly in the amount of support they reported providing ($t(52) = 1.08, p = .28, d = 0.29$), although there was a small effect in the direction of HSA partners' providing less support. Observer ratings revealed no significant differences in the amount of support provided by partners of HSA and LSA targets with an effect size near zero ($t(52) = -0.31, p = .76, d = 0.08$). For interactions in which the target was the helper, HSA and LSA couples did not differ significantly from one another in the quantity of support the target reported providing ($t(52) = 1.21, p = .23, d = 0.33$) or the quantity of support the partner reported receiving ($t(52) = 1.57, p = .12, d = 0.42$), though there were small effects in the direction of HSA targets' providing less support and HSA partners' receiving less support. Observer ratings revealed no significant differences in the amount of support HSA and LSA targets provided ($t(51) = 0.16, p = .87, d = 0.04$).

Regressions. We conducted regressions to predict the six support variables from the covariates listed above, as well as regressions to test for bias in support perception associated with social anxiety status. None of the overall regression models were statistically significant (all $ps > .06$) and therefore the models could not be interpreted. However, in light of the significant difference found on the t -test comparing HSA and LSA targets on their ratings of received support, we examined the results of this regression equation. No predictor variable or interaction approached significance with the exception of social anxiety status, which tended to demonstrate the same findings as the t test ($OR = 1.85, p = .07$). It is likely that the findings of social anxiety status are statistically significant in the case of the t -test and not in the case of the negative binomial regression because of the latter approach's more conservative standard errors

In summary, results suggest that socially anxious individuals believe that they receive less support from their partners than do non-anxious individuals, but these differences are not apparent to the anxious individuals' partners or to observers. Our results do not support the notion that socially anxious individuals provide less support to their partners than do non-anxious individuals. Finally, we found no evidence for systematic biases in perceptions of support associated with social anxiety status: That is, HSA individuals' ratings were not systematically less correlated with observer ratings than LSA participants' ratings. Rather, observer ratings were poorly correlated with participants' ratings overall.

General Discussion

Taken together, our results suggest that social anxiety is associated with difficulties even in anxious individuals' most intimate relationships. Higher levels of social anxiety in men at Time 1 are associated with greater odds of relationship dissolution by a year later, and individuals who are high in social anxiety believe that they receive less social support from their romantic partners. These findings add to a small body of literature suggesting that social anxiety is associated with difficulties in romantic relationships (Cuming & Rapee, 2010; Kashdan et al., 2013; Porter & Chambless, 2014; Sparrevohn & Rapee, 2009) and friendships (Rodebaugh, 2009; Rodebaugh et al., 2014), particularly by the anxious individual's own report.

However, socially anxious individuals' partners do not believe that they provide less support to anxious individuals, nor do observers believe that individuals high in social anxiety receive less support than those low in social anxiety during a laboratory

task. This latter finding is consistent with Beck et al.'s (2006) results regarding socially anxious women's partners' support behaviors. Taken together, our findings suggest that the heart of the problem may not be that the partners of socially anxious individuals provide less support, but rather that socially anxious individuals fail to notice their partners' attempts to provide support or to recognize these actions as supportive behaviors. Our findings thus suggest that interventions to improve relationship functioning among socially anxious individuals might do best to focus on helping the anxious individual to better recognize his or her partner's attempts to provide support, rather than focusing on intervening at the couple level in an attempt to change partners' behavior.

We did not find that socially anxious individuals systematically reported receiving less support than observers believed they received, relative to non-anxious individuals. However, this may be due in part to the measure of observer-rated support that we employed in the present study. Observers rated the frequency and intensity of a number of supportive behaviors across each minute-long interval of a 10-minute interaction, and their ratings were then averaged to create a total score. In contrast, participants made a global rating of their own and their partners' supportiveness at the end of the interaction. Observer measures of support were inconsistently related to targets' and partners' reports of support during the same interaction, perhaps because these measures captured slightly different constructs. Alternatively, participants may be rating support based on their relationship history rather than focusing specifically on behavior during the interaction task itself, whereas observers do not have access to this information. To better distinguish

between these two possibilities, future research should utilize observers' global ratings of the amount of support present in an interaction to explore whether social anxiety interacts with these ratings to predict targets' reports of received and provided support.

In contrast to Porter and Chambless's (2014) findings that social anxiety was associated with women's self-report of providing less social support to a partner, we did not find that social anxiety was associated with decreased support provision during the laboratory test according to self-, partner-, or observer-reports. Thus, our findings suggest that socially anxious individuals are just as adept as less anxious individuals at providing support to their romantic partners, at least when encouraged to do so by the structure of a laboratory task.

Our results also suggest that the association between baseline social support and the fate of the relationship one year later does not vary as a function of social anxiety. Further, consistent with past research demonstrating that perceived support is a stronger predictor of positive outcomes than is received support (e.g., Cohen, 2004; Prati & Pietrantoni, 2010), we found that perceived social support was a significant predictor of relationship status one year later for both men and women, whereas received and provided support were not significantly related to relationship status one year later. However, there were marginally significant effects of the amount of support that women received, whether reported by the women themselves or their partners. This was not the case for men. Though these effects are small, our results are consistent with previous research finding that women's received support is more important to relationship well-being than is men's received support, leading some researchers to speculate that women

serve as the barometers of the relationship (Acitelli & Antonucci, 1994; Julien & Markman, 1991).

Finally, our findings suggest social anxiety's effects on intimate relationships may be somewhat different for men and for women. We found that men's social anxiety at Time 1 conferred a greater likelihood that the couple would break up in the following year, whereas the same could not be said for women's social anxiety. Rather, women's symptoms of depression were the more potent predictor of relationship dissolution. We speculate that given the choice, all socially anxious individuals would prefer to remain in a relationship with the same partner even if the relationship is of suboptimal quality, rather than return to the dating market and seek out a new partner. However, partners of socially anxious individuals may grow tired of their partners' reluctance to engage socially, as well as their comorbid depressive symptoms, and may therefore choose to terminate the relationship. Our clinical experience with socially anxious men who entered into therapy at their partners' urging suggests that female partners of socially anxious men may be less tolerant of their partners' social anxiety than are male partners of socially anxious women. This would be consistent with other data suggesting that social anxiety may be more impairing for men than for women given societal expectations: Although rates of social anxiety disorder are somewhat higher among women in the general population, men and women are equally represented or men are slightly more prevalent in treatment-seeking samples of patients with SAD (American Psychiatric Association, 2013). However, this account is speculative, and is limited by the fact that

we did not collect data about reasons for breaking up or about which partner initiated the break-up among couples who were no longer together.

Limitations and Future Directions

In the present study, we extended past research on social anxiety and social support in romantic relationships through our use of self-, partner-, and observer-ratings of support for the same 10-minute interaction. Nevertheless, the present study has a number of important limitations. First, the present study was an analogue study: Participants in Study 1 were unselected for social anxiety symptoms, and participants in the high social anxiety group in Study 2 were selected on the basis of their scores on a self-report symptom measure. We did not employ structured diagnostic interviewing to determine whether HSA targets met criteria for social anxiety disorder. Thus, we cannot say definitively that our results would generalize to individuals with a clinical diagnosis of social anxiety disorder. However, our concern is lessened by studies showing that social anxiety does not constitute a taxon; rather, symptoms are continuously distributed throughout the population (Ruscio, 2010). Second, our sample was made up of undergraduate couples, and the mean relationship length was relatively brief (1.29 years in Study 1, 1.00 years in Study 2). Furthermore, over a third of couples were in long distance relationships, which are relatively common among undergraduates but less common in older populations. Thus, it is unclear whether our results would generalize to older couples in longer, more committed relationships. Third, observers rated the topics our participants discussed as seeming only somewhat important to the participants; unfortunately, we did not collect participants' ratings of topic significance. It may be that

the relatively trivial topics that participants chose to discuss did not necessitate especially supportive responses from partners playing the helper role. Perhaps discussions of more serious problem topics would have generated more support and more extreme differences between the HSA and LSA groups on support measures. Fourth, although both Porter and Chambless's (2014) study and our Study 1 results suggest that social anxiety's impact on intimate relationships may differ somewhat by sex, we did not have sufficient power to test whether the effects of social anxiety on support were moderated by target sex in Study 2. Finally, although we found that men's social anxiety was predictive of break-up one year later, the mechanisms linking social anxiety to break-up are poorly understood. We collected data at only two time points, and were thus unable to conduct mediation analyses to explore variables that might explain this effect. Furthermore, among couples who broke up during the follow-up period, we did not collect data on which partner initiated the break-up. Thus, we do not know whether socially anxious men or their partners initiated relationship dissolution.

The present study suggests a number of directions for future research. First, it would be desirable to replicate our findings among older, married couples in which one partner is or is not clinically diagnosed with SAD. Second, longitudinal research with repeated measurement is required to test the processes by which men's social anxiety contributes to relationship dissolution. Finally, given the importance of perceived and received support in prediction of well-being, interventions for correcting socially anxious individuals' perceptions of their partners' behavior need to be explored.

Table 1.1

Study 1 Demographics and Study Measure Scores for Undergraduate Couples in Romantic Relationships

		Men (<i>n</i> = 308)		Women (<i>n</i> = 308)	
		<i>n</i>	%	<i>n</i>	%
Race	<i>White</i>	192	62.3%	189	61.4%
	<i>Black/African American</i>	18	5.8%	6	1.9%
	<i>Asian</i>	73	23.7%	83	26.9%
	<i>Native American/Alaska Native</i>	3	1.0%	3	1.0%
	<i>Native Hawaiian/Pacific Islander</i>	3	1.0%	1	0.3%
	<i>Other</i>	15	4.9%	22	7.1%
	<i>Unknown</i>	4	1.3%	4	1.3%
Ethnicity	<i>Hispanic</i>	31	10.1%	39	12.7%
	<i>Non-Hispanic</i>	249	80.8%	248	80.5%
	<i>Unknown</i>	28	9.1%	21	6.8%
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<i>Age (years)</i>		20.0	1.77	19.4	1.20
<i>SIAS</i>		14.0	10.76	15.0	10.06
<i>DASS-21 Depression</i>		3.6	3.79	3.4	3.67
<i>SIRRS-R</i>		92.1	15.17	95.1	15.08
<i>SIRRS-R-SP</i>		98.1	13.98	97.6	13.54
<i>MSPSS Significant Other</i>		36.6	6.14	37.6	4.50

Note. DASS-21 Depression = Depression Anxiety Stress Scales-21: Depression subscale; MSPSS

Significant Other = Multidimensional Scale of Perceived Social Support: Significant Other subscale; SIAS

= Social Interaction Anxiety Scale; SIRRS-R = Support in Intimate Relationships Rating Scale – Revised;

SIRRS-R-SP = Support in Intimate Relationships Rating Scale – Revised – Support Provided.

Table 1.2

Zero-order Correlations between Study 1 Measures of Support and Psychopathology in Undergraduate Couples (N = 308)

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. T2 relationship status ^a											
Men											
2. SIAS	-.15*										
3. DASS Depression	-.19**	.40***									
4. SIRRS-R	.11	-.08	-.26***								
5. SIRSS-R-SP	.18*	-.09	-.18**	.72***							
6. MSPSS Sig. Other	.25***	-.05	-.31***	.50***	.45***						
Women											
7. SIAS	.04	.12*	.00	-.07	-.10	-.13*					
8. DASS Depression	-.11	.02	.10	-.14*	-.12*	-.18*	.37***				
9. SIRRS-R	.13*	.03	-.02	.22***	.23***	.20***	-.15*	-.22***			
10. SIRRS-R-SP	.08	.05	-.06	.29***	.26***	.27***	-.21***	-.13*	.76***		
11. MSPSS Sig. Other	.19**	-.01	-.11*	.27***	.27***	.37***	-.19**	-.34***	.48***	.39***	

Note. DASS Depression = Depression Anxiety Stress Scales-21: Depression subscale; MSPSS Sig. Other = Multidimensional Scale of Perceived Social Support: Significant Other subscale; SIAS = Social Interaction Anxiety Scale; SIRRS-R = Support in Intimate Relationships Rating Scale – Revised; SIRRS-R-SP = Support in Intimate Relationships Rating Scale – Revised – Support Provided; T2 = Time 2.

^a Relationship status was coded as 0 = no longer together and 1 = still together. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 1.3

Study 2 Demographics and Study Measure Scores by Social Anxiety Status

		HSA targets ^a		LSA targets ^a		HSA partners ^a		LSA partners ^a	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Sex	<i>Female</i>	15	55.6%	15	55.6%	12	44.4%	12	44.4%
Race	<i>White</i>	13	48.1%	16	59.3%	12	44.4%	14	51.9%
	<i>Black/ African American</i>	1	3.7%	3	11.1%	3	11.1%	4	14.8%
	<i>Asian</i>	7	25.9%	5	18.5%	9	33.3%	6	22.2%
	<i>Native American/ Alaska Native</i>	1	3.7%	0	0.0%	1	3.7%	1	3.7%
	<i>Native Hawaiian/ Pacific Islander</i>	0	0.0%	1	3.7%	0	0.0%	0	0.0%
	<i>Other</i>	3	11.1%	2	7.4%	1	3.7%	2	7.4%
	<i>Unknown</i>	2	7.4%	0	0.0%	1	3.7%	0	0.0%
Ethnicity	<i>Hispanic</i>	3	11.1%	4	14.8%	5	18.5%	2	7.4%
	<i>Non-Hispanic</i>	24	88.9%	22	81.5%	21	77.8%	22	81.5%
	<i>Unknown</i>	0	0.0%	1	3.7%	1	3.7%	3	11.1%
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<i>Relationship length (years)</i>		1.0	0.60	1.0	0.74	1.0	0.60	1.0	0.74

<i>Age (years)</i>	19.8	1.12	19.3	1.10	20.0	1.45	19.3	1.20
<i>SIAS</i>	36.9	9.23	8.4	3.75	15.5	8.40	7.8	4.35
<i>DASS-21 Depression</i>	5.3	4.73	1.7	2.35	3.8	4.42	1.7	1.70
<i>Self-reported received support</i>	9.3	2.09	10.6	1.62	9.3	2.52	10.2	1.74
<i>Self-reported provided support</i>	8.4	1.85	9.0	1.97	9.3	1.61	9.7	1.65
<i>Observer-rated provided support</i>	4.8	1.10	4.8	1.07	4.7	1.48	4.6	1.43
<i>Problem significance</i>	3.0	0.81	3.3	0.63	3.4	0.70	3.4	0.75
<i>Similarity – Helper</i>	4.7	0.88	4.7	1.20	4.9	1.05	5.1	0.91
<i>Similarity – Helpee</i>	4.6	1.15	4.8	1.39	4.6	1.28	5.1	0.93

Note. DASS-21 Depression = Depression Anxiety Stress Scales-21: Depression subscale; SIAS = Social Interaction Anxiety Scale; Similarity – Helpee = self-reported similarity to normal interactions after playing helpee role; Similarity – Helper = self-reported similarity to normal interactions after playing helper role.

