

1-1-2016

The Individual Day-to-Day Process of Social Anxiety in Vulnerable College Students

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Abstract

Transitions requiring the creation of new social networks may be challenging for individuals vulnerable to social anxiety, which may hinder successful adjustment. Using person-specific methodology, this study examined social anxiety in vulnerable university freshman away from home during their first semester of college to understand how day-to-day processes of social anxiety influenced future social anxiety and social withdrawal. Participants completed daily measures of four components of social anxiety which were examined as a process during a single day, and as a process affecting social anxiety and social withdrawal the next day. For most individuals, same day fear of negative evaluation was associated with maladaptive cognitive processes (anticipatory processing and post-event rumination) and influenced social withdrawal behaviors. Across time relations were less robust and varied between participants suggesting the importance of situational factors and individual differences. These findings may have implications for the effectiveness of various intervention strategies.

Keywords: social anxiety; person-specific methods; P-technique

The transition to college is a significant and sometimes stressful event, particularly when students leave their family and friends behind and move into new contexts. For in-coming college freshmen with pre-existing vulnerabilities to social anxiety, transitioning to new social networks may be especially difficult. Research suggests that students high in social anxiety experience greater loneliness and distress, have difficulty interacting with others, are more likely to engage in avoidant strategies that interfere with learning (Russell & Topham, 2012), and are more likely to drop out of school (Van Ameringen, Mancini, & Farvolden, 2003; also see Wittchen, Stein, & Kessler, 1999).

Participating in social events appears critical to building new social support networks, providing access to the emotional support and instrumental assistance that fosters a positive transition to college life (Buote et al., 2007), and college students who actively pursue social interactions tend to reap long-term benefits in areas of well-being and academic success (Gall, Evans, & Bellerose, 2000). When Strahan (2003) followed 55 undergraduates high in social anxiety over a period of two years, she found that they struggled with social interchanges, found interpersonal communication challenging and stressful, and often worried about how their peers evaluated them. Extensive research comparing socially-anxious with non-anxious individuals suggests that the thoughts and feelings that surround interpersonal interactions play a critical role in sustaining and amplifying feelings of social anxiety (Heimberg, Brozovich, & Rapee, 2010). In addition to experiencing elevated levels of fear of negative evaluation and social withdrawal that characterize social anxiety, youth high in social anxiety also frequently report anticipatory fears prior to social events and negative rumination following social events (Musa & Lépine, 2000). For some vulnerable youth, the transition to college may initiate a negative cascade of thoughts, behaviors, and feelings, such that the anticipatory fears and negative rumination associated with social events increases social withdrawal and fear of negative evaluation over time, thereby escalating social anxiety and undermining college adjustment.

Social Anxiety at College Entry

Social anxiety disorder is the most common anxiety disorder in late adolescence and adulthood, with rates for adolescents between 5-15% (Ollendick & Hirshfeld-Becker, 2002). In one research sample, as many as 19% of undergraduates experienced high levels of social anxiety (Beidel, Turner, Stanley, & Dancu, 1989), while other studies have found that as many as 22-33% of undergraduates report social anxiety symptoms (Strahan, 2003; Strahan & Conger, 1998). The transition into college appears to be an important developmental timeframe during which social-evaluative concerns are likely to escalate, and individuals with vulnerability to social anxiety may establish patterns of social interaction that sustain into adulthood. Cognitive-behavioral models of social anxiety, including Clark & Wells' (1995) cognitive model of social phobia and Rapee & Heimberg's (1997) cognitive behavioral model for social anxiety disorder, identify a set of affective, cognitive, and behavioral reactions to social interaction opportunities that characterize individuals high in social anxiety. Central features in these models include the core components of social anxiety (e.g., a fear of negative evaluation and a high rate of social withdrawal) and the cognitions that surround social interactions, including negative anticipatory processing before the feared event and negative rumination after the social event (see Heimberg et al., 2010, and Musa & Lépine, 2000, for reviews).

