

Development of Social Anxiety: Social Interaction Predictors of Implicit and Explicit Fear of Negative Evaluation

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Abstract Little is known about how to predict which individuals with known temperament vulnerabilities will go on to develop social anxiety problems. Adolescents ($N = 185$) were followed from age 13 to 18 to evaluate psychosocial, prospective predictors of social anxiety symptoms and fears of negative evaluation (FNE), after accounting for pre-existing social withdrawal symptoms. Results from structural equation modeling suggest that lack of perceived social acceptance predicts subsequent *explicit* social anxiety and FNE, whereas the emotional intensity of close peer interactions predicts subsequent *implicit* FNE. Results are discussed in terms of the importance of peer interaction in the development of social anxiety, and the value of measuring both implicit and explicit FNE.

Keywords Social anxiety · Fear of negative evaluation · Implicit · Peer interaction

Social anxiety and fear of negative evaluation (FNE) are risk factors for numerous maladaptive outcomes, including depression (Stein, Tancer, Gelernter, Vittone, & Uhde, 1990), restricted development of interpersonal relationships (Schneier, Johnson, Hornig, Leibowitz, & Weissman, 1992), poor academic functioning (Turner, Beidel, Dancu, & Keys, 1986), and heightened risk for substance abuse (Page & Andrews, 1996). Given the serious consequences that can follow from social anxiety symptoms, it is essential to determine which individuals are most vulnerable. Although broad

vulnerability factors have been known for some time, such as a withdrawn, behaviorally inhibited temperament (e.g., Biederman et al., 1993), little is known about how to predict which particular individuals will go on to develop social anxiety later in life, suggesting the importance of intervening life experiences in the manifestation of anxiety (Turner, Beidel, & Wolff, 1996). Specifically, “prospective studies of children characterized as shy or behaviorally inhibited suggest that a proportion of them will develop anxiety during adolescence. However, to date, it is unclear how to determine which children are likely to develop more severe disorders.” (Beidel, Morris, & Turner, 2004, p. 147).

In part, this difficulty has arisen because of the paucity of longitudinal, prospective data to shed light on the intervening psychosocial factors and life experiences that exacerbate a given predisposition to become socially anxious (though see exciting work by Morris, 2001; Warren, Huston, Egeland, & Sroufe, 1997, among others). While results from cross-sectional and retrospective studies have suggested the importance of the familial environment, peer relationships, information processing styles and conditioning experiences as critical to the etiology of social anxiety (see excellent reviews by Beidel & Turner, 1998; Hofmann & DiBartolo, 2001; Hudson & Rapee, 2000; Vasey & Dadds, 2001), it has been difficult to account for the potential influence of biases in recall or the temporal ambiguity inherent in retrospective and cross-sectional studies. Thus, the current study followed a prospective, six-year longitudinal design with the aim of evaluating social factors that would predict later social anxiety and FNE after taking into account baseline social withdrawal symptoms. Adolescents were followed from ages 13–18 because this developmental stage reflects a period of peak onset for social anxiety symptoms (Last, Perrin, Hersen, & Kazdin, 1992; Turner & Beidel, 1989).

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Implicit and explicit fear of negative evaluation

FNE and associated beliefs that one will be rejected are central features of social anxiety (e.g., Clark & Wells, 1995; Rapee & Heimberg, 1997), even among children and adolescents (Chansky & Kendall, 1997). Yet, by definition, social anxiety and FNE can be embarrassing and difficult psychological symptoms to report to others, especially for adolescents who normatively experience high levels of self-consciousness (Bell-Dolan, Last, & Strauss, 1990). As a result, the present study sought to investigate fears of negative evaluation that were expressed both explicitly (i.e., available to introspection and self-report) and implicitly (i.e., automatic responses that reside outside conscious control, and perhaps awareness) to gain a more comprehensive understanding of social fears without the constraints of self-presentation concerns or the requirement of introspective access.

There is now considerable evidence from the social cognition field that persons can hold both implicit and explicit attitudes toward a target; termed “dual attitudes” by Wilson, Lindsey, and Schooler (2000). Explicit attitudes are those we can reflect upon and consciously endorse, whereas “*implicit attitudes* are introspectively unidentified (or inaccurately identified) traces of past experience that mediate favorable or unfavorable feeling, thought, or action toward social objects.” (Greenwald & Banaji, 1995, p. 8). At times, implicit and explicit attitudes will agree and be highly related, while at other times they may diverge and be independent (Nosek, Banaji, & Greenwald, 2002). We do not view one as the ‘true’ attitude, but view both implicit and explicit attitudes as valid indicators that may tell us different things.

In applying implicit attitude measurement to the social anxiety domain, we focus on fears that one will be evaluated negatively by others, and in consequence, rejected. (This approach reflects a modification of earlier work establishing implicit measures related to self-esteem, in general; Greenwald & Farnham, 2000, and to social anxiety, in particular; de Jong, 2002). Interestingly, several lines of research suggest that implicit and explicit attitudes in this domain will show meaningful differences (see Wilson et al., 2000), including findings of little relationship among questionnaire and projective methods assessing affiliation needs (e.g., using the Thematic Apperception Test developed by Morgan and Murray in 1935; see Murray, 1938), as well as minimal to moderate correlations between interview, projective and questionnaire measures of attachment (Bartholomew & Shaver, 1998) and dependency needs (Bornstein, 1995). Moreover, the importance of involuntary, automatic fear responding has received significant theoretical attention and empirical investigation in the anxiety disorders field (McNally, 1995). Thus, the current study includes measures of both self-reported FNE and involuntary, implicit FNE.

Peer interaction as a predictor of fear of negative evaluation

There is now a large literature identifying potential risk factors for heightened social anxiety. Although these studies are predominantly retrospective or cross-sectional, leaving questions of change and development unanswered, it is clear that genetics and temperament, familial and peer relationships, social skills, cognitive biases, and conditioning experiences all contribute to the maintenance, and likely onset, of social fears. Thus, there are almost certainly numerous pathways to the emergence of social anxiety. We focus here on the importance of peer relationships, not because we believe it is the only or necessarily primary pathway, but because of its clear relevance during adolescence.

Adolescent friendships provide essential contexts for psychosocial development and act as powerful socializing agents, providing teens with information about social norms and mores (Collins & Laursen, 2004). Further, the anxiety-producing nature of peer interactions has long been recognized, as peer socialization is intrinsically a *comparative* process; in which adolescents’ judge their own behaviors relative to the norms of their peers (Rubin & Burgess, 2001). Close peer relationships may provide particularly intensive contexts for observing (at least implicitly) how one’s own behavior stands up relative to others, yielding numerous opportunities for negative self-evaluations (Baumeister, Zhang, & Vohs, 2004; Stiles & Kaplan, 2004). Similarly, the social control function of adolescent peer relationships, with its highly mercurial, judgmental responses to adolescents who deviate from peer norms (Brown, 1982), may also readily lead to negative evaluations of one’s own social success (Dunbar, 2004).