^a *n* = 27 in all groups.

Table 1.4

Zero-order Correlations between Study 2 Support Measures in Undergraduate Couples
(N = 54)

	1.	2.	3.	4.	5.	6.
1. Target's report of received support						
2. Partner's report of provided support	.49***					
3. Observer rating of partner's provided support	.27*	.06				
4. Partner's reported of received support	.29*	.51***	.04			
5. Target's reported of provided support	.48***	.35**	.35**	.42**		
6. Observer rating of target's provided support	.09	.10	.16	-.01	.28*	
* $p < .05$. ** $p < .01$. *** $p < .001$.						

Chapter 2: Criticism in Socially Anxious Individuals' Romantic Relationships

Abstract

Social anxiety is associated with a number of problems with intimate relationships. Because fear of negative evaluation is a cardinal feature of social anxiety disorder, perceived criticism from partners may play a significant role in socially anxious individuals' intimate relationships. In the present study, we examine associations between social anxiety and perceived, observed, and expressed criticism in interactions with romantic partners. In Study 1, we collected self-report data from 308 undergraduates and their romantic partners on social anxiety symptoms, perceived and expressed criticism, and upset due to criticism. One year later couples reported whether they were still in this relationship. Results showed that compared to less anxious individuals, socially anxious individuals report being more critical of their partners, and socially anxious women report being more upset by criticism from a partner. Perceived criticism was unrelated to both social anxiety and break-up. In Study 2, undergraduate couples with a partner high ($n = 26$) or low ($n = 26$) in social anxiety completed a 10-minute, videorecorded problem-solving task. Both partners rated their perceived and expressed criticism and upset due to criticism following the interaction, and observers coded interactions for criticism. Results indicated that social anxiety was not significantly related to any of the criticism variables, though there was a trend toward high social anxiety participants' being described by their partners as more upset when criticized. Taken together, our findings suggest that socially anxious individuals are accurate in their perceptions of criticism in close relationships,

but may have disproportionate emotional responses to that criticism. Results are discussed in light of known difficulties with intimacy among socially anxious individuals.

Social anxiety disorder (SAD) is one of the most common mental disorders (Kessler et al., 2005) and is associated with considerable disability (Stein & Kean, 2000). While millions of Americans suffer from SAD, many more experience subthreshold symptoms of social anxiety. Indeed, social anxiety exists on a continuum, with SAD representing the most severe subset of sufferers (Ruscio, 2010). Socially anxious individuals have difficulty forming relationships: They are more likely to report having no close friends (Furmark et al., 1999), have smaller social networks (Montgomery, Haemmerlie, & Edwards, 1991; Torgrud et al., 2004), and are less likely to marry (e.g., Davidson, Hughes, George, & Blazer, 1994; Schneier, Johnson, Hornig, Liebowitz, & Weissman, 1992). However, relatively little is known about the quality of socially anxious individuals' romantic relationships once they are established, though several studies suggest that social anxiety may be associated with decreased social support (Porter & Chambless, 2014; Porter & Chambless, 2016), greater conflict (Cumming & Rapee, 2010), and difficulties with intimacy (Porter & Chambless, 2014; Sparrevohn & Rapee, 2009; Wenzel, 2002) in romantic relationships. Further complicating matters, socially anxious individuals tend to perceive their interactions with others in a more negative light than do their interaction partners (e.g., Stopa & Clark, 1993) and are more attuned to signs of disapproval from others relative to non-anxious individuals (e.g., Veljaca & Rapee, 1998). Thus, a socially anxious individual may be more likely than a less anxious individual to perceive the same interaction with a partner as problematic. It is therefore essential for researchers to incorporate other sources of data apart from self-report when studying romantic relationships in this population.

The cardinal feature of SAD is an excessive fear of negative evaluation from others (Rapee & Heimberg, 1997). For this reason, it is surprising that the role of perceived criticism from intimate others in socially anxious people has received so little attention. Perceived criticism has since been established as a predictor of negative psychological outcome across a number of different disorders, including MDD, bipolar disorder, substance use disorders, anxiety disorders, and psychosis (for reviews, see Masland & Hooley, 2015; Renshaw, 2008). Perceived criticism is negatively associated with measures of relationship satisfaction, and is generally unrelated to demographic variables, personality traits, or measures of psychopathology (Renshaw, 2008). Previous studies have found small to medium positive correlations between individuals' reports of perceived criticism and their spouses' reports of expressed criticism (Chambless, Bryan, Aiken, Steketee, & Hooley, 1999; Hooley & Teasdale, 1989), although these correlations become large when couples rate perceived and expressed criticism during a specific 10-minute interaction, rather than global criticism (Chambless & Blake, 2009).

Only one study has examined perceived criticism as a predictor of drop-out and response to treatment among patients with SAD (Fogler, Thompson, Steketee, & Hofmann, 2007), and we are unaware of any studies which have specifically explored cross-sectional associations between perceived criticism and social anxiety. Further, relatively little is known about social anxiety and criticism in close relationships more broadly. On the Multidimensional Perfectionism Scale (MPS; Frost, Marten, Lahart, & Rosenbalte, 1990), individuals with SAD consistently report higher levels of parental criticism than do community controls (Antony, Purdon, Huta, & Swinson, 1998; Jain &

Sudhir, 2010; Juster et al., 1996; Kumari, Sudhir, & Mariamma, 2012). However, these reports are limited in that they are retrospective and may well capture parental criticism that occurred before the onset of the disorder. Additionally, the parental criticism subscale of the MPS may be better characterized as measuring high parental standards, rather than criticism per se. We are unaware of any other work examining socially anxious individuals' perceptions of criticism from close others. However, what is known is that social anxiety is associated with difficulties with self-disclosure and intimacy in romantic relationships. Compared to less anxious individuals, individuals with SAD and those high in social anxiety symptoms self-disclose less, are less emotionally expressive to their romantic partners, and describe their romantic relationships as less intimate (Cuming & Rapee, 2010; Porter & Chambless, 2014; Sparrevohn & Rapee, 2009; Wenzel, 2002), though some studies have found that these results are significant only for women. Socially anxious individuals also perceive intimacy as riskier, and their romantic partners agree that their relationships are less emotionally intimate (Porter & Chambless, 2014). It is unclear exactly why this is the case, but one possibility is that socially anxious individuals fear opening up because they experience their partners as critical.

Several studies suggest that socially anxious individuals may themselves be more critical of close others than are less anxious individuals. Budinger, Drazdowski, and Ginsburg (2013) compared the behavior of parents with SAD to that of anxious parents without SAD during a 5-minute interaction with their non-anxious child. The authors found that parents with SAD were rated by observers as being more critical of their children than were anxious parents without SAD. Because SAD is associated with high

rates of self-criticism relative to other anxiety disorders (Cox, Fleet, & Stein, 2004), the authors speculated that parents with SAD may see their children as a reflection of themselves and thus criticize their children as they would themselves. Wenzel, Graff-Dolezal, Macho, and Bredle (2005) similarly compared the behavior of socially anxious and non-anxious undergraduates during a 10-minute discussion of a relationship problem with a romantic partner. The authors found that observers rated the socially anxious participants as demonstrating more very negative communication behaviors during this interaction, although they did not examine levels of criticism specifically.

In the present study, we sought to better understand the relationship between social anxiety and criticism to and from a romantic partner. First, we were interested in whether social anxiety symptom severity was positively associated with perceived criticism from a romantic partner. Although perceived criticism has generally been found to be unrelated to measures of psychopathology (Renshaw, 2008), no published study has examined the relationship between social anxiety symptom severity and perceived criticism. Given that socially anxious individuals tend to be particularly attuned to signs of disapproval from others relative to non-anxious individuals (Veljaca & Rapee, 1998), we hypothesized that they might also be more likely to report high levels of criticism from a romantic partner. Second, given the prominence of fear of negative evaluation in social anxiety, we hypothesized that relative to less anxious individuals, more socially anxious individuals would become more upset when criticized by a romantic partner. Third, we were interested in whether socially anxious individuals themselves would be more critical of their romantic partners. Given the dearth of literature on this topic, we

treated this question as exploratory and did not have any specific hypotheses as to what we would find. Fourth, we were interested in whether social anxiety would moderate the relationship between observed criticism and perceived criticism. We did not have a hypothesis as to whether ratings of individuals high or low in social anxiety would be more in line with observer ratings, given that the literature suggests both that (a) socially anxious individuals tend to evidence a negative bias toward their own interpersonal interactions (Stopa & Clark, 1993) and (b) socially anxious individuals may be more accurate than less anxious individuals at detecting negative social stimuli (Veljaca & Rapee, 1998). We thus treated this as an exploratory hypothesis.

Our last two research questions concerned the association between perceived criticism and relationship dissolution. Although higher levels of perceived criticism are associated with lower relationship satisfaction, we are unaware of any studies prospectively linking perceived criticism to higher rates of relationship dissolution. Thus, we sought to test whether this was the case, and hypothesized that individuals who reported high levels of perceived criticism would be less likely to remain with the same romantic partner one year later. Further, we hypothesized that this association would be moderated by social anxiety, such that the relationships of more socially anxious individuals, who we hypothesized to be more sensitive to and upset by criticism, would be less enduring.

We explored these questions in a sample of undergraduates and their romantic partners. In Study 1, we examine cross-sectional associations between social anxiety and perceived criticism, expressed criticism, and upset due to criticism, as well as

longitudinal associations between perceived criticism and break-up, in a sample of undergraduate couples unselected for social anxiety. In Study 2, we examine whether individuals selected on the basis of high or low scores on a measure of social anxiety differ from one another in perceived criticism, expressed criticism, upset due to criticism, and observed criticism during a 10-minute, laboratory-based, problem-solving interaction task with a romantic partner.

Study 1

Method

Participants. Participants were University of Pennsylvania undergraduates ages 18-23 ($n = 543$) and their romantic partners ($n = 355$).⁵ All participants were fluent in English, and all couples were in an exclusive relationship of at least three months duration at the time of their participation in the study. To increase sample homogeneity, we excluded same sex couples and those who were married or engaged.

Measures.

Time 1. Participants provided demographic information about themselves, as well as information about the duration of the relationship and whether the relationship was long distance.

Social Interaction Anxiety Scale (SIAS). The SIAS (Mattick & Clarke, 1998) is a 20-item measure of anxiety in social and interpersonal situations. The reliability and validity of the SIAS have been demonstrated in clinical, community, and student samples

⁵ All of the couples included in the final sample were also included in Porter and Chambless's (2016) sample, and 163 (52.9%) were also included in Porter and Chambless's (2014) sample. However, in those publications we report findings related to social support and intimacy, rather than criticism.

(Heimberg, Mueller, Holt, Hope, & Liebowitz, 1992; Mattick & Clarke, 1998). In light of recent work (Rodebaugh, Woods, Heimberg, Liebowitz, & Schneier, 2006; Rodebaugh, Woods, & Heimberg, 2007) demonstrating the greater validity of the SIAS if only the 17 straightforwardly worded items are included, we used the straightforward item total in this research. Internal consistency was excellent for this version in the present sample ($\alpha = .91$).

Depression Anxiety Stress Scales-21 (DASS-21). The DASS-21 (Lovibond & Lovibond, 1995) is a 21-item measure of past-week symptoms of depression, anxiety, and stress. The DASS-21 has demonstrated high internal consistency in both clinical and nonclinical samples and good convergent and criterion-related validity (Antony, Beiling, Cox, Enns, & Swinson, 1998). Only the Depression subscale of the DASS-21 was used in the present analyses. Internal consistency of the subscale was good ($\alpha = .83$).

Perceived Criticism Measure (PCM). The PCM (Hooley & Teasdale, 1989) is a 2-item measure which asks individuals to rate on a 10-point Likert scale how critical their partners are of them and how upset this makes them. The PCM has demonstrated good test-retest reliability, moderate agreement with relatives' ratings of expressed criticism, and good convergent and discriminant validity (see Renshaw, 2008 for a review). In addition to the two standard PCM questions, we also asked participants to rate on the same scale how critical they are of their partners and how upset this makes their partners.

Time 2.

Relationship dissolution. Participants were asked to indicate whether they were still in a relationship with the individual they listed as their romantic partner at Time 1.

Procedure. Students were recruited primarily via the psychology department subject pool. These participants provided contact information for their romantic partner, and then completed a battery of questionnaires which included the SIAS. All received course credit for their participation. A minority of students were recruited via flyers placed around campus. These subjects also provided contact information for their romantic partner and completed the SIAS, but did not complete the rest of the questionnaire battery until completion of the laboratory portion of the study (further described under Study 2, Method). Participants recruited via flyers were paid \$15 total for completion of the questionnaires and the laboratory visit.

Romantic partners were emailed a study description and a hyperlink to the study questionnaires. Of romantic partners contacted, 66.6% participated in the study. Romantic partners of participants recruited through the subject pool were entered into a raffle for a \$200 gift certificate in exchange for their participation; additionally, students recruited through the subject pool whose partners participated were entered into a raffle for a \$100 gift certificate. Romantic partners of participants recruited via flyers were paid \$15 total for completion of the questionnaires and the laboratory visit.