Fear of negative evaluation is often considered the central affective marker of social anxiety and involves a high level of apprehension and distress about social interactions, combined with a pervasive concern and expectation that others are responding with negative views (Jakymin & Harris, 2012; Mellings & Alden 2000; Vroling & de Jong, 2009; Weeks et al., 2005). Rapee and Heimberg (1997) proposed that anxious individuals form a negative mental representation of how they appear to others in social situations and from that infer that others are evaluating them with disdain and dislike. Correspondingly, *social withdrawal* behaviors aimed at reducing the risk of social interaction represent a central behavioral marker of social anxiety (Rapee & Heimberg, 1997; Wells et al., 1995). Individuals high in social anxiety may avoid social interactions altogether or may disengage themselves during social interactions, by focusing on themselves and their own feelings rather than interacting with others (McEwan & Devins, 1983; Weeks, Rodebaugh, Heimberg, Norton, & Jakatdar, 2009). In the latter case, the heightened focus on one's internal states and worries leaves the individual with diminished capacity to attend to social cues, diminishing their social awareness and increasing their reliance on their own distorted perceptions when inferring others' perceptions (Bruch, Gorsky, Collins, & Berger, 1989; McEwan & Devins, 1983).

Conceptually, fear of negative evaluation and the tendency toward social withdrawal are amplified over time by a set of correlated cognitions. First, prior to a social interaction event, anxious individuals often engage in *anticipatory processing* in which they recall negative aspects of past social encounters and generate negative expectations about the coming event (Clark & Wells, 1995, Rapee & Heimberg, 1997). This negative anticipatory bias is associated with less positive autobiographical memories (Mansell & Clark, 1999; Vassilopoulos, 2008), and often involves stagnant deliberation—a maladaptive strategy in which individuals dwell on the problem and experience unproductive thoughts about it, as opposed to engaging in adaptive strategies such as problem analysis and plan rehearsal. For example, when Hinrichsen and Clark (2003) interviewed individuals high in social anxiety about their social interactions, they recalled more perceived failures than successes, engaged in more speculation about what might happen, thought more about how they would look to others, and thought more about ways to escape or avoid the situation than did non-anxious individuals. A follow-up experimental manipulation revealed that engaging in such anticipatory processing led to higher sustained levels of anxiety for both high and low socially-anxious groups than for those in the distraction condition, indicating that it is likely the anticipatory processing employed by individuals high in social anxiety that, in part, leads to greater anxiety in the feared situation.

Research has also pointed to *post-event rumination* as an important variable in the maintenance of social anxiety (Abbott & Rapee, 2004; Clark & Wells 1995; Dannahy & Stopa, 2007; Mellings & Alden, 2000). During post-event rumination, individuals high in social anxiety revisit their social experience, focusing on memories of the anxiety they experienced and their perceived negative self-performance, in part because these aspects of the experience received greater encoding and stronger storage in memory due to their high attentional salience in vulnerable individuals (Kocovski, Endler, Rector, & Flett, 2005). For example, Dannahy and Stopa (2007) found that post-event rumination was linked to the extent of anxiety and negative self-appraisal experienced, and Mellings and Alden (2000) found that it predicted open-ended recall of negative self-related information and negative bias in self-judgments, as assessed the day following a laboratory social interaction. In a study utilizing a diary method, Lundh and Sperling (2002) found

associations over time, such that post-event processing on the same day as the social event was highly correlated with greater next-day post-event rumination, suggesting that post-event rumination may be a maladaptive patterned response contributing to the development and maintenance of social anxiety over time.

Researchers have suggested that the cognitions and behaviors associated with social anxiety may transact over time in a negative cascade that amplifies student distress and maladjustment. For example, engaging in social withdrawal often reduces immediate fear of negative evaluation by distancing the individual from the threatening social situation. However, the value of social withdrawal as a coping mechanism is short-lived, as over time the social isolation increases the individual's discomfort in and fear of social situations (Beidel & Turner, 2007). Indeed, prolonged exposure to social interaction (until habituation reduces anxiety) has been found to be the central component of effective treatment for social phobia (Beidel & Turner, 2007). Social withdrawal within the context of social interactions, such as avoiding eye contact, maintaining a stance at the periphery of a group, and speaking softly are also often used as a means of coping with anxious feelings (Rapee & Heimberg, 1997), but they also are ineffective over time and can evoke the feared response from others --for example, avoiding eye contact may lead other participants to end the social interaction prematurely (Clark & Wells, 1995).