The influence of peer socialization on FNE is not simply a question of whether a person has close friends or not, though certainly peer status may be influential (e.g., Morris, 2001). Chansky and Kendall (1997) suggest that even in the midst of relationships, anxious children may doubt whether their friend truly likes them, pointing to the importance of cognitive biases interacting with peer relationships. In Crick and Dodge’s (1994) reformulated model of social information processing, they note the reciprocal relationship between social perceptions and social behavior. Thus, we evaluate both perceptions of social acceptance (the extent adolescents believe they are liked) and actual behavior with a close peer to predict subsequent social anxiety and FNE.

Perceived social acceptance

There is considerable support for the idea that anxious children tend to misinterpret their likelihood of success in social situations (Spence, Donovan, & Brechman-Toussaint, 1999). Further, cross-sectional studies indicate that children’s perceptions of their social acceptance are related to social

anxiety and FNE (e.g., Chansky & Kendall, 1997). The current study will extend these findings by evaluating whether perceived social acceptance is also a prospective predictor of social anxiety and FNE in adolescence. Importantly, perceptions of social acceptance do not necessarily match objective ratings of social performance or success (see Beidel, Turner, & Dancu, 1985; Rapee & Lim, 1992; Stopa & Clark, 1993; Turner et al., 1986). Thus, the current study focuses on the predictive validity of *perceived* acceptance with the expectation that it will be a negative predictor of subsequent social anxiety and FNE. If adolescents believe they are not liked, they are likely to fear subsequent social interactions and expect to be evaluated negatively. More specifically, because perceptions of social acceptance require introspective awareness and reflect *interpretations* of social interactions (i.e., mental representations within conscious awareness) rather than actual experience, low perceived social acceptance is hypothesized to predict subsequent *explicit* social anxiety symptoms. The prediction of implicit FNE, which lies outside conscious control and/or awareness, from perceived social acceptance is less clear and reflects an exploratory aspect of this investigation.

Social behavior with peer

Social information processing models note that, “the child mentally represents social behavior and its outcomes and stores them in memory, and they become part of his or her general social knowledge that will influence future actions” (Crick & Dodge, 1994, p. 79). This raises the important question of which aspects of social behavior are particularly formative of one’s social knowledge base, in general, and fears of negative evaluation, in particular? Elements of social behavior that are intense, in terms of high emotional demands for support and high levels of social information exchange, seem to be likely contenders because of the long-established finding that emotional material is preferentially processed and encoded (Cahill & McGaugh, 1998; Piéron, 1928), making it probable this material will influence future social information processing.

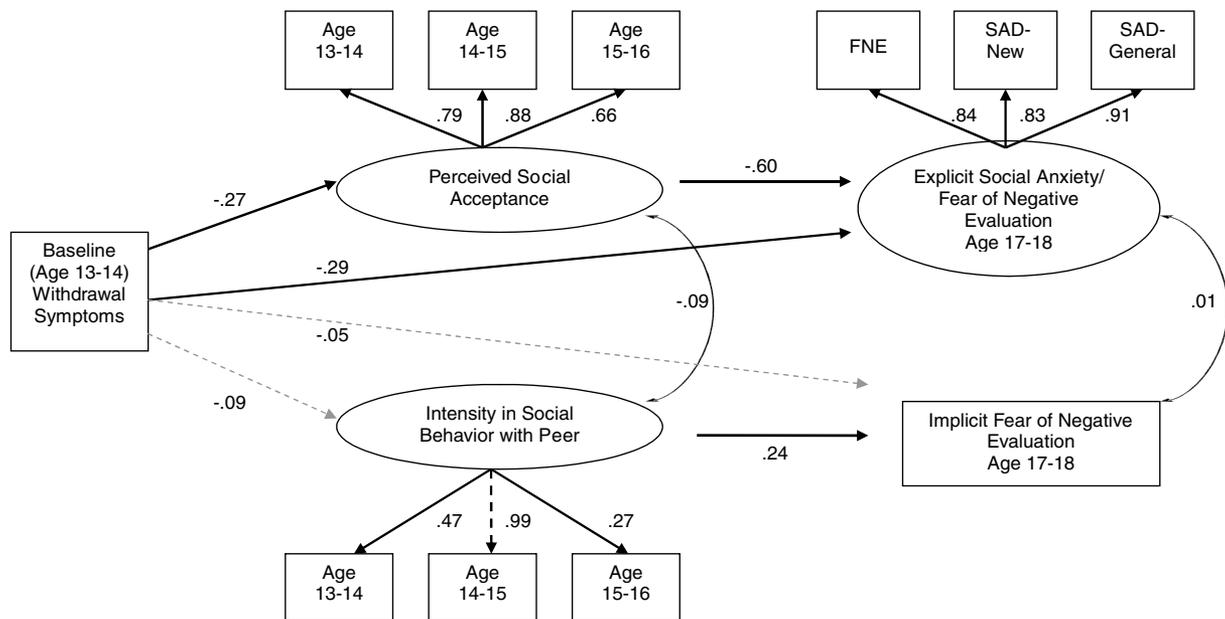
We hypothesize that early adolescent peer relationships that are *excessively* intense are likely to predict future negative self-evaluations. Emotional intensity in peer relationships during adolescence may appear in any of several forms, including 1) high levels of reassurance-seeking and dependency, as reflected in repeated calls for emotional support from a peer, or 2) social comparison-seeking, as seen in high levels of disclosure of one’s own uncertainties and a high degree of social-referencing behavior. Although some reassurance-seeking could reflect adaptive solicitation of social support (Blatt, Quinlan, Chevron, McDonald, & Zuroff, 1982; Joiner, Metalsky, Katz, & Beach, 1999), a pattern of intense emotional exchanges around a teen’s problems may

be indicative of someone needing continual reassurance and lacking self-confidence, who is thus vulnerable to FNE and social anxiety. Similarly, excessive dependency in relationships has been linked with social anxiety (Harb, Heimberg, Fresco, Schneier, & Liebowitz, 2002; Overholser & Freiheit, 1994). Finally, social comparison processes are also likely to lead to opportunities to identify ways in which one does not “measure up” and may be subject to negative evaluation by others (Baumeister et al., 2004; Stiles & Kaplan, 2004). Thus, excessive levels of emotional intensity in peer interactions may be a precursor to fears of negative evaluation.

This hypothesis may be specific to emotional intensity in particular situations, especially stressful circumstances. It seems plausible that intense peer interactions will lead to positive outcomes in some cases, such as when a person feels excited or confident about the domain being focused upon (e.g., intensity in young romance). However, we suspect that when under stress or when feeling insecure, intensity can become problematic. Calls for emotional support in these situations may overtax peers (perhaps leading to rejection), and negative self-evaluation seems likely when the intensity is focused on an area of discomfort or relative weakness. Thus, to create an opportunity to examine reassurance-seeking, dependency, and social comparison under stressful circumstances, the current study evaluated intensity while asking peers to discuss a personal problem.