All participants provided informed consent. Questionnaires included those listed above, as well as additional measures of relationship quality not pertinent to the present study. Order of questionnaires was randomized for each participant. All study procedures were approved by the Institutional Review Board at the University of Pennsylvania.

Approximately 12 months after completion of the initial questionnaire battery, all participants were contacted to ascertain whether they were still in a romantic relationship

with the same romantic partner and to complete questionnaires not pertinent to the present study. All participants were entered into a raffle for a \$50 gift certificate in exchange for their participation.

Of the sample of 355 couples, 320 had been contacted for 12-month follow-up data prior to preparation of this manuscript and were thus eligible for the present study. Of these, we excluded 12 couples because one partner failed to provide data on the Social Interaction Anxiety Scale, one of the key measures of interest. Thus, the final sample consisted of 308 couples. Of these, we were able to obtain data on relationship status at 12-month follow-up from 242 couples (78.6%). Data for the remaining 66 couples was imputed with multiple imputation in SPSS version 23.

Analytic strategy.

Cross-sectional analyses. We first conducted cross-sectional analyses on the Time 1 data to determine whether actors' and/or partners' social anxiety was associated with actors' perceived and expressed criticism, the extent to which actors got upset when criticized by a partner, and the extent to which they believed their partners became upset when criticized by them. Thus, the dependent variables (DVs) were each of the four items on the PCM. Independent variables (IVs) were actor SIAS, partner SIAS, actor sex (coded as -1 = male, 1 = female), long distance status (coded as -1 = not long distance, 1 = long distance), relationship length, and the interactions between actor SIAS and each of the latter three predictors, and between partner SIAS and each of the latter three predictors. These interaction terms were included in light of our previous findings that these variables interacted with social anxiety to predict other relationship constructs

(Porter & Chambless, 2014). To conserve power, non-significant interaction terms ($p \geq .10$) were dropped from the model, and the model was rerun without these interactions. In each case, we tested whether removing these interaction terms significantly worsened model fit, and in no instance was this the case. Here, we report the results of the final models only. Given that depression is both highly comorbid with social anxiety (Ohayon & Schatzberg, 2010) and related to relationship difficulties (Mead, 2002), when a significant main effect of actor or partner social anxiety was obtained, or when a significant interaction between actor or partner social anxiety and one of the other predictor variables emerged, we reran the analysis controlling for actor and partner DASS Depression scores to determine whether these effects were specific to social anxiety.

Due to the dyadic and non-independent nature of the Time 1 questionnaire data, all cross-sectional analyses were conducted using the Actor-Partner Interdependence Model (APIM; Kenny, Kashy, & Cook, 2006). APIM is an analytic approach for dyadic data that statistically accounts for the non-independence of partners' data. Analyses are conducted using multilevel modeling, with individuals nested within dyads. Below is an example of the full Level 1 model. The corresponding Level 2 models are not included below because they contained only fixed effects.

$$Y_{ij} = \beta_0 + \beta_1 (\text{actor social anxiety}_{ij}) + \beta_2 (\text{partner social anxiety}_{ij}) + \beta_3 (\text{actor sex}_{ij}) + \beta_4 (\text{long distance status}_{ij}) + \beta_5 (\text{relationship length}_{ij}) + \beta_6 (\text{actor social anxiety}_{ij} * \text{actor sex}_{ij}) + \beta_7 (\text{partner social anxiety}_{ij} * \text{actor sex}_{ij}) + \beta_8 (\text{actor social anxiety}_{ij} * \text{long distance status}_{ij}) + \beta_9 (\text{partner social anxiety}_{ij} * \text{long distance status}_{ij}) + \beta_{10}$$

$$(\text{actor social anxiety}_{ij} * \text{relationship length}_{ij}) + \beta_{11} (\text{partner social anxiety}_{ij} * \text{relationship length}_{ij}) + e_{ij},$$

where i represents the individual, j represents the couple, e is a residual error term, and Y is the DV (e.g., actor's perceived criticism). As per the recommendations of Kenny et al., all continuous predictor variables were grand mean centered, and all dichotomous predictor variables were effect coded.

All analyses were run in SPSS version 23. Before conducting our main analyses, we used maximum likelihood estimation to test whether sex should be treated as a distinguishing factor in our analyses. Results indicated that the constraints required for an indistinguishable model significantly worsened model fit in all cases except when the DV was the actor's expressed criticism. For consistency across analyses, we chose to treat couples as distinguishable by sex in all analyses and to treat the residual structure using heterogeneous compound symmetry. Main analyses were conducted using restricted maximum likelihood estimation. Significant interactions were probed using a two-intercept approach, in which separate intercepts and slopes were estimated simultaneously for men and women, in order to obtain simple slopes.

A power analysis conducted using APIM Power (Kenny & Ackerman, 2015) indicated that with 308 dyads, we had 99.9% power to detect a small-medium actor effect of $r_p = .20$ and 70.7% power to detect a small partner effect of $r_p = .10$, assuming partners' scores on the IVs (SIAS) were correlated at $r = .17$ and partners' scores on the DV (each PCM variable) were correlated at $r = .10$. Estimated correlations between

partners' scores on these measures were based on preliminary analyses using the subset of the current sample which was included in Porter and Chambless (2014).

Longitudinal analyses. We then used logistic regression to conduct longitudinal analyses to determine whether the main effects of perceived and expressed criticism and upset due to criticism at Time 1, as well as the interactions between these variables and social anxiety at Time 1, were predictive of whether the couple had broken up one year later.⁶ Thus, the DV was Time 2 relationship status (coded as 0 = no longer together, 1 = still together), and the IVs were men's and women's SIAS, men's and women's scores on the relevant PCM variable (perceived criticism, upset due to criticism, or expressed criticism), the interactions between each partner's SIAS and their PCM variable score, relationship length, long distance status (coded as 0 = not long distance, 1 = long distance) and the interactions between these latter two variables and each partner's SIAS. As in the cross-sectional analyses, non-significant interaction terms ($p \geq .10$) were dropped from the regression model to conserve power, and the model was rerun without these interactions. Here, we report the results of the final logistic regressions only. When a significant main effect of actor or partner social anxiety was obtained, or when a significant interaction between actor or partner social anxiety and one of the other predictor variables emerged, we reran the analysis controlling for actor and partner DASS Depression scores to determine whether these effects were specific to social anxiety.

In accordance with the recommendations of Aiken and West (1991), all predictor variables were mean centered to reduce multicollinearity. Diagnostic statistics including

⁶ We did not use APIM for these analyses because the dependent variable was a between dyads variable, and APIM requires that the DV be a mixed variable (Kenny et al., 2006).

dfbetas, condition indexes, and residuals were checked to ensure the data did not violate the assumptions of regression. A power analysis conducted with G*Power (Erdfelder, Faul, & Buchner, 1996) indicated that in a logistic regression with a sample of 308 couples and an estimated base rate of 50% of couples remaining together at Time 2, there was 93% power to detect a change of 10 percentage points in break-up rate associated with each one standard deviation increase on the SIAS.

Results and Discussion

Description of the sample. Sample demographics and mean scores on study measures are presented in Table 2.1. At Time 1, mean relationship length was 1.29 years (SD = 1.04, range = 3 months to 6 years), and over a third of couples (37.7%) indicated that they were in a long distance relationship. Using multiple imputation, we estimated that 184 couples (59.7%) were still together at Time 2. Table 2.2 displays the zero-order correlations between study measures. As shown in Table 2.2, there were moderate levels of agreement between partners as to how critical each partner was and how upset each partner became when criticized, and perceived criticism and upset due to criticism were also moderately correlated within individuals. For women but not men, social anxiety was positively correlated with being more critical of one's partner, and male partners agreed that socially anxious women were more critical than less socially anxious women. Women's social anxiety was also positively correlated with self-reports of being more upset when criticized and of one's partner's becoming more upset when criticized. In neither sex was social anxiety related to higher perceived criticism. However, there were

significant positive correlations between men's and women's depression and all of the PCM variables.

Cross-sectional analyses.

Perceived criticism. The DV in our first multilevel model was perceived criticism. We were interested in the effects of both actor social anxiety (i.e., do socially anxious individuals perceive more criticism?) and partner social anxiety (i.e., do partners of socially anxious individuals perceive more criticism?) in this model. No interaction terms were included in the final model. Neither actor nor partner social anxiety predicted perceived criticism; rather, the only significant predictor of perceived criticism was sex, such that men perceived higher levels of criticism than did women ($\beta = -.26, p < .001$).

Expressed criticism. The DV in our second multilevel model was expressed criticism. Again, we were interested in the effects of both actor social anxiety (i.e., do socially anxious individuals report being more critical of their partners?) and partner social anxiety (i.e., do partners of socially anxious individuals report being more critical of their partners?). No interaction terms were included in the final model. We found a significant effect of actor social anxiety, such that more socially anxious individuals reported being more critical of their partners ($\beta = .12, p < .001$). There was no significant partner effect, nor were any other predictors in the model significant. When we reran the model controlling for actor and partner depression, actor social anxiety was no longer a significant predictor of expressed criticism, whereas both actor ($\beta = .09, p < .001$) and partner depression ($\beta = .09, p = .04$) predicted higher levels of expressed criticism. That

is, both depressed individuals and the partners of depressed individuals reported being more critical.

Upset due to criticism. We then predicted individuals' self-reports of how upset they became when criticized, as well as their reports of how upset they believed their partners became when criticized, from actor and partner social anxiety and the other covariates listed above. In the former model, we were most interested in the effects of actor social anxiety (i.e., do socially anxious individuals report becoming more upset when criticized?). In the latter model, we were most interested in the effects of partner social anxiety (i.e., do the partners of socially anxious individuals report that anxious individuals become more upset when criticized?). When the DV was one's own upset due to criticism, the interaction between actor sex and actor social anxiety was retained in the model. There was a significant main effect of actor social anxiety ($\beta = .24, p < .001$), such that socially anxious individuals reported being more upset by criticism, as well as a significant interaction between actor sex and actor social anxiety: Among women, social anxiety was associated with becoming more upset by criticism ($\beta = .21, p < .001$), whereas men's social anxiety was unrelated to levels of upset due to criticism ($\beta = .04, p = .41$). There were also significant main effects of actor sex ($\beta = .24, p < .001$) and relationship length ($\beta = .04, p = .41$), such that women and those in longer relationships reported being more upset by criticism. When we reran the model controlling for actor and partner depression, the main effect of actor social anxiety was no longer significant, but the interaction between actor sex and actor social anxiety remained significant ($\beta =$

.10, $p = .01$). There was also a significant main effect of actor depression ($\beta = .23$, $p < .001$).

When the DV was actors' perceptions of how upset their partners became when criticized, no interaction terms were retained in the model. There was no significant effect of partner social anxiety, but there were significant main effects of actor social anxiety ($\beta = .12$, $p = .004$), sex ($\beta = -.16$, $p < .001$), and relationship length ($\beta = .11$, $p = .01$), such that more socially anxious individuals, men, and those in longer relationships reported that their partners were more upset by criticism. When we reran the model controlling for actor and partner depression, the main effect of actor social anxiety was no longer significant, but significant effects of actor ($\beta = .15$, $p < .001$) and partner depression ($\beta = .13$, $p = .003$) emerged: More depressed individuals and the partners of more depressed individuals report that their partners become more upset when criticized.

Longitudinal analyses. We ran logistic regressions to predict Time 2 relationship status from men's and women's social anxiety, men's and women's scores on the relevant criticism variable (perceived criticism, expressed criticism, and upset due to criticism, respectively, in each of the three models), and the interactions between each individual's social anxiety score and his or her criticism score, as well as the covariates listed above. There were no significant main or interaction effects of perceived criticism in any of the three models.

Summary. Taken together, our results suggest that relative to less anxious individuals, more socially anxious individuals believe they are more critical of their partners and that relative to less anxious women, more socially anxious women report

being more upset by criticism from a partner, though the former effect may be better accounted for by comorbid symptoms of depression. In contrast, there was no indication that partners of socially anxious individuals perceived the anxious individuals as being either more critical or more upset by criticism. Furthermore, social anxiety appears to be unrelated to perceived criticism from a romantic partner, and perceived and expressed criticism as well as upset due to criticism appear to be unrelated to whether a couple remains together one year later, regardless of the respondent's level of social anxiety. In contrast, depressive symptoms were consistently positively associated with all criticism variables for both men and women. Finally, while not the main focus of our analyses, we identified important sex differences in perceived criticism: Men perceive more criticism from their female partners than vice versa, and both men and women agree that women are more upset by criticism from a partner.

This study constituted an important first step toward better understanding the associations between social anxiety, perceived criticism, and relationship dissolution. However, a limitation of this study is that when partners' reports of perceived and expressed criticism differed from one another, it was unclear which partner's report to trust. Thus, in Study 2 we had couples rate perceived criticism, expressed criticism, and upset due to criticism during an identified 10-minute interaction, rather than making global ratings of these constructs. We anticipated that this would lead to higher levels of agreement between partners, as in previous research (Chambless & Blake, 2009). Furthermore, the use of these interactions allowed us to obtain a more objective, observer-rated measure of criticism for each individual, which we could then use to

clarify discrepancies between partners' reports of criticism and to investigate whether social anxiety moderated the relationship between perceived and observed criticism. We further built upon the design of Study 1 by oversampling couples with a partner who scored above the clinical cutoff on social anxiety in Study 2.