Negative cascade models of social anxiety assume that the experiences of individuals mimic those identified at the group level. However, the emerging area of person-specific methodology (p-technique) is illuminating variations in individual functioning that often exist within, and may be hidden by, group tendencies.

Person-Specific Methodology

Employing statistical analyses of individuals in a longitudinal time series design allows for modeling of intra-individual variation – variance in individual responding, which is essentially ignored in aggregate studies (Molenaar, Sinclair, Rovine, Ram, & Corneal, 2009). Such person-specific modeling can lead to greater precision in identifying and clarifying the critical components of a developmental process as it occurs within the person. The person-specific research methodology utilized in this study focused on a few individuals (rather than a large sample), allowing for examination of the *process* of social anxiety as it occurs over time in individual university freshmen. Such studies are the initial steps in identifying precise processes and mechanisms within persons that are critical for informing individual treatment and intervention efforts (Hamaker, Dolan, & Molenaar, 2005; Nesselroade & Ram, 2004).

Person-specific methodology is a necessary step in verifying that findings obtained at the group level apply at the individual level. Often, constructs that appear cohesive when examined with group data fail to replicate within individuals (Molenaar, 2008; Molenaar & Campbell, 2009). While it may seem reasonable to expect that constructs that hold for groups also hold for individuals within those groups, this is only true in situations in which populations are homogenous in all essential elements and the constructs of interest are stationary (Molenaar & Campbell, 2009). At the point of college entry, when young emerging adults transition into new social contexts, one would not expect stability in their social anxiety, but rather dynamic developmental adaptation as they cope with novel social challenges. During such a period of heightened novelty and challenge associated with college entry, one might expect variation among individuals in their social perceptions, affect, and behaviors, and hence in the way their social anxiety is construed and experienced.

The Present Study

While some research has examined how social anxiety impacts university life, there are two important gaps in the literature. First, no known research has specially addressed the university transition for first-year socially-anxious students. Yet the prevalence of social anxiety in university students is quite high and is linked with problematic adjustment (Russell & Shaw, 2009; Strahan, 2003; Strahan & Conger, 1998; Tillfors & Furmark, 2007) creating a need to better understand the challenges for socially-anxious first-year students in order to inform preventative intervention design. Second, although factors involved in social anxiety have been examined in many studies conducted with group samples, little attention has focused on how these same factors occur and interact together within an individual during a social interaction event and over time. This study addressed both of these gaps by following a group of 10 freshmen vulnerable to social anxiety over the course of their first semester in college, using a daily diary approach to document their experiences with social interaction. In addition, the study applied new and innovative person-specific statistics (p-techniques; Molenaar, Sinclair, Rovine, Ram, & Corneal, 2009) to model intra-individual variation, in order to examine the dynamics of social anxiety over time within individual participants.

The present study tested the applicability of a four-factor model to represent the social experiences of vulnerable students over the course of their first semester in college. Four components of social experience were measured using a daily diary method: 1) daily level of fear of negative evaluation, 2) anticipatory processing of threat in the context of an anxiety-provoking social event, 3) post-event rumination following the event, and 4) the use of social withdrawal behaviors to manage anxiety during the event. In testing the model, daily levels of fear of negative evaluation and the use of social withdrawal behaviors were conceived of as markers of development towards or away from disordered social anxiety. Levels of anticipatory processing and post-event rumination surrounding daily events were considered critical catalysts, either amplifying or muting concurrent and future social anxiety (fear of negative evaluations and social withdrawal). Accordingly, we examined the relations among these four factors as they were experienced in response to a single anxiety-provoking event (within time), and explored how these factors evolved and cascaded over time during the transition to university life (across time).