Intensity in these challenging interactions is hypothesized to predict *implicit* FNE because the subtleties in close peer interactions may make them difficult to consciously evaluate in an objective manner. When reassurance-seeking, dependency, and social comparison processes cross the line from promoting closeness to leaning too heavily on a peer is likely based on cues not easily defined by those in the midst of the interaction. (For this reason, we use independent observations of social behavior, rather than relying on self-report in the present study). Nonetheless, these difficult interactions may still contribute to implicit fears of negative evaluation because social information processing happens without conscious evaluation. It is less clear whether intensity in peer interactions will predict explicit FNE given the ambiguity surrounding adolescents’ insight into their social behavior.

The current study followed a community sample of adolescents from age 13 to 18 to evaluate how psychosocial factors related to peer interactions predict implicit FNE and explicit social anxiety after accounting for social withdrawal symptoms at baseline. Perceived social acceptance and intensity during an interaction with a close friend were assessed annually over the course of three years to obtain a more reliable indicator of peer interaction than is possible from a single time point. Variability across years is expected due to situational factors; so structural equation modeling was used to extract and examine the common variance across time points to capture those aspects of peer interactions that



Note. FNE = Fear of Negative Evaluation subscale; SAD-New = Social Avoidance and Distress in New Situations subscale; SAD-General = General Social Avoidance and Distress subscale. Paths that are non-significant are noted with dashed lines, and significant paths are noted with solid lines. To improve readability, error terms for the manifest and latent variables are not noted in the Figure, but were included in all analyses.

Fig. 1 Structural regression model predicting implicit and explicit FNE from perceived social acceptance and intensity in social behavior with close peers, accounting for baseline social withdrawal symptoms

are constant across situations. This more stable variance is expected to be most predictive of social anxiety and FNE because it is likely to encompass enduring, rather than only situational, features. It is hypothesized that perceived social acceptance will predict explicit FNE because both require introspective access and conscious endorsement, whereas emotional intensity observed in actual social behaviors is expected to predict implicit FNE because the effects of such behaviors are more likely to occur beyond the realm of strategic control and conscious awareness. These relationships were examined (see Fig. 1) while statistically controlling for the variance explained by baseline social withdrawal symptoms to evaluate the unique contribution (in terms of prediction over time) of peer interactions on the subsequent development of FNE and social anxiety symptoms. Finally, gender differences in these relationships were evaluated as an exploratory aspect of the current study.

Methods

Participants

This report is drawn from a larger longitudinal investigation of adolescent social development in familial and peer contexts (see Allen, Porter, & McFarland, 2006; Allen, Porter, McFarland, Marsh, & McElhaney, 2005). Participants in-

cluded 185 adolescents who were initially interviewed at approximately age 13 (52% female; Age: $M = 13.35$, $SD = 0.64$) with their parents and closest friends, and then re-interviewed on an annual basis for the next 5–6 years. The current study uses three waves of measurement (when adolescents were approximately, 13, 14, and 15 years old) to predict social anxiety and FNE when adolescents were 17–18 years old. The sample was racially/ethnically and socio-economically diverse: 107 adolescents identified themselves as Caucasian, 54 as African American, and 24 as being from other and/or mixed minority groups. Adolescents' parents reported a median family income in the \$40,000–\$59,999 range. Adolescents were recruited from the 7th and 8th grades at a public middle school drawing from suburban and urban populations in the South-eastern United States. Students were recruited via an initial mailing to all parents along with follow-up contact efforts at school lunches. Adolescents who indicated they were interested in the study were contacted by telephone. Of all students eligible for participation, 63% agreed to participate either as target participants or as peers providing collateral information, which is good for a study of this intensity (i.e., requiring multiple interview sessions, each spanning several hours, with teens, parents and peers). The resulting sample was quite similar to the larger community population in terms of both socioeconomic status and racial/ethnic background. Adolescents provided informed assent and their parents provided informed consent

before each interview session. Interviews took place in private offices within a university academic building.

At each wave, adolescents were also asked to nominate their “closest friend” of the same gender to be included in the study. If adolescents appeared to have any difficulty naming close friends, it was explained that naming their “closest” friends did not mean that they were necessarily very close to these friends, just that they were close to these friends *relative* to other acquaintances they might have. Close friends reported that they had known the target adolescents for an average of 7.68 years ($SD = 5.91$) at the first wave. At each new wave, participants’ *current* closest peer was selected. This gives the clearest possible picture of the adolescent’s recent close peer interactions, and eliminates the problem of repeatedly assessing a peer who may no longer be close to the adolescent, perhaps due to circumstances that have nothing to do with the friendship (e.g., geographic moves).

Materials

Social anxiety, withdrawal, and fear of negative evaluation measures

Explicit Measures. Social anxiety and FNE as outcome variables were measured with the Social Anxiety Scale for Adolescents (SAS-A; LaGreca & Lopez, 1998, administered at age 17–18). This 22-item scale includes 18 descriptive self-statements and four filler items, which participants rate according to how true they feel the item is for them (from 1 = not at all, to 5 = all the time). The SAS-A has three subscales: fear of negative evaluation, social avoidance and distress in new situations, and general social avoidance and distress. These three subscales served as the indicators for the latent factor ‘Explicit FNE’. The scale has strong psychometric properties (e.g., LaGreca & Lopez, 1998), and internal consistency in the current study was good (Cronbach’s $\alpha = .94$).

Baseline social withdrawal symptoms were measured with the withdrawal scale from the Pupil Evaluation Inventory (administered at age 13–14), which was designed to assess peer ratings of children’s behavior in grades one through nine (Pekarik, Prinz, Liebert, Weintraub, & Neale, 1976). This scale sums peer ratings (on a scale ranging from 0 = not true, to 2 = very often or often true) of the target child on nine different items tapping socially withdrawn behavior, such as “S/he often doesn’t want to hang out or do things with other kids.” The subscale also includes items assessing shyness and fears of negative evaluation (e.g., “She is too shy to make friends easily” and “She is upset when called on to answer questions in class”), so it serves as a useful measure of early social anxiety-relevant concerns. Thus, we conceptualize this measure as a proxy for baseline social anxiety because it captures the affective, cognitive and be-

havioral components of many key social anxiety symptoms in a developmentally appropriate way. The choice to have peer ratings of withdrawal symptoms follows from multiple lines of research suggesting that peer-ratings may overcome some of the biases inherent in using self-ratings of social behavior (Berger, Jodl, Allen, McElhaney, & Kuperminc, 2005; Kobak & Sceery, 1988; Nisbett & Wilson, 1977). The scale has been shown to have good reliability and validity as a marker of childhood vulnerability to psychopathology (Pekarik et al., 1976; Weintraub, Prinz, & Neale, 1978), and internal consistency in the current sample was adequate (Cronbach’s $\alpha = .72$).

Implicit Measure. The *Implicit Association Test* (IAT; Greenwald, McGhee, & Schwartz, 1998, administered at age 17–18) measures automatic associations in memory; automatic in the sense that evaluations occur outside conscious control, and at times, outside awareness. The measure has adequate psychometric properties (Greenwald & Nosek, 2001), and like many tasks used by social cognition researchers (Fazio, 2001), the IAT is a reaction time task that purportedly reflects strength of association between concepts in memory. The computerized version of the IAT requires items to be classified while two category labels are paired on either side of the screen. (See <http://implicit.harvard.edu/implicit/> for more information and a sample test.) Specifically, the task involves comparing the time taken to classify stimuli when paired categories match a person’s automatic associations versus when paired categories contradict automatic associations. Thus, it is a relative measure of associations, rather than an absolute measure.