Study 2

Method

Participants. Participants were University of Pennsylvania undergraduates and their romantic partners who completed the SIAS as part of Study 1. We selected high social anxiety (HSA) couples and low social anxiety (LSA) couples from this pool of couples and invited them to participate in the laboratory portion of the study. We defined HSA couples as those in which at least one partner scored one standard deviation above the published mean on the full 20-item SIAS (score of > 34 ; Heimberg et al., 1992). We defined LSA couples as those in which both partners scored below the mean on the SIAS (score of < 20 ; Heimberg et al., 1992). A total of 27 HSA and 34 LSA couples participated in the laboratory portion of the study. Two LSA couples and one HSA couple did not follow instructions or complete the study tasks, and were therefore excluded from the analyses.

Because our research questions concerned how HSA and LSA targets and their partners differ from one another with regard to criticism, we designated one individual in each couple to serve as the HSA target or the LSA control to whom the HSA target's behavior would be compared. In HSA couples, the partner with the higher SIAS score was designated the target. We then randomly selected 26 LSA couples from the 32 LSA

couples who completed the study tasks and determined which partner would serve as the target in each couple by yoking each LSA couple to an HSA couple on target sex. The final sample thus consisted of 26 HSA couples and 26 LSA couples with the same number of female targets in each group.

Measures.

Self-report measures. In addition to the measures listed below, all participants also completed the measures listed above as part of Study 1, as well as other measures not pertinent to the present study.

Interaction-Specific Perceived Criticism Measure (PCM-I). Following the problem-solving interaction, participants completed the PCM-I (Chambless & Blake, 2009). This measure is a modified version of the original PCM (described above under Study 1 Methods) which asks respondents to base their criticism ratings on a specific interaction. The PCM-I has demonstrated high levels of agreement with spouses' ratings of expressed criticism and observers' ratings of criticism during the same interaction, and higher scores predict lower marital satisfaction (Chambless & Blake, 2009).

Similarity to normal interactions. Following the problem-solving interaction, both partners rated the similarity of the interaction to their normal interactions ("How similar was this interaction to your usual discussions with your partner outside the lab?") on a 7-point Likert scale from 0 (not at all) to 6 (very much so).

Observer-rated measures.

Observed criticism. A team of three female undergraduates who were uninformed as to study hypotheses and couple social anxiety status independently coded all

interactions for criticism. Ratings were made for each partner's behavior across the entire problem solving interaction on the same 10-point Likert scale employed by the PCM. Raters were not trained; instead, they used their personal judgement to determine the extent to which an individual was critical during the interaction. Raters' judgments were then averaged to yield the final score. Previous research has shown that pooled naive ratings of criticism are highly reliable and correlate significantly with participants' ratings of perceived criticism and marital satisfaction (Chambless & Blake, 2009). In the present study, interrater reliability was good ($r_1(3,3) = .83$).

Problem significance. After viewing each interaction, coders rated the apparent importance of the problem topic to the couple on a 5-point Likert scale from 1 (*not at all important*) to 5 (*very important*). Interrater reliability was good ($r_1(3,3) = .80$).

Procedure. All couples first provided written informed consent and then completed a 5-minute videorecorded warm-up discussion to get used to talking in front of the camera. Participants then completed two 10-minute, videorecorded social support interactions followed by a series of questionnaires. Findings regarding the social support interactions are reported elsewhere (Porter & Chambless, 2016). Couples then completed a problem-solving interaction. Prior to the interaction, couples were instructed to select a problem area in their relationship to discuss, and were told that they would be asked to work toward a mutually satisfactory resolution of the problem. Once the couple agreed on a topic, they were left alone for 10 minutes to discuss the topic, and their discussion was videorecorded. Following the problem-solving interaction, both partners completed the PCM-I and rated how similar the interaction task was to their normal interactions.

Participants recruited via flyers then completed the questionnaire battery described above under Study 1, and all participants were then debriefed. Participants recruited through the psychology subject pool and their romantic partners were offered a choice of course credit or entry into a raffle for a \$100 gift certificate in exchange for their participation. Participants recruited via flyers and their partners were paid \$15 for their participation in the laboratory visit and completion of the questionnaire battery. All study procedures were approved by the Institutional Review Board at the University of Pennsylvania.

Power analysis. A power analysis conducted with G*Power (Erdfelder, Faul, & Buchner, 1996) indicated that with a sample of 52 couples, there was 78% power to detect a medium effect size of $f^2 = .15$ in a multiple regression model with five predictor variables (the maximum number of predictors included in any model).

Results and Discussion

Descriptive statistics. Sample demographics and mean scores on study measures are displayed in Table 2.3. Participants reported moderate levels of both perceived and expressed criticism and rated the problem-solving interaction as moderately similar to their normal interactions. Observers rated the problem topics as seeming somewhat important to couples (see Table 2.3). The HSA and LSA groups did not differ significantly from one another on relationship length, problem significance, or any demographic variables. However, compared to LSA targets, HSA targets rated the interaction as marginally less similar to their normal interactions ($t(49) = 1.83, p = .07, d = .50$), though partners of HSA and LSA targets did not differ significantly in their similarity ratings. Partners of HSA targets scored higher on the SIAS than did LSA

partners ($t(37) = -4.29, p < .001, d = 1.19$). This is likely the result of our inclusion criteria (LSA partners were required to score below 20 on the SIAS, whereas HSA partners were not), although assortative mating may have contributed somewhat to this finding: In Study 1, as in Porter and Chambless (2014), we found a significant but small correlation between partners' SIAS scores in a sample unselected for social anxiety (see Table 2.2). HSA targets and partners also evidenced higher levels of depressive symptoms than LSA targets and partners ($t(30) = -4.34, p < .001, d = 1.20$ for targets and $t(32) = -2.31, p = .03, d = 0.64$ for partners). Table 2.4 displays the zero-order correlations between item scores on the PCM-I and observer ratings of criticism.

Group differences in criticism. We conducted independent sample t -tests to compare the high and low social anxiety groups on target and partner perceived and expressed criticism, observer ratings of target and partner criticism, targets' self-reports of upset due to criticism, and partners' reports of targets' upset due to criticism. The HSA and LSA groups did not differ significantly from one another on any variable, though partners of HSA targets reported that their partners were marginally more upset by criticism ($t(50) = -1.70, p = .09, d = 0.47$). Effect sizes for all other group differences were relatively small (all $ds < .38$), with many effect sizes close to zero.

We also used multiple regression to test whether HSA individuals systematically misperceive or overestimate the amount of criticism from their partners. To do this, we predicted targets' perceived criticism from observer ratings of partner criticism, social anxiety status (coded as 0 = LSA, 1 = HSA), and the interaction between these two variables. If significant, the interaction term would serve as a measure of bias, indicating

that the relationship between observed criticism and targets' perceived criticism is different for HSA and LSA targets. We also included relationship length and its interaction with social anxiety status in the model as covariates, in light of our previous work finding that these variables interacted to predict other relationship constructs (Porter & Chambless, 2014). In accordance with the recommendations of Aiken and West (1991), all predictor variables were mean centered to reduce multicollinearity. Diagnostic statistics including dfbetas, condition indexes, and residuals were checked to ensure the data did not violate the assumptions of regression. Results indicated that the model was non-significant and could thus not be interpreted. These findings were unchanged when relationship length and its interaction with social anxiety status were trimmed from the model.

Summary. Our results indicate that social anxiety is unrelated to perceived, expressed, and observed criticism in a laboratory-based problem-solving task. Furthermore, socially anxious individuals do not appear to systematically misperceive or overestimate criticism from their romantic partners. Two marginally significant between-group differences emerged, however: Partners of HSA targets believed these individuals to be more upset by criticism during the interaction, and HSA targets described the interaction as less similar to their typical interactions with their partners. The former finding is consistent with the results of Study 1, which indicated that among women, greater social anxiety is associated with being more upset by criticism from a partner. The latter finding might suggest that socially anxious individuals manage their relatively greater distress due to criticism by avoiding discussions of relationship problems with

their partners. Alternatively, this finding may reflect the fact that HSA targets felt their behavior during this interaction was not as typical for them as was the behavior of the LSA targets, perhaps due to the fact that the interaction was being videorecorded: HSA participants may have felt more constrained by the camera than LSA participants.

General Discussion

Taken together, our findings indicate that surprisingly, socially anxious individuals do not perceive their romantic partners as more critical than do less anxious individuals. This finding was unexpected: Given the prominence of fear of negative evaluation in SAD, we predicted that socially anxious individuals would be quick to view a romantic partner as critical. Rather, social anxiety seems to be more closely related to feeling especially upset when one is criticized by a romantic partner: In Study 1, social anxiety among women was associated with significantly greater levels of global upset due to criticism, and in Study 2, partners of HSA targets reported that these targets seemed marginally more upset by criticism during a 10-minute interaction, relative to partners of LSA targets' ratings. Our results suggest that high levels of perceived criticism from a partner cannot adequately explain why socially anxious individuals refrain from opening up to their romantic partners. Thus, questions remain as to why socially anxious individuals limit self-disclosure to their romantic partners and perceive intimacy as risky. One possibility is that anxious individuals fear criticism from their partners because they find such criticism to be so distressing, but believe they can successfully manage their partners' criticism by limiting self-disclosure and emotional expression. Socially anxious individuals may also be fearful that partners have critical

thoughts about this, even if their partners are not expressing those thoughts to them directly. Alternatively, criticism may be only one aspect of the rejection that socially anxious individuals fear should they reveal their true selves to a romantic partner.

It is striking that social anxiety was unrelated to perceived criticism even in our relatively large Study 1 sample, nor was there any evidence to suggest that partners of socially anxious individuals truly are more critical than partners of less anxious individuals. Furthermore, social anxiety did not moderate the relationship between observed and perceived criticism, indicating that socially anxious individuals are not more or less accurate judges of criticism from a partner than are less anxiety individuals. It should be noted that our findings pertain only to perceived criticism from a romantic partner. It may well be that socially anxious individuals do perceive more criticism from casual acquaintances or authority figures. However, when it comes to their intimate relationships, this does not appear to be the case.

With regard to the extent to which socially anxious individuals criticize their romantic partners, results were mixed. In Study 1, social anxiety was positively associated with global reports of expressed criticism toward a partner, yet partners of socially anxious individuals did not perceive more criticism. Furthermore, there were no significant relationships between target social anxiety status and criticism of their partners in Study 2, whether we examined target expressed criticism, partner perceived criticism, or observer-rated criticism. Our significant findings in Study 1 may reflect socially anxious individuals' tendencies to perceive their own interpersonal interactions and social skills in a more negative light than warranted (e.g. Stopa & Clark, 1993).

Global ratings of criticism may be more susceptible to bias than ratings of criticism during a brief interaction, given that the former lack clear behavioral referents.

Alternatively, perhaps socially anxious individuals are indeed more critical of their partners, but held back on criticism during the interaction task in Study 2 because they felt constrained by the presence of the videocamera. Supporting this, compared to LSA targets, HSA targets reported that the laboratory tasks were marginally less similar to their usual interactions with their romantic partners. However, this account remains largely speculative.

Overall, depression appeared to be more strongly related to criticism variables than was social anxiety. Depression evidenced significant zero-order correlations with all items on the PCM in Study 1 for both men and women, and the relation of actor social anxiety to actor expressed criticism became non-significant when we controlled for comorbid depressive symptoms. These findings are consistent with previous research suggesting that interactions between depressed individuals and their spouses are characterized by high levels of negative communication behaviors (see Rehman, Gollan, & Mortimer, 2008 for a review). Furthermore, while at first blush these results may seem to contradict previous research which found no relationship between perceived criticism and depressive symptoms, the small positive associations found in the present study were in fact of similar magnitude to those reported in the literature (e.g., Renshaw, Chambless, & Steketee, 2001; Riso, Klein, Anderson, Ouimette, & Lizardi, 1996). However, these effects reached significance only in our sample, which was considerably larger than that

of other studies in which associations between depression and perceived criticism were examined.

The present study also sheds light on the construct of perceived criticism independent of psychopathology. First, we identified important sex differences in perceived criticism in heterosexual relationships: Men reported more global perceived criticism from their female partners, and both men and women agreed that women are more upset by criticism. These results mirror Peterson and Smith's (2010) findings that wives report more global expressed criticism⁷ and less global perceived criticism than do husbands, and are consistent with previous studies indicating that wives on average want more changes in their marriages than do husbands (Margolin, Talovic, & Weinstein, 1983), and that communication patterns in which the wife makes demands and the husband withdraws are more common than vice versa (Christensen & Heavey, 1990). Second, we found that perceived criticism was not predictive of break-up one year later in our sample, nor did social anxiety moderate this effect. These findings are surprising given research indicating that perceived criticism is negatively correlated with relationship satisfaction (Renshaw, 2008), and low levels of relationship satisfaction are predictive of relationship dissolution (e.g., Hendrick, 1988). However, it is important to note that given that our sample consisted of undergraduates, most respondents were probably not living with the partner about whom they completed the PCM. Previous research has found that the detrimental effects of perceived criticism may be specific to

⁷ Peterson and Smith (2010) use the term *intended criticism* for a partner's report of how critical she or he was of the other spouse. Because the questions they and we used do not inquire about one's intentions, only what one did, we chose to call this item *expressed criticism*.

criticism from a romantic partner or parent with whom the respondent lives (Renshaw, 2007). Additionally, most participants were in relatively brief relationships (mean relationship length was 1.29 years in Study 1 and 1 year in Study 2), and our findings indicated that upset due to criticism increased with relationship length. Perhaps perceived criticism would indeed predict break-up among couples in longer relationships than the undergraduate couples included in our sample. Moreover, it may be difficult to identify relationship variables that predict break-up in an undergraduate sample, given that a substantial portion of undergraduate couples may break up for logistical reasons (e.g., graduating and finding jobs in different cities). Further research on perceived criticism and break-up is therefore needed to better understand perceived criticism's longitudinal effects on relationship outcomes.