Depiction of the hypothesized model is presented in Figure 1. Within time hypotheses are depicted on the left side of the figure with numbered pathways. In line with theoretical models and previous research, it was hypothesized that fear of negative evaluation on a given day would be linked with the negative anticipatory processing of a social event (Path 1), as well as post-event rumination that same day (Path 2). It was also hypothesized that fear of negative evaluation would be associated with social withdrawal behaviors during the social event, either directly or mediated through anticipatory processing (see Paths 3 and 4). It was further hypothesized that the cognitive factors, anticipatory processing and post-event rumination, would be correlated (Path 5).

Across time hypotheses, reflecting spillover or cascading effects over time, are depicted on the right side of the figure. Focusing first on fear of negative evaluation, continuity in baseline levels of fear of negative evaluation was anticipated, such that fear of negative evaluation at one time (T) would predict fear of negative evaluation at a subsequent time point (T + 1). A negative cascade model was also anticipated, such that negative anticipatory processing (Path B) or post-event rumination (Path C) of a social event at one time (T) would also predict fear of negative evaluation at a subsequent time point (T + 1). The relation between social withdrawal (T) and fear of negative evaluation at the next time point (T + 1) was also examined, (Path D). While social withdrawal behaviors during a social event might reduce social anxiety in the present, they are expected to increase anxiety over time. Focusing next on the prediction of social withdrawal over time, it was expected that fear of negative evaluation (Path E), negative anticipatory processing of a social event (Path G), and post-event rumination (Path F) in response to a social event on one day (T) would each predict an increase in social withdrawal behaviors the following day (T + 1). Continuity in the utilization of social withdrawal behaviors was also expected (Path H).

Method

Participants

Participant recruitment began with a screening of students from a large introductory human development class at a mid-Atlantic university. Criteria for participation included: 1) enrollment as a first-semester university freshman with no previous college experience, 2) moving to the university from an outside community, and 3) residing in the university dormitories. The screening instrument used to identify students vulnerable to social anxiety was the Social Avoidance and Distress (SAD) scale, a 28 item true/false measure which has been found to have good reliability, a strong correlation with fear of negative evaluation ($r = 0.75$) and has been utilized to distinguish individuals high in social anxiety (Watson & Friend, 1969). Following previous studies which used cutoff scores of 12 or 13 (Mellings & Allen, 2000; Watson & Friend, 1969), criteria for participation in this study included scoring 12 or higher on the SAD scale.

Of approximately 200 qualified freshman students who completed the SAD scale screening, 21 scored above the cutoff and were invited to participate in the study; 12 agreed to participate. Nonetheless, one participant withdrew after two weeks and another failed to provide sufficient data for modeling. Thus, the study involved data from 10 young adult participants (9 females, and 1 male) starting their first semester of college away from home. No information regarding race or ethnicity was obtained. A t-test for dependent means of the pre- and post-assessment SAD scores indicated similar levels of social anxiety across the semester ($M = 16.43$, $SD = 3.60$ vs. $M = 16.43$, $SD = 4.24$; $t(6) = 0.00$, $p > 0.05$).

Measures and Assessment Procedures

Daily assessments were requested throughout 13 weeks of the participants' first semester. During each daily assessment, participants were asked to briefly describe the setting of their most salient anxiety-provoking social interaction that day and respond to questions tapping the core constructs investigated in this study (described below). Participants were instructed to complete at least 5 daily assessments each week on their own time and at their convenience and were also given a goal of completing the assessment on at least 60 occasions. Daily experience sampling was used in this way to offer some flexibility in compliance demands in an attempt to minimize participant satisficing and attrition (Conner & Lehman, 2012).

Prior to completing the online daily assessments, participants met with a research assistant to receive training. To help maintain participant motivation, the research assistant sent periodic emails encouraging participants to complete the assessments and participants were compensated with payments of \$25 for each 15 occasions of data provided, with a total possible compensation of \$100. The number of assessments completed by each participant ranged from 26 to 69.

Measures of Social Anxiety. Given the burden of the daily assessment method, brief measurement scales were needed. To create these brief measurement scales, condensed versions of established scales were created.¹ Additionally, all of the response scales were modified to allow for the reporting of greater potential variability in individuals' responses (Dixon, Bobo, & Stevick, 1984). Participants responded to each item by selecting one point out of ten possible unspecified response points between the poles "not at all" and "very much", resulting in scores ranged from one to ten. Average scores for each scale were computed, with higher scores indicating higher levels of each construct.