The task has a number of features that make it particularly suitable for social anxiety research. First, this methodology minimizes the influence of self-presentational concerns and conscious control (Greenwald et al., 1998). Second, the IAT uses a within-subject design, so the influence of mood state is held constant because the anxiety-evoking stimuli are present in all conditions being compared, permitting a relatively clean evaluation of cognitive processing. To apply this technique to assess fear of negative evaluation, response times to classify stimuli when category pairs match hypothesized anxious beliefs (e.g., that the self is rejected) are compared with response times for classifying stimuli when category pairs contradict social anxiety-relevant beliefs (e.g., that the self is liked).

Because the IAT is a relative task, equivalent comparison categories are required. In this case, the category “Not Me” was used as a comparison to the category “Me.” These categories were compared while being paired with descriptor categories to reflect the concepts “Rejected” versus “Liked.” Specifically, the categories “Rejected” and “Me” were paired at the top left of the computer screen while “Liked” and “Not me” were simultaneously paired at the top right.

Participants were told to classify stimuli that belonged to either the “Rejected” or “Me” categories on the left, and stimuli that belonged to either the “Liked” or “Not me” categories on the right. The dependent variable was speed of classification across a series of trials. Following this category pairing condition, the labels were switched and the same categorization task was completed while pairing “Rejected” with “Not me” (and “Liked” with “Me”). Thus, for each condition, two sets of category pairs were presented simultaneously. It is assumed that when categories are paired to match a person’s automatic associations, they will be able to classify the stimuli more quickly. IAT effects are determined by contrasting average response time in one category pairing condition with average response time in the other.

Three items were selected as stimuli for each category: Me (me, self, I); Not me (not me, other, them); Rejected (rejected, disliked, unwanted); Liked (liked, admired, popular). Following an unrelated practice task, the IAT consisted of two critical blocks: one block of trials where the target and descriptor categories reflected FNE (self + rejected), and one block in which the associations with the self were positive (ordering of these blocks was counterbalanced). Each critical block consisted of 36 classification trials (trials were composed of equal numbers of stimuli from each category), and was preceded by 20 practice trials. Participants were instructed to respond as quickly and as accurately as possible, and were provided error feedback so they could correct any misclassifications before moving on to the next trial.

It was hypothesized that participants high in fears of negative evaluation would implicitly associate themselves as relatively more rejected. For simplicity, this task is referred to as ‘implicit FNE’, though given the relative nature of the IAT it is important to keep in mind that this association can simultaneously be interpreted as a preferential association with others as liked (vs. the self as rejected). We assume both are valid interpretations of the measure, though we emphasize the implications of the implicit social comparison for self-evaluation because of the tendency for information about the self to be preferentially processed (see review by Baumeister, 1998). It is also important to note that this task is not intended to capture the identical construct reflected on the SAS-A (which reflects a variety of self-reported social anxiety symptoms). Instead, the IAT was designed to assess implicit rejection associations because of the significance of perceived negative evaluation in social anxiety.

Establishing the validity of the task. There is now considerable evidence for implicit fear associations (measured by IATs) across a number of different anxiety concerns, including trait anxiety (Egloff & Schmukle, 2002), anx-

iety sensitivity (Teachman, 2005), obsessional concerns (Teachman, Woody, & Magee, 2006), and specific phobias (e.g., Teachman & Woody, 2003). Modified versions of the task have also been used successfully in social anxiety research with adults. For instance, de Jong (2002) found that women with high social anxiety showed relatively less implicit self-esteem than did women with low social anxiety, and de Jong, Pasman, Kindt, and van den Hout (2001) found that social situations were implicitly associated with negative outcomes for high, relative to low, socially anxious women. Moreover, Asendorpf, Banse, and Mücke (2002) found a double dissociation whereby an implicit measure of shyness predicted spontaneous social behavior and an explicit shyness measure predicted controlled social behavior, but not vice versa. Thus, the IAT now has substantial support as a measure of implicit anxiety in adults, including social anxiety. Further, the task has been used in the past with children (e.g., Sinclair, Dunn, and Lowery, 2005 evaluated implicit race bias and Craeynest et al., 2004, evaluated implicit attitudes toward food among children), indicating its appropriateness for use with the present sample. The current version of the task thus used labels and stimuli that were conceptually analogous to those described above, and for which validity has been well-established.

Finally, a number of checks were conducted to establish the reliability and validity of the tool with this sample. First, scoring of the IAT data suggested adequate psychometric properties, and acceptable data quality. Specifically, the IAT data were scored according to the revised scoring algorithm developed by Greenwald, Nosek, and Banaji (2003), because this approach maximizes convergent validity as assessed by the relationship between implicit and explicit measures, and improves the psychometric properties of the tool (by taking into account each respondent’s latency variability). Only the critical trial data were used for analyses because a shortened version of the IAT was employed (without single categorization blocks). Implementing the Greenwald et al. procedure resulted in deletion of six participants’ IAT data based on high error rates (>30% errors overall) and/or unusually fast response times (>10% trials under 300 ms). Second, the overall IAT error rate for the remaining data was in the usual range (~8%), indicating appropriate properties of the tool for this sample. Third, a modest correlation was observed with an alternate IAT task that examined evaluation of the self (versus others) as worthless ($r = .16, p = .07$), suggesting a small relationship as would be expected, but demonstrating that the implicit FNE task is not simply a measure of implicit self-worth or self-esteem.

Predictors of FNE

Perceived social acceptance. Adolescents’ perceptions of their likelihood of acceptance in social situations were

assessed with the social acceptance subscale¹ of the Self-Perception Profile for Adolescents (Harter, 1988). A 4-item version of this scale (with a .97 correlation with the original version) was used. Adolescents were asked to choose between two contrasting stem items and then rate that item as either “sort of true” or “really true” about themselves (e.g., “Some teens find it HARD to make friends” versus “Some teens find it’s pretty EASY to make friends”). The measure was completed three times, once per year starting at age 13–14, and the three scale scores were then used as the indicators for the latent factor ‘Perceived Social Acceptance’. The scale has strong psychometric properties (Harter, 1988), with internal consistencies ranging from .76 to .79 over the 3 years of the current study.