The present study constitutes an important first step toward better understanding the relationship between social anxiety and perceived and expressed criticism. However, this study is not without limitations. First, the present study was an analogue study: Couples in Study 1 were unselected for social anxiety, and couples in Study 2 were selected on the basis of scores on a self-report measure of social anxiety symptoms, but were not assessed to determine whether or not they met diagnostic criteria for SAD. Thus, replication in a clinical sample of patients with SAD is warranted. Second, our sample consisted entirely of undergraduates and their romantic partners in relatively brief relationships. As such, it is important to replicate these results in older couples in more committed relationships. Similarly, over a third of couples in Study 1 were in long distance relationships, and although we did not collect data on whether the remainder of

couples were living together, given the undergraduate nature of our sample, we suspect that few were. Given that perceived criticism seems to have stronger effects when the critical individual lives with the respondent (Renshaw, 2007), it will be important for future studies to examine whether our findings can be replicated among couples who live together. Finally, it is possible that the problem-solving interaction task in Study 2 may lack external validity for high social anxiety participants, given that these participants rated the interactions as less similar to their normal interactions with their partners than did low social anxiety individuals. Nevertheless, we believe that the combination of self-report, partner-report, and observer-report methods remains the best way to understand interpersonal interactions in a population where self-report data may be biased.

Table 2.1

Study 1 Demographics and Study Measure Scores for Undergraduate Couples

		Men (<i>n</i> = 308)		Women (<i>n</i> = 308)	
		<i>n</i>	%	<i>n</i>	%
Race	<i>White</i>	192	62.3%	189	61.4%
	<i>Black/African American</i>	18	5.8%	6	1.9%
	<i>Asian</i>	73	23.7%	83	26.9%
	<i>Native American/Alaska Native</i>	3	1.0%	3	1.0%
	<i>Native Hawaiian/Pacific Islander</i>	3	1.0%	1	0.3%
	<i>Other</i>	15	4.9%	22	7.1%
	<i>Unknown</i>	4	1.3%	4	1.3%
Ethnicity	<i>Hispanic</i>	31	10.1%	39	12.7%
	<i>Non-Hispanic</i>	249	80.8%	248	80.5%
	<i>Unknown</i>	28	9.1%	21	6.8%
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<i>Age (years)</i>		20.0	1.77	19.4	1.20
<i>SIAS</i>		14.0	10.76	15.0	10.06
<i>DASS-21 Depression</i>		3.6	3.79	3.4	3.67
<i>PCM: Perceived criticism</i>		5.0	2.72	3.6	2.33
<i>PCM: Upset</i>		4.6	2.31	5.8	2.58
<i>PCM: Expressed criticism</i>		4.6	2.23	4.5	2.25
<i>PCM: Partner's upset</i>		5.7	2.58	4.9	2.54

Note. DASS-21 = Depression Anxiety Stress Scales-21; PCM = Perceived Criticism Measure; SIAS = Social Interaction Anxiety Scale

Table 2.2

Zero-order Correlations between Study 1 Measures of Criticism and Psychopathology in Undergraduate Couples (N = 308)

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. T2 relationship status ^a													
Men													
2. SIAS	-.11												
3. DASS Depression	-.15*	.41***											
4. PCM: Perceived crit.	-.07	.07	.12*										
5. PCM: Upset	-.06	.06	.22***	.32***									
6. PCM: Expressed crit.	-.07	.08	.19**	.35***	.29***								
7. PCM: Partner's upset	.05	.10	.18**	.27***	.59***	.36***							
Women													
8. SIAS	.05	.12*	.01	.13*	.05	.06	.08						
9. DASS Depression	-.13*	.02	.10	.04	.09	.15*	.17**	.37***					
10. PCM: Perceived crit.	-.06	.02	.05	.08	.09	.27***	.18**	.02	.22***				
11. PCM: Upset	-.07	.11	.14*	.20***	.27***	.26***	.35***	.20***	.30***	.32***			
12. PCM: Expressed crit.	-.08	.00	.05	.38***	.20**	.15**	.23***	.19**	.19**	.39***	.32***		

13. PCM: Partner's upset	-.06	.05	.12*	.17**	.33***	.16**	.20***	.14*	.19**	.22***	.54***	.24***
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Note. Crit = criticism; DASS = Depression Anxiety Stress Scales-21; PCM = Perceived Criticism Measure; SIAS = Social Interaction Anxiety Scale; T2 = Time

2. ^a Relationship status was coded as 0 = no longer together and 1 = still together.

* $p < .05$. ** $p < .01$. *** $p < .001$

Table 2.3

Study 2 Demographics and Study Measure Scores by Social Anxiety Status

		HSA targets ^a		LSA targets ^a		HSA partners ^a		LSA partners ^a	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Sex	<i>Female</i>	15	57.7%	15	57.7%	11	42.3%	11	42.3%
Race	<i>White</i>	12	46.2%	15	57.7%	12	46.2%	13	50.0%
	<i>Black/ African American</i>	1	3.8%	3	11.5%	3	11.5%	4	15.4%
	<i>Asian</i>	7	26.9%	5	19.2%	8	30.8%	6	23.1%
	<i>Native American/ Alaska Native</i>	1	3.8%	0	0.0%	1	3.8%	1	3.8%
	<i>Native Hawaiian/ Pacific Islander</i>	0	0.0%	1	3.8%	0	0.0%	0	0.0%
	<i>Other</i>	3	11.5%	2	7.7%	1	3.8%	2	7.7%
	<i>Unknown</i>	2	7.7%	0	0.0%	1	3.8%	0	0.0%
Ethnicity	<i>Hispanic</i>	3	11.5%	4	15.4%	5	19.2%	2	7.7%
	<i>Non-Hispanic</i>	23	88.5%	21	80.8%	20	76.9%	21	80.8%
	<i>Unknown</i>	0	0.0%	1	3.8%	1	3.8%	3	11.5%
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<i>Relationship length</i>		1.0	0.61	1.0	0.75	1.0	0.61	1.0	0.75

<i>(years)</i>								
<i>Age (years)</i>	19.7	1.12	19.3	1.09	19.9	1.47	19.3	1.20
<i>SIAS</i>	37.2	9.24	8.3	3.79	15.7	8.49	7.7	4.35
<i>DASS-21 Depression</i>	5.5	4.70	1.3	1.46	3.9	4.50	1.7	1.74
<i>PCM-I: Perceived</i>	4.6	2.99	4.8	2.06	4.7	2.40	5.6	2.58
<i>criticism</i>								
<i>PCM-I: Upset</i>	3.3	1.69	3.1	2.16	2.9	1.80	2.7	2.26
<i>PCM-I: Expressed</i>	5.0	2.55	5.3	2.15	5.6	2.61	6.0	2.28
<i>criticism</i>								
<i>PCM-I: Partner's</i>	3.2	2.43	3.2	2.22	3.4	1.81	2.5	1.92
<i>upset</i>								
<i>Observer-rated</i>	2.9	1.44	3.3	1.96	2.8	1.40	2.5	1.25
<i>criticism</i>								
<i>Problem significance</i>	3.1	0.65	3.1	0.50	3.1	0.65	3.1	0.50
<i>Similarity</i>	4.3	1.29	4.9	1.13	4.5	1.36	4.9	1.14

Note. DASS-21 = Depression Anxiety Stress Scales-21; PCM-I = Interaction-Specific Perceived Criticism Measure; SIAS = Social Interaction Anxiety Scale.

^a *n* = 26 in all groups.

Table 2.4

Zero-order Correlations between Study 2 Interaction Specific Criticism Measures in Undergraduate Couples

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Target										
1. PCM-I: Perceived criticism		.57**	.51**	.49*	.09	.37	.51**	.48*	.53**	.39*
2. PCM-I: Upset	.28		.39*	.48*	.26	.38	.30	.18	.50*	.12
3. PCM-I: Expressed criticism	.40*	.46*		.47*	.64***	.57**	.43	.18	.22	.03
4. PCM-I: Partner's upset	.42*	.62**	.67***		.13	.08	.48*	.07	.37	.24
5. Observed criticism	.46*	.46*	.68***	.67***		.65***	.18	.18	.25	-.01
Partner										
6. PCM-I: Perceived criticism	.09	.31	.22	.17	.37		.16	.22	.20	.11
7. PCM-I: Upset	.07	.44*	.09	.39*	.32	.30		.45*	.84***	.46*
8. PCM-I: Expressed criticism	.09	.20	.04	.01	.28	.63**	.29		.57**	.49*
9. PCM-I: Partner's upset	.19	.55**	.18	.33	.28	.25	.84***	.44*		.54**

10. Observed criticism	.05	.42*	.07	.17	.14	-.12	.34	.37	.47*
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Note. PCM-I = Interaction-Specific Perceived Criticism Measure. Data for high social anxiety couples ($n = 26$) are shown above the diagonal and data for low social anxiety couples ($n = 26$) are shown below the diagonal. * $p < .05$. ** $p < .01$. *** $p < .001$

Chapter 3: Social Anxiety Disorder and Perceived Criticism in Intimate Relationships: Comparisons with Normal and Clinical Control Groups

Abstract

Individuals with social anxiety disorder (SAD) have difficulties in their romantic relationships, including decreased satisfaction and intimacy, but the reasons for these difficulties are poorly understood. Because fear of negative evaluation is a cardinal feature of SAD, perceived criticism from a romantic partner may play a central role in socially anxious individuals' relationships. In the present study, we compared levels of perceived, expressed, and observed criticism and reactions to criticism among individuals with SAD and their partners, individuals with other anxiety disorders and their partners, and couples free of psychopathology. Participants rated both global criticism and criticism during a 10-minute problem-solving task, which was also coded for criticism by observers. Individuals with anxiety disorders showed elevated levels of interaction-specific perceived criticism, expressed criticism, and upset and stress due to criticism relative to normal controls; however, there were no group differences on global measures of criticism, and the two anxious groups did not differ on any measures. Upset due to criticism mediated the associations between diagnosis and relationship satisfaction and between diagnosis and post-discussion stress. Findings suggest that the high levels of criticism anxious individuals are subject to and their corresponding negative reactions to criticism may account for some of the relationship difficulties that have been identified in SAD. Results also indicate that anxious individuals may play a role in creating and exacerbating their relationship difficulties by being highly critical themselves. Overall,

our findings point to the need for a clinical focus on decreasing perceived criticism among individuals with anxiety disorders.

Social anxiety disorder (SAD), one of the most common mental disorders (Kessler et al., 2005), is associated with considerable disability (Stein & Kean, 2000). Fortunately, effective treatments for SAD have been developed: In a recent network meta-analysis, Mayo-Wilson et al. (2014) found that both cognitive-behavioral therapy (CBT) and medications such as selective serotonin-reuptake inhibitors and serotonin-norepinephrine reuptake inhibitors were effective treatments for SAD. However, nearly half of patients who receive these interventions fail to respond to treatment (Davidson et al., 2004). Moreover, individuals with SAD have difficulty forming close relationships, including romantic relationships (e.g., Davidson, Hughes, George, & Blazer, 1994), and even such relationships when they form are fraught with difficulty. In romantic relationships social anxiety is associated with decreased relationship satisfaction (Filsinger & Wilson, 1983; Porter & Chambless, 2014; Whisman, 1999), decreased social support (Kashdan, Ferssizidis, Farmer, Adams, & McKnight, 2013; Porter & Chambless, 2014, 2016a; Rapee, Peters, Carpenter, & Gatson, 2015), greater conflict and communication difficulties (Cuming & Rapee, 2010; Wenzel, Graff-Dolezal, Macho, & Brendle, 2005), difficulties with emotional expression, self-disclosure, and intimacy (Porter & Chambless, 2014; Sparrevohn & Rapee, 2009; Wenzel, 2002), and higher rates of relationship dissolution (Porter & Chambless, 2016a). Although CBT is associated with small improvements in satisfaction with interpersonal functioning, many treatment completers fail to achieve normative levels of satisfaction in this domain (Eng, Coles, Heimberg, & Safren, 2005; Watanabe et al., 2010), suggesting that further intervention may be needed to improve relationship quality in this population.

Perceived criticism from a romantic partner is one aspect of relationship functioning that has received little attention among individuals with SAD. Perceived criticism is associated with poor relationship satisfaction (Renshaw, 2008) and has been identified as a predictor of poor treatment response in anxiety and fear-based disorders such as obsessive-compulsive disorder, panic disorder, and agoraphobia (Chambless et al., 2016; Chambless & Steketee, 1999), and in a variety of other disorders, including major depressive disorder (MDD), bipolar disorder, substance use disorders, and psychosis (for reviews, see Masland & Hooley, 2015; Renshaw, 2008). Although no existing study has adequately tested the relationship of perceived criticism to outcome of SAD treatment⁸, the literature on other anxiety disorders suggests that decreasing perceived criticism among patients with SAD has the potential to improve treatment response rates and increase relationship satisfaction (see Chambless, 2012).

There is some reason to believe that patients with SAD may display particularly elevated levels of perceived criticism. Although perceived criticism has been generally found to have small, non-significant relationships with measures of psychopathology (Renshaw, 2008), the central role of fear of negative evaluation in SAD (Rapee & Heimberg, 1997) suggests that socially anxious individuals may perceive their romantic partners as especially critical. To date, only one study has examined whether social

⁸ The results of the only study in which perceived criticism was tested as a predictor of response to treatment for SAD (Fogler, Thompson, Steketee, & Hofmann, 2007) would appear to contradict this general statement, in that no predictive relationship was observed. However, a major flaw of this study is that patients rated perceived criticism from friends, family members, or romantic partners with whom they may have had no more than a weekly telephone contact. Subsequent research has shown that perceived criticism may only exert detrimental effects when it comes from a romantic partner or parent with whom the respondent lives (Renshaw, 2007).

anxiety is associated with perceived criticism. Porter and Chambless (2016b) found that among undergraduates, social anxiety was not associated with global perceived criticism from a romantic partner or with perceived criticism from a partner during a problem-solving interaction task. Porter and Chambless (2016b) also examined a related construct, how upset individuals became when criticized by a romantic partner, and found evidence that individuals higher in social anxiety, particularly women, may be more upset by a partner's criticism. This study had a number of limitations: Participants were not clinically diagnosed with SAD, and couples were young and in relatively short relationships, and chose to discuss relatively trivial problems. Thus, a replication of this study using a clinical sample of older couples in more committed relationships may yield different results. Further study of the role of perceived criticism in SAD is important because individuals with SAD have problematic relationships but the reasons for these difficulties are not yet well understood. If socially anxious individuals were found to perceive their romantic partners as especially critical or to become especially upset in response to their partners' criticism, this might contribute to their being less satisfied in their relationships, self-disclosing less to their romantic partners, reporting less emotional intimacy with their partners, and perceiving intimacy as especially risky (Porter & Chambless, 2014). Furthermore, if individuals with SAD do indeed report high levels of perceived criticism in their intimate relationships, this would underscore the importance of addressing perceived criticism clinically in this population and further studying its impact on treatment outcome.