Daily assessments began with the 8 positively-worded items from the Brief Fear of Negative Evaluation scale (BFNE; Leary, 1983) which, in prior research, demonstrated adequate internal consistency ($\alpha = 0.90-0.96$), discriminated socially disordered patients from non-anxious controls, and correlated as expected with both self-report and clinical measures of social anxiety (Weeks et al., 2005). Furthermore, in research examining the properties of the positively and negatively worded items, Duke, Kirshnan, Faith, & Storch (2006) found that the positively-worded items and negatively-worded items each fit separate factors. The positively-worded items were also higher in internal consistency ($\alpha = .94$), compared to the negatively-worded items ($\alpha = .73$). Thus we retained only the positively worded items for the abbreviated scale.

Next, participants were asked to think about the opportunities that they had experienced that day to interact with unfamiliar others and to select the most salient anxiety-provoking social interaction they had encountered. This study focused on interactions with unfamiliar others as opportunities to build new relationships and expand social networks are important tasks for new university freshman living away from home. Specification of the "most salient anxiety-provoking social interaction" was used to ensure that participants selected events that triggered the process of social anxiety. To further inform event selection, participants were given a list of types of potential experiences (e.g. informal opportunity to initiate a conversation with an unfamiliar person, an organized social event, other) and were asked to indicate the type of interaction and to describe the opportunity/event in which they participated.

After selecting a relevant social interaction, participants were asked to report on their negative anticipatory processing of that event using 6 items taken from the 12-item Anticipatory Social Behaviors Questionnaire (ASBQ; Hinrichsen & Clark, 2003). Items were chosen for face validity and straightforwardness and included "I thought over in detail what might happen", and "I thought about ways I could escape from the situation if it got too embarrassing." The ASBQ has high internal consistency ($\alpha = .88$) and prior analyses indicated higher scores and greater endorsement of nearly all items for individuals high vs. low in social anxiety (Hinrichsen & Clark, 2003). Internal reliability and measurement validity for the 6 items used in this study are reported below.

Participants were also asked to describe negative post-event rumination, using 5 items selected from the Post-Event Processing Questionnaire (PEPQ; Rachman, Gruter-Andrew, & Shafran, 2000). Items included "Thoughts about the event interfered with my concentration" and "My feeling about the event got worse and worse". In prior research, the

¹ Specific items used in the abbreviated scales can be obtained from the first author.

PEPQ has shown good internal reliability ($\alpha = .87-.85$) and higher scores in socially-anxious clinical samples as compared to non-clinical samples (Rachman, Gruter-Andrew, & Shafran, 2000). Internal consistency and validity for the 5 selected items are reported below.

Finally, for each daily social interaction, participants were also asked to report on the degree and quality of their participation in the social interaction. Social withdrawal during the event was assessed with the following items described in the literature (e.g. Rapee & Heimberg, 1997; Wells et al., 1995): “Rate the degree to which you engaged in each of these behaviors: 1) avoided eye contact, 2) avoided standing out or drawing attention to yourself, 3) kept your distance or hid from others, 4) kept conversations short to avoid difficulties, 5) spoke softly, hesitantly, or mumbled, and 6) other avoidant or protective behaviors”, which participants were given an opportunity to describe.

Results

This study involved analyses of samples obtained at two levels: 1) samples of social interaction occasions obtained from the population of individual experiences to examine within-person processes (within-person sample sizes ranged from 23-69), and 2) participants' (n=10) samples of experiences aggregated across participants (n=532) in order to compare within-person findings with across-person findings. In the group data, occasions are nested within individuals and as such are not equivalent to a sample of independent occasions, yet the comparison does theoretically provide information concerning the connection between within-person processes and the process of social anxiety modeled using standard nomothetic methods (see Hamaker, 2012).