Social behavior: intensity of peer interaction. Adolescents participated in an eight-minute interaction task with their closest peer, during which they were told to ask that peer for help with a “problem they were having that they could use some advice or support about.” Typical topics included dating, problems with peers or siblings, raising money, or deciding about joining sports teams. These interactions were coded using the Supportive Behavior Coding System (Allen et al., 2001), which was based on related systems designed for adults (Crowell et al., 1998; Haynes & Katz, 1993; Julien et al., 1997). The *intensity* of the adolescent’s interaction with their peer was coded on a 0–4 scale that captured calls for emotional support (and peers’ responses to those calls), depth of self-disclosure, and the amount of social-referencing in the interaction. Codes were based on an anchored scoring system that accounts for both the intensity and the frequency of interactive behaviors with peers. Each interaction was reliably coded as an average of the scores obtained by two trained raters blind to other data from the study (Intraclass correlations ranged from .87 to .91 across the 3 waves of data collection). The interaction task was completed three times, once per year starting at age 13–14, and the three intensity scores were then used as the indicators for the latent factor ‘Intensity in Social Behavior’. This system has been found to capture aspects of peer interactions linked to both adolescent attachment relationships, and to short-term increases in adolescent depressive symptoms (Allen, Insabella, & Porter, 2006; Allen, Porter, McFarland, McElhaney, & Marsh, *in press*).

Procedure

In Wave 1, adolescents came in separate sessions for interviews, first with their parents, and then with their named

closest peer. In subsequent waves of data collection, adolescents again came in for two visits, the first time on their own and the second with the person who they named as their current closest peer. Confidentiality was assured to all study participants and adolescents were told that their parents would not be informed of any of the answers they provided. Participants’ data were protected by a Confidentiality Certificate issued by the U.S. Department of Health and Human Services. Parents, adolescents, and peers were all paid for their participation.

Strategy for primary analyses

Multivariate techniques are used to build a “true score” measure of explicit FNE, perceived social acceptance and intensity in social behavior in order to model interindividual differences taking into account intraindividual variability. First, the theoretical rationale for the selection of indicators is outlined. Second, correlations among the indicators *within* each latent factor are evaluated to determine the empirical support for the selected combination of indicators. Third, correlations among the indicators *across* the latent factors are assessed to check for specificity of the assigned loadings. Fourth, a series of nested structural equation models are examined. All models are fit to the data using AMOS. To best address any potential biases due to sample attrition, full information maximum likelihood methods are used so that incomplete data are treated as missing at random (Little & Rubin, 1987). Note that at age 17–18, $N = 143$ completed the explicit social anxiety measure and $N = 133$ completed the implicit FNE measure. Formal attrition analyses in which this subsample was compared to members of the larger study who were not in this subsample (using either t -tests or χ^2 tests as appropriate) revealed that this subsample did not differ significantly from those members of the larger sample on any of the measures examined in this study. Further description of the analysis techniques and results are presented below in step-wise fashion with later analyses having been informed by earlier ones.

Our primary question concerned the fit of the hypothesized relationships in the model predicting implicit FNE and explicit social anxiety/FNE at age 17–18 from earlier perceptions of social acceptance and intensity during interactions with a close peer. Figure 1 outlines the proposed relationships. To evaluate this model, a series of nested regression models are compared (see McArdle & Hamagami, 1996), allowing for simultaneous consideration of relations between multiple predictors and dependent variables, along with direct tests of hypothesized differences across nested models that vary the constraints on the paths predicting social anxiety and FNE. Comparing the change in fit for nested models allows alternative hypotheses to be evaluated systematically (Joreskog & Sorbom, 1979).

¹ The original subscale was used, except for one item that had the lowest correlation with the total scale in prior research on similar samples, which was dropped due to time constraints.

Table 1 Descriptive statistics for social anxiety, FNE and their predictors

| | <i>M</i> | <i>SD</i> |
|---|----------|-----------|
| Baseline withdrawal symptoms (Age 13–14) | | |
| Pupil evaluation inventory | 2.04 | 2.39 |
| Perceived social acceptance | | |
| Self-perception profile for adolescents (Age 13–14) | 13.00 | 2.91 |
| Self-perception profile for adolescents (Age 14–15) | 13.39 | 2.63 |
| Self-perception profile for adolescents (Age 15–16) | 13.33 | 2.48 |
| Intensity with peer in social behavior | | |
| Emotional intensity with peer (Age 13–14) | 1.50 | .84 |
| Emotional intensity with peer (Age 14–15) | 1.42 | .76 |
| Emotional intensity with peer (Age 15–16) | 1.47 | .75 |
| Social anxiety scale for adolescents (Age 17–18) | | |
| Fear of negative evaluation | 13.87 | 5.68 |
| Social avoidance and distress in new situations | 12.81 | 5.56 |
| General social avoidance and distress | 6.43 | 2.64 |
| Implicit fear of negative evaluation (IAT D score, Age 17–18) | –.59 | .37 |

Results

Descriptive statistics for social anxiety, FNE and their predictors

Means and standard deviations for each variable in the proposed model are listed in Table 1.

Explicit FNE

As expected, the means on the Social Anxiety Scale for Adolescents (SAS-A) were comparable to those observed by Chansky and Kendall (1997) for their control (non-anxious) children and by LaGreca & Lopez (1998). The developers of the SAS-A suggest a cutoff score of 50 on the total SAS-A (summing the three subscales) to identify adolescents who fall in the socially anxious range and may exhibit clinically significant distress. Ten percent of the current sample fell within this clinical range.

Implicit FNE

The absolute value for the implicit FNE measure is negative (IAT D score² $M = -.59$). This indicates that, not surprisingly, adolescents associated the self with being liked

(and others as rejected) more quickly on average than their associations of the self as rejected (and others as liked). A *t*-test on the full sample indicated that the implicit positive self-evaluation was significantly different from zero ($t_{(126)} = 18.18, p < .001, d = 1.62$). An exploratory aspect of the current study was the relationship between implicit and explicit FNE. As noted in the introduction, the relationship among implicit and explicit measures can vary tremendously, depending on self-presentation concerns and other moderating variables (Nosek, 2004). Thus, there was no specific hypothesis about the relationship in the current study, though social desirability concerns were assumed to be prominent given the adolescent sample and the interpersonally sensitive topic. Results indicated minimal relationships between implicit FNE and the explicit social anxiety/FNE subscales (IAT D score with SAD-General: $r = .12, p > .10$, with SAD-New: $r = .07, p > .10$, and with FNE subscale: $r = .06, p > .10$), suggesting the implicit and explicit measures capture different components of social rejection concerns.

Relationships among indicators

The choice to combine the indicators across time points for the perceived social acceptance and the intensity with peer in social behavior latent factors follows from our interest in capturing *patterns* in peer relations, rather than isolated events that might reflect transitory, situational demands. The goal was to model those aspects of peer relations that were stable across time points based on the belief that the development of social anxiety is frequently better explained by a pattern of recurring interactions, rather than a single traumatic event (see Mineka & Zinbarg, 1995). Next, the theoretically-derived factors were evaluated empirically. Correlations among the indicators on each latent variable were examined to evaluate whether there was common variance that would justify grouping them together. The three indicators for the latent ‘Explicit FNE’ factor were all significantly inter-related (r range = .69–.76), as were the indicators for the ‘Perceived Social Acceptance’ (r range = .54–.69) and the ‘Intensity in Social Behavior’ (r range = .18–.47) factors. Given the significant relationships in all cases and the theoretical interest in capturing those aspects of social behavior and perceptions that were pervasive across occasions, all indicators were retained on their respective factors. Moreover, examination of the relationships among the indicators *across* the latent factors indicated no significant relationships between any of the perceived social acceptance indicators and the social behavior with peer indicators (all p 's $> .10$), providing further support for two latent factors as distinct predictors of later social anxiety and FNE.