It is also important to be clear about what high perceived criticism reflects among individuals with SAD. Previous studies have found that patients' ratings of perceived criticism are positively related to both relatives' reports of expressed criticism and observer ratings of relatives' criticism, although substantial unexplained variance in perceived criticism remains (Chambless & Blake, 2009; Chambless, Bryan, Aiken, Steketee, & Hooley, 1999; Hooley & Teasdale, 1989). However, there is reason to believe that among individuals with SAD, perceived criticism may be less strongly related to other measures of criticism. Social anxiety appears to be associated with a negative perceptual bias with regard to one's interpersonal interactions: Socially anxious individuals perceive their interactions in a more negative light than do their interaction partners (e.g., Stopa & Clark, 1993) and are more attuned to signs of disapproval from others relative to non-anxious individuals (e.g., Veljaca & Rapee, 1998). Individuals with SAD may thus describe their interpersonal interactions in more negative terms than warranted. Therefore, if perceived criticism is found to be elevated in SAD, it is important to determine whether individuals with SAD show elevations on measures of criticism rated by other reporters to determine whether individuals with SAD are truly subject to more criticism or whether this problem is mainly in the eye of the socially anxious beholder.

It is also important to determine whether individuals with SAD might behave in ways that elicit criticism from their partners. Porter and Chambless (2016b) found evidence to suggest that more socially anxious individuals themselves may be critical of their romantic partners. The latter finding emerged only by the socially anxious

individuals' own report with regard to global criticism, and not by the partners' report or by ratings obtained during the problem-solving interaction. Nevertheless, this finding is consistent with previous research indicating that compared to parents with anxiety disorders apart from SAD, parents with SAD were rated by observers as being more critical during a 5-minute interaction with their non-anxious children (Budinger, Drazdowski, & Ginsburg, 2013). Porter and Chambless's (2016b) findings are also consistent with previous work documenting problematic communication behaviors among socially anxious individuals when interacting with their romantic partners: Although they did not examine criticism specifically, Wenzel et al. (2005) found that observers rated socially anxious undergraduates as displaying more very negative communication behaviors than non-anxious undergraduates during a 10-minute discussion of a relationship problem with a romantic partner. These findings highlight the need for further research examining criticism from individuals with SAD toward their romantic partners, particularly given prior research finding that criticism is predictive of relationship dissolution (see Gottman, Gottman, Greendorfer, & Wahbe, 2014).

In the present study, we seek to better understand whether SAD is associated with elevated levels of perceived criticism from a romantic partner, more negative reactions to criticism from a partner, and greater expressed criticism to a partner among couples in committed relationships who are cohabitating. We examine both global criticism (i.e., how critical do individuals with SAD perceive their partners to be in general) and criticism during a 10-minute problem-solving interaction. In addition to self-report, we utilize partner- and observer-report measures. We also build upon previous research

examining relationship functioning among socially anxious individuals by comparing individuals with SAD to individuals with other anxiety disorders, as well as normal controls. This design allows us to determine whether any observed differences in criticism are specific to SAD or a feature of anxiety disorders or psychopathology more broadly.

We hypothesized that individuals with SAD would be more upset by criticism and would experience a problem-solving discussion as more stressful than normal controls and individuals with other anxiety disorders, as measured by self- and partner- reports of upset, as well as self-reports of stress and changes in self-reported affect following a problem-solving discussion. Further, we hypothesized that upset due to criticism would mediate the relationships between diagnosis and relationship satisfaction and diagnosis and post-discussion stress. Given the dearth of literature concerning the relationship between SAD and perceived and expressed criticism, we treated the questions of whether individuals with SAD would differ from normal controls and other anxious individuals on these constructs as exploratory.

Previous research suggests that interactions between depressed individuals and their spouses are characterized by high levels of negative communication behaviors (see Rehman, Gollan, & Mortimer, 2008 for a review). Thus, in a final set of analyses we examined whether any obtained differences among groups were still observed when we excluded individuals with comorbid major depression.

Method

Participants

Participants were heterosexual couples who had been cohabitating for at least three months prior to study participation. Couples who reported any domestic violence in the past year were excluded.

Clinical sample. The clinical sample consisted of individuals with a primary diagnosis of a *DSM-IV* anxiety disorder (henceforth referred to as “patients”) and their spouses or romantic partners ($n = 60$). Patients with a primary diagnosis of specific phobia or performance-specific SAD and no other anxiety disorders were excluded from the study; however, those with anxiety disorder not otherwise specified (anxiety NOS) were eligible for the study if this diagnosis was deemed clinically significant at intake. Patients were excluded if they were acutely suicidal, had organic brain pathology or significant cognitive impairment, had a lifetime history of bipolar disorder or psychosis, or if they met criteria for substance dependence during the six months prior to study participation. We also excluded couples in which the spouse or romantic partner was cognitively impaired, had been diagnosed with a psychotic disorder, or had uncontrolled bipolar disorder at the time of study participation. Because our intent was to compare couples in which the patient had SAD to those in which the patient had a different anxiety disorder, patients with a subclinical diagnosis of SAD as evidenced by a severity rating of 3 on the SAD module of the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; DiNardo, Brown, & Barlow, 1994) ($n = 1$) were also excluded from the present analyses. Several couples completed all study procedures but were excluded from the present analyses due to a failure of our videorecording equipment ($n = 2$) and previously undiagnosed cognitive impairment in the patient which interfered with questionnaire

completion ($n = 1$). Thus, the final clinical sample consisted of 56 couples, 21 of which included a patient with a diagnosis of SAD.

Normal control sample. The normal control sample consisted of couples in which neither partner met criteria for any DSM-IV disorders ($n = 34$). Couples in which a partner was currently taking psychotropic medication were also excluded. Additionally, to equate the normal control and clinical samples on age, we excluded the four youngest couples in the normal control sample from the present analyses. Thus, the final normal control sample consisted of 30 couples.

Measures

Interview measures.

Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV). The ADIS-IV (DiNardo, Brown, & Barlow, 1994) was used to screen for the presence of anxiety disorders, exclusionary conditions, and other comorbid disorders among patients in the clinical sample. The ADIS is a semi-structured diagnostic interview. The interviewer assesses the presence or absence of each disorder, and assigns each disorder a severity rating ranging from 0 (*absent*) to 8 (*very severe*). Ratings of 4 and above are considered clinically significant. In the present study, ADIS interviewers were doctoral students and post-doctoral fellows in clinical psychology who were trained to reliability with a master rater. Interrater reliability was acceptable ($\kappa = .87$ for SAD; $\kappa = .74$ – 1.00 for all diagnoses). Reliability on SAD severity was excellent ($r(2,1) = .91$). A subset of patients ($n = 27$) were recruited from other clinics or research studies and had already completed the ADIS. We obtained consent to use their prior ADIS data rather than readministering

the ADIS to these patients. The vast majority of these patients ($n = 18$) were recruited from a panic disorder treatment study (Milrod et al., 2015), in which interrater reliability on the ADIS was acceptable ($\kappa = .64$ -.1.00 for all diagnoses; for SAD, $\kappa = .70$ and $r_1(2,1) = .70$).

Mini International Neuropsychiatric Interview (MINI). The MINI (Sheehan et al., 1998) was used to screen for the presence of psychiatric disorders in the normal control sample. The MINI is a brief structured diagnostic interview with favorable psychometric properties, including high interrater reliability and convergent validity with other structured diagnostic interviews (Sheehan et al., 1998). Participants in the normal control sample completed a set of yes/no questions that screen for the presence or absence of each disorder in self-report form online prior to study participation. Participants who answered in the affirmative to any of the screening questions were contacted by phone by a clinical psychology doctoral student, who administered the corresponding MINI modules.

Self-report measures. In addition to the measures listed below, all participants also provided basic demographic information and completed other measures not pertinent to the present study.

Perceived Criticism Measure (PCM). The PCM (Hooley & Teasdale, 1989) is a 2-item measure which asks individuals to rate on a 10-point Likert scale how critical their partners are of them and how upset this makes them. The PCM has demonstrated good convergent and discriminant validity, moderate agreement with relatives' ratings of expressed criticism, and good test-retest reliability (see Renshaw, 2008 for a review).

Relationship Assessment Scale (RAS). The RAS (Hendrick, 1988) is a 7-item measure of relationship satisfaction. It has demonstrated good internal consistency and construct validity in published samples (Hendrick, 1988). Internal consistency in the present sample was excellent ($\alpha = .91$ for targets and $\alpha = .90$ for partners).

Positive and Negative Affect Scale (PANAS). The PANAS (Watson, Clark, & Tellegen, 1988) is a self-report measure comprised of two 10-item subscales, which measure positive and negative affect, respectively. Respondents rate on a 5-point Likert scale to what extent they are currently experiencing 10 positive and 10 negative emotions. The PANAS subscales have shown high internal consistency and good construct validity (Watson, Clark, & Tellegen, 1988). In the present study, internal consistency was excellent ($\alpha = .90-.92$ for positive affect and $\alpha = .87-.89$ for negative affect).

Interaction-specific Perceived Criticism Measure (PCM-I). The PCM-I (Chambless & Blake, 2009) is a modified version of the original PCM which asks respondents to base their criticism ratings on a specific interaction. In addition to rating perceived criticism and upset due to criticism during the interaction, participants also rated on the same scale how critical they were of their partners and how upset their partners became when criticized. The PCM-I has demonstrated high levels of agreement with observers' ratings of criticism and spouses' ratings of expressed criticism during the same interaction, and higher scores predict lower marital satisfaction (Chambless & Blake, 2009).

Perceived Discussion Stress Scale (PDSS). The PDSS (Powers, Pietromonaco, Gunlicks, & Sayer, 2006) is a 3-item, self-report measure of stress in response to a couples' problem solving interaction. Respondents rate how stressful, intense, and negative the discussion was on 7-point Likert scales. This measure has demonstrated good internal consistency in the literature (Powers et al., 2006), and internal consistency in the present study was good ($\alpha = .84$).

Observer-rated measures.

Observed criticism. A team of four female undergraduates who were uninformed as to study hypotheses and couple psychopathology independently coded all interactions for criticism. Ratings were made for each partner's behavior across the entire problem-solving interaction using the same 10-point Likert scale employed by the PCM. Raters were not trained; instead, they used their personal judgment to determine the extent to which an individual was critical during the interaction. Raters' judgments were then averaged to yield the final score. Previous research has shown that pooled naive ratings of criticism are highly reliable and correlate significantly with participants' ratings of perceived criticism and marital satisfaction (Chambless & Blake, 2009). In the present study, interrater reliability was very good ($r_1(3,4) = .88$).

Problem significance. After viewing each interaction, coders rated the apparent importance of the problem topic to the couple on a 5-point Likert scale from 1 (*not at all important*) to 5 (*very important*). Interrater reliability was acceptable ($r_1(3,4) = .71$).

Procedure

Clinical sample. Patients in the clinical sample were recruited via flyers, online advertisements, and referrals from other research studies and clinics. Patients completed a telephone screening interview with a research assistant to assess basic eligibility criteria. Those who appeared to be eligible based on the phone screen were scheduled to come in to meet with a graduate student or postdoctoral fellow to complete the ADIS. Most patients who were referred from other research studies or clinics had already completed the ADIS; we obtained consent to use their prior ADIS data rather than readministering the ADIS to these patients. Patients who were deemed eligible on the basis of their ADIS interview were invited to come into the lab with their spouse or romantic partner for the main study visit. During this visit, the couple provided informed consent and then completed a series of self-report questionnaires including the PCM and RAS. Next, in randomized order couples (a) met separately with study staff for further interviewing about the patient's symptoms, and (b) completed the problem-solving interaction tasks.

For the problem-solving tasks, couples were instructed to select the top problem area in their relationship that was related to the patient's anxiety disorder and the top problem area in their relationship that was not related to the anxiety disorder. A research assistant helped to facilitate this process and ensure that the couple agreed on their problem topics. When couples had difficulty generating topics, the research assistant provided suggestions from items both had endorsed on the Areas of Change Questionnaire (Weiss, Hops, & Patterson, 1973). The couple was then instructed to discuss each topic for 10 minutes and to try to work towards a mutually satisfactory resolution of the problem. Prior to the discussion, each participant completed the

PANAS. The research assistant then left the room while the couple discussed the problem. The interaction was videotaped and later coded for criticism by observers. Following the discussion, participants again completed the PANAS, as well as the PCM-I, PDSS, and other measures not pertinent to the present study. The order in which couples completed the anxiety-related and non-anxiety-related interactions was randomly assigned. In the present study, to keep coders uninformed as to the clinical status of participants, we analyzed data from the non-anxiety-related discussions only.

Patients were paid \$10 per hour to complete the ADIS, and patients and relatives were each paid \$75-\$105 to complete the main study visit. All participants provided informed consent. All study procedures were approved by the Institutional Review Board at the University of Pennsylvania.

Normal control sample. Participants in the normal control sample were recruited via flyers and online advertisements, which included a link to the screening questionnaires for the study. The first individual from each couple to participate in the study provided informed consent and then completed the screening questionnaires, which included the MINI screening questions. Participants who appeared eligible or possibly eligible based on their responses to these questionnaires were then asked to provide their own and their partner's name and contact information. Participants who responded in the affirmative to any of the MINI screening questionnaires but who otherwise appeared eligible for the study were contact by a graduate student who administered the relevant MINI modules and determined whether the participant was eligible. A research assistant then contacted the partners of participants who were deemed eligible with the link to the

screening questionnaires, and this process was repeated. Once both partners had completed the screening procedures, couples who were deemed to be eligible for the study were invited to come in for the main study visit.