² IAT D scores reflect the difference in mean reaction time across critical blocks divided by the standard deviations across blocks, which is conceptually similar to Cohen's *d* (see Greenwald et al., 2003).

Developmental model predicting social anxiety and FNE

The basic form of the model statistically controlled for pre-existing social withdrawal symptoms to estimate the unique prediction of perceived social acceptance and social behavior on FNE and social anxiety. Five versions of this model were fit, varying constraints on the regression parameters (the one-headed arrows) to test hypotheses about the prediction of implicit and explicit FNE (models were labeled such that the number notation reflects the number of parameters constrained; see Table 2). Note that ‘Explicit FNE’ is used as shorthand to reflect explicit social anxiety symptoms and FNE because the factor reflects both constructs. The baseline model (labeled Model₂ because it constrained two parameters) reflected the hypothesized fit for the data, and the other models systematically added or deleted a parameter to determine whether the alternative models could provide a better fit. In Model₂, both the pathway from the Intensity in Social Behavior factor to the Explicit FNE factor and the pathway from the Perceived Social Acceptance factor to the Implicit FNE factor were constrained to zero, and all other regressions were estimated freely. This permitted evaluation of the goodness of fit for the overall model, and then served as a baseline model to contrast with alternative models. In Model_{1A}, only the one path from Perceived Social Acceptance to Implicit FNE was constrained to zero (all other paths were estimated freely) to evaluate whether this resulted in a significantly better fit in comparison with Model₂ (no significant difference was anticipated).³ In Model_{1B}, only the one path from Intensity in Social Behavior to Explicit FNE was constrained to zero (all other paths were estimated freely) to evaluate whether this improved the fit in comparison with Model₂ (again, no significant difference was anticipated). Next, an additional constraint was added to the baseline model to evaluate whether *removing* one of the hypothesized paths predicting Implicit or Explicit FNE would worsen the fit (resulting in three constrained parameters). In Model_{3A} and Model_{3B}, the additional constraint was expected to significantly worsen the fit in comparison with Model₂ because these paths were hypothesized to reflect key predictors of FNE. Specifically, Model_{3A} set the path from Perceived Social Acceptance to Explicit FNE to zero, and Model_{3B} set the path from Intensity in Social Behavior to Implicit FNE to zero.

Table 2 outlines the standardized parameter estimates and goodness of fit indices for each model, and the change in fit (based on the relevant $\Delta\chi^2$ on the Δdf distribution) between Model₂ and each alternative model. Each model was compared to the baseline model to determine whether the fit

³ It was necessary to constrain the variance of one indicator to .1 for this model because of an initial negative variance estimate. This additional constraint accounts for the equivalent *df* between Model_{1A} and Model₂.

was inferior or superior. The estimates in bold indicate significant parameter estimates. Assessment of model fit was based on the root-mean-square error of approximation index (RMSEA; Browne & Cudeck, 1993, which accounts for both absolute fit and model complexity, so that simply adding parameters to the model does not improve fit (Steiger, 2000). RMSEA less than .05 can be considered a “close” fit (MacCallum, Browne, & Sugawara, 1996). In addition, the comparative fit index (CFI) and normed fit index (NFI) were noted in Table 2, given the importance of looking for convergent evidence across fit indices. Both the CFI and NFI vary from 0 to 1, with values above .90 indicating an acceptable fit (Hu & Bentler, 1999).

The baseline model provides strong support for the hypothesized relationships predicting FNE. The indicators explain significant common variance on their respective latent factors, and Perceived Social Acceptance is a significant predictor of Explicit FNE (but not Implicit FNE) and Intensity in Social Behavior is a significant predictor of Implicit FNE (but not Explicit FNE). Further, these relationships held even after accounting for the variance explained by Baseline Withdrawal Symptoms. Interestingly, these baseline symptoms accounted for significant variance in subsequent Perceived Social Acceptance (and Explicit FNE⁴), but not in Intensity in Social Behavior or Implicit FNE. This is not altogether surprising given the shared method variance (all questionnaire-based) for the baseline withdrawal and perceived social acceptance variables, compared to the absence of shared method variance for the implicit and behavioral measures. Finally, inspection of the goodness of fit for Model₂ suggests a strong fit across all indices: RMSEA < .05, CFI and NFI > .90.

The alternative models, Model_{1A} and Model_{1B}, constrained the pathways predicting FNE one at a time to insure that adding these constraints would not result in a significantly diminished fit. As evident from Table 2, when compared with the fit of the baseline model, these models’ fit was not significantly worse, and all hypothesized paths predicting FNE remained significant with few changes to the parameter estimates. Further, as expected, the addition of further constraints to the model (i.e., removing the paths predicting FNE from Perceived Social Acceptance and Intensity in Social Behavior in Model_{3A} and Model_{3B}) did result in a significantly inferior fit, suggesting that these peer interaction factors are meaningful predictors of subsequent FNE and social anxiety. In other words, this 1 *df* change resulted in a significant decrement in fit relative to the previous model.

⁴ The surprising negative relationship noted between Baseline Withdrawal Symptoms and Explicit FNE appears to reflect a suppression effect. When Perceived Social Acceptance is not included in the model, the relationship between Baseline Withdrawal Symptoms and Explicit FNE is no longer significant.

Table 2 Structural regression models with nested hypothesized equality constraints

| | Models | | | |
|--|--|----------------------|---------------------|----------------------|
| | M _{1A} 1 | M _{1B} 1 | M ₂ 2 | M _{3A} 3 |
| # Pathways constrained: | | | | M _{3B} 3 |
| | Standardized regression estimates (bold typeface = $p < .05$) | | | |
| Baseline | -.27 | -.27 | -.27 | -.27 |
| Withdrawal | -.08 | -.09 | -.09 | -.08 |
| | -.28 | -.29 | -.29 | -.29 |
| Perceived social Acceptance | -.04 | -.04 | -.05 | -.07 |
| | .67 | .67 | .66 | .66 |
| | .88 | .88 | .88 | .88 |
| | .79 | .79 | .79 | .67 |
| | -.59 | -.60 | -.60 | -.60 |
| Social behavior | Set to zero | .03 | Set to zero | Set to zero |
| | .30 | .27 | .27 | .28 |
| | .91 | .99 | .99 | .97 |
| | .51 | .47 | .47 | .48 |
| | .12 | Set to zero | Set to zero | Set to zero |
| | .26 | .24 | .24 | .25 |
| | .85 | .84 | .84 | .84 |
| | .83 | .83 | .83 | .83 |
| | .90 | .91 | .91 | .91 |
| | -.07 | -.09 | -.09 | -.09 |
| | .01 | .01 | .01 | .08 |
| Goodness of Fit Indices: | | | | |
| ϵ_a (RMSEA) | .021 | .029 | .026 | .039 |
| Normed Fit Index (NFI) | .93 | .93 | .93 | .91 |
| Comparative Fit Index (CFI) | .99 | .99 | .99 | .98 |
| Model Comparison: | | | | |
| Chi-square | 41.08 | 42.67 | 42.73 | 49.74 |
| Degrees of freedom (<i>df</i>) | 38 | 37 | 38 | 39 |
| Change in chi-square | 1.65 | .06 | Baseline | 7.01 |
| Significance of change in chi-square (relative to baseline Model 2): | No | No | Yes | Yes |

Note. Boldface type denotes significant parameter estimates. RMSEA = root-mean-square error of approximation. The baseline (hypothesized) model is highlighted in grey. 'Explicit FNE' is used as shorthand to reflect Explicit Social Anxiety symptoms and FNE, as it reflects both constructs.