Procedures for the main study visit were similar to those employed for the clinical sample. Participants first provided informed consent and then completed a series of self-report questionnaires, including the PCM and RAS. Participants then completed a single 10-minute problem-solving discussion about the top problem area in their relationship. Procedures for this discussion and interaction data collection were identical to those described above. Each partner was paid \$50 for participation in the study. All study procedures were approved by the Institutional Review Board at the University of Pennsylvania.

For data analysis purposes, we needed to determine which partner in each normal control couple would be compared to the patients from the clinical sample, and which partner would be compared to the partners in the clinical sample. To do this, we calculated the proportion of male targets in the clinical sample and randomly selected an equal proportion of normal control couples for which the male partner would serve as the target to whom we would compare male patients in the clinical sample. In the remaining normal control couples, the female partner served as the target.

Data analysis. Analyses were conducted using ANOVA with planned contrasts to explore differences between the clinical and control groups, and between the socially anxious and other anxiety disorders groups. When we had data on the same variable from multiple reporters (e.g., patient's perceived criticism, partner's expressed criticism, and

observer report of partner's criticism), we treated these variables as repeated measures. We used post-hoc pairwise comparisons to better understand the nature of any significant effects of reporter and corrected for multiple comparisons using the Holm-Bonferroni correction (Holm, 1979). The resulting corrected alphas for post-hoc analyses are listed in footnotes. All data were checked to ensure that they met the assumptions of ANOVA, including sphericity and homogeneity of variance. When heterogeneity of variance was detected, all dependent variables were transformed until a non-significant result on Levene's test could be obtained. Below, we note when dependent variables were transformed. Mediation analyses were conducted using the PROCESS macro written by Hayes (2013). This macro utilizes bias-corrected bootstrapping, which has been shown in simulation studies to be the most accurate method for testing mediation (MacKinnon, Lockwood, & Williams, 2004).

A power analysis conducted with G*Power (Erdfelder, Faul, & Buchner, 1996) indicated that we had sufficient (80%) power to detect a medium-large between-groups effect size of $d = 0.64$ in planned contrasts between the clinical and control groups and a large between-groups effect of $d = 0.79$ in planned comparisons between the socially anxious and other anxiety groups.⁹ With 86 participants and an estimated correlation of .5 between variables treated as repeated measures, there was 80% power to detect a medium between groups effect size of $f = .28$ in a mixed 3 x 3 ANOVA.

⁹ The power calculations for planned contrasts between the socially anxious and other anxiety groups were based on the number of participants in these groups, whereas SPSS used the full sample, including the control group, to calculate degrees of freedom for the planned contrasts. Thus, our power analysis constitutes a slight underestimate of actual achieved power for these comparisons.

Results

Descriptive Statistics

Sample demographics and mean scores on study measures are presented in Table 3.1. The three groups did not differ from one another on any demographic measures. Approximately half of the couples included in the present analyses were married (52.4%, 57.1%, and 46.7% in the socially anxious, other anxiety, and normal control groups, respectively). The average number of clinical diagnoses was 3.4 in the socially anxious group ($SD = 1.54$, range = 2-7) and 2.0 in the other anxiety group ($SD = 0.98$, range = 1-4). Four participants in the socially anxious group (19.0%) and six participants in the other anxiety group (17.6%) received a comorbid diagnosis of MDD. The most common diagnoses in the other anxiety group were panic disorder ($n = 20$; 57.1%), agoraphobia ($n = 15$; 42.9%), and generalized anxiety disorder ($n = 15$; 42.9%). Overall, problem topics were rated by observers as seeming somewhat important to participants (see Table 3.1). There were high levels of agreement between target, partner, and observer ratings of criticism during the interactions and high levels of agreement between target and partner ratings of how upset the target was by the partner's criticism (see Table 3.2).

Group Differences in Partner Criticism

We first used planned contrasts between the clinical and control groups and between the socially anxious and other anxiety groups to test whether the groups differed on global target perceived criticism. The dependent variable was square root transformed to achieve homogeneity of variance. Results indicated that the clinical sample and the control sample did not differ significantly from one another, ($t(82) = 1.70$, $p = .09$, $d =$

0.37), nor did the two clinical groups differ from one another ($t(82) = -0.93, p = .35, d = 0.21$). The effect sizes were small.

Next, we used a mixed 3 (Group) x 3 (Reporter: Target, partner, or observer) ANOVA with planned contrasts to test whether the groups differed on interaction-specific partner criticism of the target. The criticism variables were log transformed to achieve homogeneity of variance. Results showed a significant effect of group ($F(2,83) = 3.69, p = .03, \eta_p^2 = .08$), such that partners of targets in the clinical sample were significantly more critical than targets of partners in the control sample ($p = .009, d = 0.58$) but the socially anxious and other anxiety groups did not differ from one another ($p = .39, d = 0.19$). There was also a significant effect of reporter ($F(2,166) = 8.84, p < .001, \eta_p^2 = .10$), such that partners themselves reported being more critical than either patients ($p = .003^{10}, d = 0.66$) or observers rated them as being ($p < .001^{11}, d = .84$). Finally, the Group X Reporter interaction was not significant, $F(4,166) = 2.21, p = .07, \eta_p^2 = .05$.

Group Differences in Targets' Criticism of their Partners

We examined differences in partners' reports of global perceived criticism using planned contrasts. Results indicated that partners of targets in the clinical group did not differ significantly from partners of targets in the control group on global perceived criticism ($t(83) = 1.04, p = .30, d = .23$), nor did partners of targets in the socially anxious and other anxiety groups differ significantly from one another ($t(83) = -1.33, p = .19, d = .29$). Effect sizes were small.

¹⁰ $\alpha = .025$

¹¹ $\alpha = .017$

Next, we examined group differences on interaction-specific target criticism using a mixed 3 (Group) x 3 (Reporter) ANOVA. There was a significant effect of group ($F(2,83) = 3.30, p = .04, \eta_p^2 = .07$), such that targets in the clinical group were more critical than targets in the control group ($p = .02, d = 0.53$), but targets with SAD and those with other anxiety disorders did not differ from one another ($p = .26, d = 0.24$). There was also a significant effect of reporter ($F(2,166) = 20.64, p < .001, \eta_p^2 = .20$), such that observer ratings of target criticism were lower than either targets' reports of expressed criticism ($p < .001^{12}, d = 1.44$) or partners' reports of perceived criticism ($p < .001^{13}, d = 1.09$). The interaction between group and reporter was not significant ($F(4,166) = .07, p = .99, \eta_p^2 = .002$).

Group Differences in Targets' Reactions to Criticism

We next examined whether the groups differed on targets' global reports of upset due to criticism using planned contrasts. Results indicated that targets in the clinical group and control group did not differ significantly from one another on global upset due to criticism ($t(82) = 1.84, p = .07, d = 0.41$), nor were there significant differences between the socially anxious and other anxiety targets ($t(82) = -1.08, p = .28, d = 0.24$).

We then examined group differences in interaction-specific upset due to criticism using a mixed 3 (Group) x 2 (Reporter) ANOVA. The criticism variables were log transformed to achieve homogeneity of variance. Results demonstrated a significant group effect ($F(2,83) = 5.75, p = .005, \eta_p^2 = .12$): Participants in the clinical group were

¹² $\alpha = .017$

¹³ $\alpha = .025$

significantly more upset by criticism than those in the control group ($p = .001$, $d = 0.74$), but the socially anxious and other anxiety groups did not differ from one another ($p = .56$, $d = 0.13$). Neither the main effect of reporter nor the interaction between group and reporter was significant ($F(1,83) = 0.30$, $p = .58$, $\eta_p^2 = .004$ and $F(2,83) = 1.15$, $p = .32$, $\eta_p^2 = .03$, respectively).

To examine whether targets in the clinical group were more upset by the same level of criticism than those in the control group, we reran this analysis controlling for observer ratings of the relative's criticism. Results showed that although the relative's observed criticism significantly predicted the patient's level of upset ($F(1,82)=19.31$, $p < .001$, $\eta_p^2 = .19$), the effect of group remained significant ($F(2,82) = 3.94$, $p = .02$, $\eta_p^2 = .09$), with participants in the clinical group reporting significantly higher levels of upset than those in the control group ($p = .006$, $d = 0.61$) but no differences between the social anxiety and other anxiety groups ($p = .54$, $d = 0.13$).

We also used 3 (Group) x 2 (Time) ANOVAs to test whether the groups differed from one another on change in positive and negative affect. For positive affect, there was a significant effect of group ($F(2,82) = 3.55$, $p = .03$, $\eta_p^2 = .08$) such that the normal control group reported more positive affect than the clinical group across time points ($p = .02$, $d = 0.52$) but the clinical groups did not differ from one another ($p = .12$, $d = 0.34$). There was no significant effect of time ($F(1,82) = .57$, $p = .45$, $\eta_p^2 = .01$) and the Group X Time interaction was also non-significant ($F(2,82) = .24$, $p = .78$, $\eta_p^2 = .01$) indicating that the groups did not differ from one another in change in positive affect.

In analyses examining negative affect, we took the negative inverse of the square root of negative affect to achieve homogeneity of variance. Results revealed a significant effect of group ($F(2, 82) = 27.38, p < .001, \eta_p^2 = .40$), such that targets in the clinical sample reported higher levels of negative affect across time points relative to those in the normal control sample ($p < .001, d = 1.61$), but targets in the socially anxious sample did not differ from those in the other anxiety sample ($p = .23, d = 0.26$). There was also a significant effect of time ($F(1, 82) = 10.62, p = .002, \eta_p^2 = .12$): Surprisingly, across groups negative affect *decreased* from pre- to post-interaction. There was no significant Group X Time interaction ($F(2, 82) = 0.19, p = .83, \eta_p^2 = .01$), indicating that the groups did not differ from one another on change in negative affect.

Finally, we used planned contrasts to examine whether there were group differences in self-reported stress following the problem-solving interaction. Results indicated that targets in the clinical group reported more stress following the discussion than targets in the control group ($t(83) = 3.21, p = .002, d = 0.70$), but the socially anxious and other anxiety groups did not differ from one another ($t(83) = 0.30, p = .76, d = 0.07$).

Upset as a Mediator

As expected, targets and partners in the clinical samples reported significantly lower relationship satisfaction than those in the control sample ($t(83) = -3.67, p < .001, d = 0.81$ and $t(65) = -4.13, p < .001, d = 1.03$ for targets and partners, respectively). However, the socially anxious and other anxiety groups did not differ from one another ($t(83) = 0.32, p = .75, d = 0.07$ and $t(36) = 0.09, p = .95, d = 0.02$ for targets and partners,

respectively).¹⁴ We examined whether targets' self-reports of how upset they became when criticized by their partners during the interaction mediated the relationship between diagnosis (being in the clinical or control group) and relationship satisfaction. The bias-corrected, 95% confidence interval for the indirect effect of diagnosis on relationship satisfaction through upset was -2.80 to -0.80. Because this confidence interval does not include zero, results are significant and indicate that upset due to criticism does indeed serve as a mediator. The 95% confidence interval for the direct effect of diagnosis on satisfaction was -4.80 to -0.67, indicating that upset due to criticism only partially mediated this relationship.

We also tested whether upset due to criticism mediated the relationship between diagnosis and post-discussion stress. The bias-corrected, 95% confidence interval for the indirect effect of diagnosis on relationship satisfaction through upset was 0.54 to 2.49, and the 95% confidence interval for the direct effect of diagnosis on satisfaction was -0.18 to 3.64, indicating that upset due to criticism fully mediated this relationship.¹⁵

Results Controlling for Depression

To test whether the differences we found between the clinical and control groups could be explained by the presence of targets with comorbid depression in the clinical group, we reran all analyses on which we initially found a significant difference between

¹⁴ Targets' RAS was square root transformed in these analyses to achieve homogeneity of variance. We were unable to successfully transform partners' RAS, so we used the raw values and report results from the contrast that does not assume equal variances.

¹⁵ Perceived criticism also significantly mediated the relationship between diagnosis and satisfaction (95% CI [-1.95, -0.11]) and between diagnosis and post-discussion stress (95% CI [0.22, 2.29]). We do not report these results in the text because perceived criticism and upset due to criticism were so highly correlated (see Table 3.2).

the clinical and control groups, excluding the 10 participants with comorbid MDD diagnoses. Due to the loss of power for these analyses, we focus on changes in effect size. Excluding depressed participants resulted in very small decreases in between-groups effect sizes (change in $d = 0.02-0.08$), indicating that comorbid MDD explained little of the differences between the clinical and control groups.

Discussion

Overall, our results indicate that individuals with anxiety disorders and their romantic partners are more critical of one another when discussing a problem topic than are couples without psychopathology. These findings were robust and were not dependent on which source (target, partner, or observer) was reporting on criticism. We also found that compared to normal controls, individuals with anxiety disorders experienced the problem-solving discussion as more stressful and were more upset by their partners' criticism, and upset due to criticism mediated the relationship between diagnosis and relationship satisfaction. Surprisingly, we did not find any differences between groups on global measures of criticism, nor did we find any differences between the socially anxious and other anxiety groups on any of the measures.

Our finding that anxious individuals were criticized more by their romantic partners than normal controls is consistent with prior research on criticism in anxiety disorders: Chambless et al. (2002) found that compared to the husbands of women without psychopathology, husbands of agoraphobic women were more critical of their wives during a laboratory-based problem-solving interaction. Our results suggest that these prior results were not specific to agoraphobia, but rather may represent the effects

of anxiety disorders more broadly. Interestingly, we also found that individuals with anxiety disorders were more critical of their partners than were normal controls. Taken together, these results highlight the role that anxious individuals themselves may play in creating or perpetuating their relationship problems. Previous investigations of perceived criticism among individuals with anxiety disorders have largely focused on anxious individuals as the recipients of criticism and have neglected to examine anxious individuals' criticism of their partners (e.g., Chambless et al., 2016; Chambless & Steketee, 1999). Our research indicates that anxious individuals criticize their partners at higher rates than controls; anxious individuals' behavior may therefore elicit or perpetuate the high levels of criticism that these individuals perceive from their partners, and may contribute to their own relationship dissatisfaction. In other words, anxious individuals may in part bring about or exacerbate their relationship difficulties by being critical themselves. This is reminiscent of the stress generation model of depression (Hammen, 1991), which posits that depression-prone individuals actively create stressors, particularly interpersonal stressors, in their lives, which in turn contribute to the onset or recurrence of their depression. This model has received considerable empirical support (for reviews, see Hammen, 2006; Liu & Alloy, 2010). Our findings suggest that anxious individuals may similarly elicit interpersonal stress in the form of perceived criticism, which in turn serves as an indicator of poor prognosis in treatment (Chambless et al., 2016; Chambless & Steketee, 1999). Critically, this pattern of results held even when individuals with comorbid MDD were excluded from our analyses: Excluding depressed individuals resulted in only very small decreases in effect sizes. Our results thus suggest

that the high levels of negativity that characterize interactions between depressed individuals and their spouses (Rehman et al., 2008) may be the result of negative affect more broadly, rather than MDD specifically.

Compared to control couples, individuals with anxiety disorders and their partners reported decreased relationship satisfaction, though this may reflect very high satisfaction among controls, rather than particularly low satisfaction in the anxious group. Mean RAS scores for anxious couples were similar to those of other married couples in the literature and were higher than those of individuals seeking marital or family therapy, whereas normal controls reported higher mean satisfaction than published samples of married or dating couples (Hendrick, Dicke, & Hendrick, 1998). Anxious individuals were also more upset by their partners' criticism than were normal controls even when we controlled for observer-rated criticism from the partner, suggesting that the same level of criticism is more upsetting to individuals with anxiety disorders compared to those free of psychopathology. Furthermore, upset due to criticism mediated the relationship between diagnosis and relationship satisfaction. Thus, anxious individuals may be less satisfied in their relationships in part because their partners are more critical of them, and they find this criticism to be particularly upsetting. Contrary to hypothesis, this finding was not specific to people with social anxiety disorder, who are known to be highly concerned about negative evaluation. Rather, it was a feature of anxiety disorders more broadly. Caution in interpreting the direction of these results is warranted given the cross-sectional nature of our study, and replication of this finding using a longitudinal design is needed. Nevertheless, it would be interesting to see whether upset due to criticism might also

explain some of the difficulties with intimacy that have been documented among individuals with SAD, the mechanisms of which are poorly understood (Porter & Chambless, 2014; Sparrevohn & Rapee, 2009; Wenzel, 2002). For example, do socially anxious people perceive intimacy as risky because they are subject to especially high levels of criticism from their partners, which they find to be upsetting? Further research is needed to elucidate such questions.

Individuals with anxiety disorders also experienced the problem-solving discussion as more stressful than did controls. This appeared to be related to the heightened level of criticism they were subjected to during the interaction and their reactions to that criticism: Upset due to criticism fully mediated the relationship between diagnosis and post-discussion stress.

Surprisingly, although our clinical and control groups differed on measures of interaction-specific criticism, the groups did not differ on global measures of criticism. We are unsure of why this was the case. One possibility is that we lacked sufficient power to detect differences between groups: Differences between the clinical and control groups on global perceived criticism and upset due to criticism approached statistical significance, and it is possible significant effects would be found in a larger sample. However, global measures of criticism were also associated with smaller between-group differences than were interaction-specific measures of criticism. It may be that although anxious individuals and their partners are more critical of one another when they discuss problems in their relationships, such couples are less inclined to openly discuss areas where they disagree in the course of their day-to-day lives. Supporting this, Davila and

Beck (2002) found that among undergraduates, social anxiety symptoms were associated with greater desire to avoid conflict and greater conflict avoidance when interacting with romantic partners, friends, and family members. Porter and Chambless (2016b) also found that compared to undergraduates low in social anxiety, those high in social anxiety rated a laboratory-based problem-solving interaction with their partners as marginally less similar to their normal interactions with their partners; however, both groups rated social support interactions as equally similar to their normal interactions with their partners (Porter & Chambless, 2016a). Unfortunately, we did not ask participants in the present study to rate the extent to which they generally avoid discussing areas of conflict in their relationship with their partners, so this account remains speculative.

Despite the centrality of fear of negative evaluation in SAD, we found no evidence that individuals with SAD perceive or express more criticism or are more upset by criticism than individuals with other anxiety disorders. Rather, heightened criticism appears to be a characteristic common to all anxiety disorders. These results highlight the need for inclusion of clinical comparison groups in other studies examining relationship difficulties in SAD to determine whether other difficulties associated with SAD (e.g., low social support; Kashdan et al., 2013; Porter & Chambless, 2014, 2016a; Rapee et al., 2015) are specific to this disorder or reflect problems associated with anxiety disorders more broadly.

Our results in the present study differ from the findings of the only other known study to examine associations between social anxiety and perceived and expressed criticism (Porter & Chambless, 2016b), which found no significant differences in

criticism between undergraduate couples high and low in social anxiety during a laboratory task. We suspect that our divergent findings may be explained by differences in the study populations: In the present study, we compared cohabitating community couples in which one partner either was or was not diagnosed with an anxiety disorder of clinical severity, whereas Porter and Chambless (2016a) compared undergraduate couples who likely did not share a residence and who were selected based on their scores on a self-report measure of social anxiety. Given that the present sample was older, had more significant psychopathology, and likely consisted of individuals in more serious relationships, it is unsurprising that group differences emerged in the present study but not in Porter and Chambless's (2016a) study.

To our knowledge, the present study is the first to compare levels of perceived and expressed criticism among a clinical sample of individuals with SAD, individuals with other anxiety disorders, and normal controls. Nevertheless, this study has a number of limitations. First, this was a cross-sectional study. As such, we could not test whether upset due to criticism truly mediated the relationship between diagnosis and relationship satisfaction because all three variables were measured at a single time point. Thus, longitudinal research is needed to confirm the temporal relationships between diagnosis, upset due to criticism, and relationship satisfaction. Furthermore, although our findings are consistent with a stress generation model, longitudinal research could help to elucidate how anxious individuals' criticism of their partners might influence their partners' criticism of them and their relationship satisfaction over time. Second, we unfortunately did not collect data from participants in the present sample about other

areas of relationship dysfunction that have been found to relate to social anxiety. Specifically, we would be interested to see whether the low levels of self-disclosure and intimacy and high levels of perceived risk in intimacy which have been found to be associated with social anxiety in undergraduate samples would replicate in a clinical sample, as well as whether perceived criticism and upset due to criticism might mediate this relationship. Finally, the present study was somewhat lacking in statistical power, and further replication with larger samples is needed.

Clinically, our findings suggest that during treatment for anxiety disorders, a focus on perceived criticism and emotional reactions to criticism is warranted, both to improve treatment outcomes and to increase anxious individuals' relationship satisfaction. Intervention strategies to target perceived criticism could take multiple forms. In individual therapy for anxiety disorders, clinicians might focus on helping patients to modify the attributions they make for their partners' criticism. Previous research has found that attributions explain variance in perceived criticism above and beyond the variance explained by observed criticism (Chambless Blake, & Simmons, 2010), and individuals who make more positive and less negative attributions for a relative's criticism perceive the relative as less critical overall (Allred & Chambless, 2014). Our results also suggest that it may be beneficial for clinicians to help anxious individuals to decrease their own criticism of their partners, which may have the indirect effect of decreasing their partners' criticism of them and decreasing the overall level of negativity in the relationship. Finally, some couples may also benefit from adjunctive

couples' therapy specifically aimed at decreasing criticism in the relationship (Chambless, 2012).

Table 3.1

Demographics and Study Measure Descriptive Statistics for Couples by Diagnostic Group

		Socially anxious (<i>n</i> = 21)				Other anxiety (<i>n</i> = 35)				Normal controls (<i>n</i> = 30)			
		Targets		Partners		Targets		Partners		Targets		Partners	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Sex	<i>Female</i>	16	76.2%	5	23.8%	23	65.7%	12	34.2%	24	80.0%	6	20.0%
Race	<i>White</i>	17	81.0%	16	76.2%	25	71.4%	21	60.0%	22	73.3%	24	80.0%
	<i>Black/African American</i>	3	14.3%	3	14.3%	5	14.3%	7	20.0%	3	10.0%	4	13.3%
	<i>Asian</i>	0	0.0%	2	9.5%	1	2.9%	0	0.0%	2	6.7%	2	6.7%
	<i>Other</i>	1	4.8%	0	0.0%	4	10.0%	2	5.7%	3	10.0%	0	0.0%
	<i>Unknown</i>	0	0.0%	0	0.0%	0	0.0%	5	14.2%	0	0.0%	0	0.0%
Ethnicity	<i>Hispanic</i>	3	14.3%	1	4.8%	2	5.7%	1	2.9%	2	6.7%	0	0.0%
	<i>Non-Hispanic</i>	18	85.7%	20	95.2%	33	94.3%	27	77.1%	27	90.0%	30	100%
	<i>Unknown</i>	0	0.0%	0	0.0%	0	0.0%	7	17.5%	1	3.3%	0	0.0%
Education	<i>High School Diploma or Less</i>	1	4.8%	2	9.5%	4	11.4%	7	20.0%	1	3.3%	1	3.3%
	<i>Some College or 2 Year College Degree</i>	4	19.0%	5	23.8%	6	17.1%	4	11.4%	3	10.0%	5	16.7%

<i>4 Year College Degree</i>	8	38.1%	5	23.8%	9	25.7%	10	28.6%	7	23.3%	8	26.7%
<i>Any Graduate School</i>	8	38.1%	8	38.1%	16	45.7%	10	28.6%	18	60.0%	16	53.3%
<i>Unknown</i>	0	0.0%	1	4.8%	0	0.0%	4	11.4%	1	3.3%	0	0.0%
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<i>Age (years)</i>	34.1	12.02	36.2	13.09	36.7	10.06	39.1	10.80	32.2	8.62	32.8	9.43
<i>PCM: Perceived criticism</i>	4.3	2.70	4.3	2.97	4.9	2.65	5.3	2.74	3.5	1.98	4.1	2.54
<i>PCM: Upset</i>	5.8	2.84	-	-	6.6	2.30	-	-	5.1	2.45	-	-
<i>PCM-I: Perceived criticism</i>	4.2	2.06	4.9	2.74	3.7	2.40	4.4	2.81	2.2	1.15	3.7	2.93
<i>PCM-I: Upset</i>	3.5	2.32	-	-	3.5	2.37	-	-	1.9	1.42	-	-
<i>RAS</i>	4.1	0.72	4.2	0.82	4.0	0.72	4.14	0.68	4.7	0.61	4.7	0.47
<i>PCM-I: Expressed criticism</i>	5.3	2.43	4.3	2.20	4.6	2.34	4.2	2.54	4.0	2.32	3.8	2.17
<i>PCM-I: Partner's upset</i>	-	-	3.7	2.63	-	-	3.3	2.71	-	-	2.4	1.96
<i>Observed criticism</i>	3.5	1.89	3.2	1.72	3.1	1.66	3.2	2.07	2.2	1.24	2.5	1.26
<i>Problem significance</i>	3.4	0.72	3.4	0.72	3.1	0.64	3.1	0.64	3.0	0.58	3.0	0.58
<i>PANAS Positive Pre-Interaction</i>	22.7	9.47	-	-	26.3	8.46	-	-	28.6	7.07	-	-

<i>PANAS Positive Post-Interaction</i>	22.9	11.20	-	-	26.6	9.15	-	-	29.8	9.22	-	-
<i>PANAS Negative Pre-Interaction</i>	22.3	7.53	-	-	19.3	5.62	-	-	12.5	3.12	-	-
<i>PANAS Negative Post-Interaction</i>	19.4	8.07	-	-	17.6	6.20	-	-	11.8	3.72	-	-
<i>PDSS</i>	11.0	4.43	-	-	10.6	4.33	-	-	7.6	4.52	-	-

Note. Means and standard deviations for measures not included in analyses are not listed. PANAS = Positive and Negative Affect Scale; PCM = Perceived Criticism Measure; PCM-I = Interaction-Specific Perceived Criticism Measure; PDSS = Perceived Discussion Stress Scale; RAS = Relationship Assessment Scale.

Table 3.2

Zero-order Correlations between Criticism Measures

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. T-PCM: Perceived criticism											
2. T-PCM: Upset	.43***										
3. T-PCM-I: Perceived criticism	.20	.22*									
4. T-PCM-I: Upset	.13	.37**	.72***								
5. T-PCM-I: Expressed criticism	.00	.05	.35**	.41***							
6. P-PCM: Perceived criticism	-.02	-.09	.10	.23*	.15						
7. P-PCM-I: Perceived criticism	-.10	-.05	.34**	.39***	.46***	.43***					
8. P-PCM-I: Expressed criticism	.08	.08	.48***	.42***	.10	.24*	.42***				
9. P-PCM-I: Target's upset	-.05	.14	.47***	.50***	.25*	.31**	.63***	.67***			
10. O-Target criticism of partner	-.01	.04	.15	.36**	.41***	.44***	.52***	.12	.39***		
11. O-Partner criticism of target	.06	.02	.50***	.39***	.26*	.42***	.39***	.51***	.42***	.50***	

Note. Variables preceded by T- are target-reports, those preceded by P- are partner reports, and those preceded by O- are observer-reports. PCM = Perceived Criticism Measure; PCM-I = Interaction-Specific Perceived Criticism Measure.

* $p < .05$. ** $p < .01$. *** $p < .001$

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Chapter 1

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