Taken together, these results suggest that Model₂, the model predicting dissociation for predictors of Implicit versus Explicit FNE, is the most parsimonious model and provides a good fit for the data. That is, the loss of model fit is trivial when we remove constraints - specifying only one pathway predicting Implicit FNE and one pathway predicting Explicit FNE, but the loss of fit is meaningful if further pathways predicting FNE are constrained. Figure 1 notes all estimated paths and covariances, with the standardized regression estimates from Model₂ included. Paths that are non-significant are noted with dashed lines, and significant paths are noted with solid lines.

Gender differences in the prediction of social anxiety and FNE

Mean levels on the manifest variables in the model were not significantly different for males and females (all p 's > .10), with the exception of scores on the intensity codes that load on the Intensity in Social Behavior factor, where females were coded as having more intense interactions with their close peer (relative to males) at each time point: Age 13–14 ($t_{(176)} = 2.82, p = .005, d = .43$), Age 14–15 ($t_{(161)} = 5.31, p < .001, d = .84$), Age 15–16 ($t_{(131)} = 4.27, p < .001, d = .75$). To examine the effects of gender, a multi-group analysis paralleling the analysis above was conducted to allow us to examine whether any of the pathways in Model₂ differed significantly across gender. Constraining all measurement and structural weights equal across gender groups did not result in a significant loss of fit, relative to the unconstrained model, suggesting that the parameters reported above do not differ substantially for males versus females.

Discussion

The current study found that several qualities of peer interactions among adolescents from ages 13–16 were prospective, longitudinal predictors of social anxiety symptoms and fears of negative evaluation (FNE) at ages 17–18, even after accounting for pre-existing social withdrawal symptoms. Specifically, structural equation modeling analyses suggest that lack of perceived social acceptance predicts subsequent explicit social anxiety and FNE, and intensity and dependence in peer interactions predicts subsequent implicit FNE. These results shed light on the psychosocial factors that are linked to the development of social anxiety problems and provide support to social information processing theories of developmental psychopathology. In addition, these findings point to the importance of measuring both implicit and explicit markers of anxiety-relevant symptoms, and suggest divergent predictors of automatic and self-reported fears of negative evaluation.

The finding of prospective prediction of FNE by peer relationship variables provides important support to the purported influence of social information processing mechanisms on adolescent social adjustment. For instance, information processing theories of social anxiety propose that misinterpreting ambiguous social situations in negative and threatening ways will promote anxiety and avoidance (Clark & Wells, 1995; Rapee & Heimberg, 1997). The finding that lower perceived social acceptance predicts social anxiety and FNE is in line with this perspective. Note, however, that while the longitudinal nature of the study permits developmental inferences, no claims about causality can be drawn from these data. Instead, this study suggests that social information processing in adolescent friendships may encompass critical markers of vulnerability for later social anxiety.

Peer interaction predictors of social anxiety and FNE

Although not directly evaluated in this study, it is nonetheless interesting to speculate about the mechanisms that might link peer interaction to social anxiety and FNE. With respect to lack of perceived social acceptance, it is easy to conjecture that beliefs about inadequate social skills would lead to avoidance and withdrawal, thereby reducing social networks and providing fewer opportunities to develop or improve social skills, or to obtain evidence disconfirming biased perceptions of rejection. It should be noted, though, that these perceptions of rejection are not necessarily biased. It is possible that those adolescents reporting low perceived acceptance are processing information accurately in that they properly perceive their lack of efficacy in social situations, which in turn leads to social anxiety. Given the evidence for diminished social skills among persons with social anxiety (Beidel et al., 1999), and the evidence for exaggerations of these deficits by individuals with social anxiety (Stopa & Clark, 1993), it seems likely that both processes are active (i.e., judgments are correct in that these individuals are less liked than others, and they overestimate the extent of their rejection).

With regard to intensity in social behavior with close peers, it seems plausible that these behaviors become draining over time and may lead to actual peer rejection, which in turn feeds into the cycle of social withdrawal. Francis and Ollendick (1987) noted that while popular children enter social groups by adopting the group's frame of reference, unpopular children tend to draw attention to themselves when entering groups. Chansky and Kendall (1997) link this finding to the well-established relationship between heightened self-focused attention and social anxiety (e.g., Woody, 1996). They suggest that perhaps the discomfort experienced by certain children during social interactions may lead to more attention-demanding, ineffective behavior. Although only conjecture, it seems plausible that the

emotional neediness and calls for emotional support by the adolescents in the current sample may fit this pattern. One problem with relationships in which there are intense calls for emotional support, is that these calls are being made to other *early adolescents*, who may not be prepared to handle them. To the extent that intense calls for support create discomfort and, in the long-term, negative reactions from close peers, these reactions would likely contribute to an accumulating implicit sense of the self as somewhat rejected. We do not assume that teens are consciously calling for emotional support or demanding attention, nor would they necessarily be consciously tracking the nature of their friends' reactions to them. In seeking to understand the link between intense social interactions with a close friend and FNE, *implicit* attitudes can be understood as capturing trace accumulations of actual experiences that may not be consciously assimilated.

Intense social interactions with a close friend might also be linked to future FNE via a different mechanism. The intensity factor incorporated both high emotional demands and high levels of social information exchange about others. This latter criterion was explicitly assessed as part of the intensity of social interaction because one of the primary functions of close social relationships in adolescence is social referencing. Discussions about peers are intrinsically social comparison processes (Wert & Salovey, 2004). Adolescents who engage intensively with friends in such processes undoubtedly will accumulate many examples of behaviors against which they have difficulty measuring up. In short, the social comparison process in adolescence—especially under stressful circumstances—is likely to lead to implicit negative self-evaluations for those involved (Baumeister et al., 2004; Stiles & Kaplan, 2004). Given that participants were instructed to discuss a problem in the current study, the context for the social interaction in some ways invited a negative self-evaluation.

It is not clear what factors predispose certain adolescents to repeatedly seek emotionally intense interactions with their peers. The social withdrawal symptoms at age 13 did not predict intensity in social behavior at ages 13–15, leaving open the question of other predictors. Perhaps a more direct measure of behaviorally inhibited temperament or tendency toward self-focused attention would identify vulnerable individuals. Alternatively, some other aspect of interactions with peers, such as experiences of rejection, might be more predictive (though it is difficult to avoid questions of 'chicken or the egg' here). Insight into social behavior might also play a role. It would be interesting to determine how aware individuals are that they appear emotionally distressed and needy to others. Our guess is that these behaviors are apparent to the actor at the extremes, but perhaps not in their more subtle forms, in line with numerous other behaviors and attitudes that occur without either our awareness or our endorsement

(Greenwald & Banaji, 1995; Nisbett & Wilson, 1977; Wilson et al., 2000).

Although the current study has highlighted the role of peer interaction as a vulnerability marker for later anxiety symptoms, we expect the relationship is likely bidirectional. The early studies by Schachter (1959), who found that participants preferred to stay with others rather than alone when awaiting electric shocks, highlight the desire for affiliation under conditions of threat and anxiety. Thus, it is plausible that the relationship between feelings of anxiety about social standing and intense emotional behavior are connected in a maladaptive, self-perpetuating cycle. The same cycle may also occur for perceptions of social acceptance (and may be more likely given that early social withdrawal symptoms negatively predicted perceived acceptance, but not intense social behavior).

Cause and effect is also interesting to consider regarding the lack of a significant relationship between perceived social acceptance and observed social behavior in the present study. This was surprising, given that Crick and Dodge (1994), among others, would predict a reciprocal interaction between social behavior and social information processing. One possibility is that intensity is simply not an aspect of social behavior that shares a linear relationship with appraisals of social acceptance. Certainly, it seems likely that the self-reported perceptions are more readily monitored and controlled than the distress and emotional neediness evident in close peer interactions. Thus, self-presentation concerns may diminish the observed correlation. Another possibility follows from the different targets assessed by the measures; specifically, the perceived social acceptance measure focused on relationships with peers in general, whereas the intensity in behavior measure focused on interactions with a particular close peer. Alternatively, these social behaviors may operate similarly to social skills in that their relationship to social anxiety is variable. For example, it may be that intense social interactions are linked to high levels of anxiety for some individuals, but to comfort in affiliative relationships for others, thus negating any overall relationship between intensity and self-reported social acceptance. As noted earlier, we expect that intense social interactions might lead to positive outcomes in some cases, and negative outcomes in others. Presumably, variable effects on explicit perceptions of social acceptance are also possible.

Divergent predictors of implicit and explicit FNE

To our knowledge, this study is the first to prospectively evaluate implicit fears of negative self-evaluation in adolescents, and adds further support to the role of implicit processes in social anxiety (see de Jong, 2002; de Jong et al., 2001). The finding that implicit and explicit FNE were related to different aspects of early peer interaction points to the importance

of examining social anxiety-relevant concerns that are difficult to strategically control, in addition to more traditional self-report measures. Responding that is automatic, in the sense of being uncontrollable, appears to be central to the maintenance of anxiety (McNally, 1995). After all, the anxious adolescent does not choose to blush or have their heart race when talking to a group of classmates, nor does he or she choose to have rapid evaluations of the situation as rejecting or critical. In treatment, one can learn how to re-evaluate the negative thought, ‘they think I am stupid’ and can learn to remain in the situation rather than escaping or avoiding, but that does not mean one can control the occurrence of the thought or the urge to flee in the first place.

The current study highlights the utility of evaluating implicit FNE as an outcome measure for adolescents. It would also be interesting to learn whether this automatic belief system makes an individual vulnerable to becoming anxious or to relapse. To the extent that implicit associations share qualities with fear schemata (and both do seem to fit the definition of interconnected associations in memory offered by Segal, 1988), then implicit FNE should theoretically predict other biased social information processing, along with anxiety and avoidance (Beck and Emery with Greenberg, 1985). It will also be interesting to learn what components of social interaction are better explained by implicit measures and which are better reflected by explicit ones. The current study found that perceptions of social behavior aligned with self-report, while behavioral indicators predicted implicit FNE. Interestingly, a recent meta-analysis by Poehlman, Uhlmann, Greenwald, and Banaji (2005) found that the Implicit Association Test significantly predicted relevant criterion measures, such as judgments, choices, physiological responses, and behaviors, with an average $r = .27$. The current study found comparable implicit association/behavior relationships (though the direction was measured in reverse). To the extent that reactivity of measurement and ability to control behaviors predict the divergence, then one would expect physiological, automatic behavioral measures, and perhaps other cognitive processing that occurs outside awareness or control to converge with implicit measures, whereas interview, self-report measures and behavior that is easier to regulate should converge with explicit measures.

It is also noteworthy that minimal relationships were observed between implicit and explicit FNE in the present study. The degree of correspondence among implicit and explicit measures may be context-dependent (Nosek, 2005), so it is not yet clear when to predict that the constructs will be independent and when they will be related. Perhaps the relationship will shift under conditions of more or less social desirability, or depending on the centrality of the evaluation to the self (see Correll, Spencer, & Zanna, 2004; Zuwerink & Devine, 1996).

Limitations

The conclusions about implicit and explicit FNE need to be interpreted in light of the study’s limitations. This is a study of the development of social anxiety symptoms and FNE, not a study of social phobia. The sample seems to be fairly representative of the range of adolescent social anxiety symptoms, with approximately 10% reporting clinically significant levels, but no diagnostic interview for social phobia was included. In addition, no data on familial psychopathology was obtained, which would have been a useful covariate to further isolate the unique contribution of the peer interaction variables. Other markers of baseline social withdrawal and shyness symptoms, such as observational measures in addition to peer-report, as well as baseline measures of implicit and explicit FNE would also have been helpful to get a better understanding of early social functioning. Further, it would have been interesting to rate the adolescents’ social skills and self-focused attention during the peer interaction (because of their centrality to social anxiety phenomenology) to see how they related to the other aspects of social behavior. Finally, structural equation modeling is a correlational analysis, so no claims about causal relations are possible.

Clinical implications and conclusion

Although the current study was designed to address theoretical questions about the development of social anxiety symptoms and FNE, the results may also have intriguing clinical implications. Perhaps most notably, the finding of peer interaction vulnerability markers may aid in identification of children at risk for developing more serious social anxiety problems. This would encourage secondary prevention efforts designed to interrupt the maladaptive cycle of social withdrawal, ineffective social behavior and biased social information processing. Work on secondary prevention of anxiety problems is still in its infancy, but early results are promising (e.g., Rapee, 2002). These efforts have focused primarily on parent education and trying to modify inhibited temperaments; the current results imply that focusing on peer interactions may also be helpful (though note the Rapee study focused on a different age group). Social anxiety is a ubiquitous and debilitating mental health problem. Identifying those factors that exacerbate genetic and temperamental vulnerabilities to predict who will go on to develop more serious anxiety problems remains a significant challenge. The current results suggest that both social behavior with peers and perceptions of social acceptance are important predictors of social anxiety symptoms and fears of negative evaluation among adolescents, even when they occur outside conscious control. Friendships may be the bedrock of support for many, but for individuals with social anxiety, interacting with peers

can feel more like wandering through a landmine of potential criticism and rejection.

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