Measurement Reliability and Validity

The first step in the analyses was to verify the factorial validity of the variables as they were measured in this study. To do so, all daily measures for all participants on a given variable (i.e. the group data for each variable) were submitted to a confirmatory factor analysis using LISREL, in which the items for each variable were loaded onto one latent factor representing the variable of interest. Model fit indices (the comparative fit index [CFI], the standardized root mean squared residual [SRMR], and the goodness of fit index [GFI]) were examined. The CFI is a robust fit index especially appropriate for small samples (Tabachnick & Fidell, 2007) with values above 0.95 indicating good fitting models (Bentler, 1990). Hu & Bentler (1999) recommend reporting CFI in combination with SRMR, with SRMR values over 0.08 considered to indicate poor-fitting models. The GFI calculates the proportion of variance accounted for and can be interpreted as analogous to R^2 in multiple regression (Tabachnick & Fidell, 2007).

Model fit indices for one-factor measurement models for each variable using the group data verified a good fit to a one-factor solution; see Table 1 (Group). Reliability coefficients for each variable were also computed from the group data using Cronbach's alpha, which indicated strong internal consistency for fear of negative evaluation, $\alpha=0.97$; anticipatory anxiety, $\alpha=0.99$, post-event rumination, $\alpha=0.99$, and social withdrawal, $\alpha=0.98$.

Each variable for each participant *individually* was also submitted to a confirmatory one-factor model to examine the utility of the scales for measurement at the individual level. Examination of the model fit indices (CFI, SRMR, GFI) per variable per individual are also presented in Table 1 and indicate good to adequately fitting one-factor measurement models for each variable for each individual. These results support the use of the abbreviated scales for person-specific measurement.

Social Anxiety Cascade Model – Group Model

To examine the process of social anxiety surrounding an event (within time) as well as the stability and influence in variables across time in the group, time series analyses were used to fit the hypothesized model to the full aggregated data. The aggregated data consisted of all responses from the sample of ten participants ($N = 532$) with means and variance representing average group statistics. The fit of the group data to the hypothesized model was excellent; CFI = 0.98, SRMR = 0.05, GFI = 0.96; see Figure 2. As hypothesized, within time, anticipation and rumination were strongly related to fear of negative evaluation and fear of negative evaluation and anticipation were related to social withdrawal. Also, as hypothesized, anticipation and rumination were significantly correlated.

Examination of the across time hypothesized relations in the group model, indicated only one significant relation. Fear of negative evaluation was found to be stable across time. That is, fear of negative evaluation at a given time (T) predicted fear of negative evaluation at a subsequent time point (T+1). The hypothesized relations between anticipation, rumination, and social withdrawal at one occasion (T) and fear of negative evaluation at the next occasion (T+1) were not significant. No significant across time relations emerged predicting subsequent social withdrawal.

Social Anxiety Cascade Model–Individual Models

While application of the hypothesized model to aggregate data confirmed the expected within-time model and the stability of fear of negative evaluation over time, the primary goal of this study was to determine whether models and results obtained through general aggregated data (group data) could be applied to individuals. Accordingly, the hypothesized model was also fit separately to each individual's data. In these single-subject time series analyses, the sample consists of the number of measurement occasions (e.g. $N = 60$), with means and variance representing average statistics for the sample of measurements from a single individual, see Table 1.

Group and individual model results are presented together for comparison in Table 2 and individual models are presented graphically in Figures 3-5. While the hypothesized model was a good-fit for the group data, model fit indices for individual models varied, indicating good-fitting models for only six participants. The comparative fit index (CFI) for model fit at the individual level ranged 0.11-1.00.

Within Time Relations – Individual Models. As was the case for the group model, individual models generally confirmed hypothesized within-time associations between the affective, cognitive, and behavioral processes associated with social anxiety. As described in more detail below, for the majority of the participants, within-time hypothesized relations between fear of negative evaluation, the cognitive elements (anticipation and rumination), and social withdrawal were significant, although with important variations. The cross-time associations, however, were quite variable across individuals. The across-time stability of fear of negative evaluation found in the group model held for four of the participants' individual models and other significant relations across time emerged for other individuals, as described below. For further discussion, the individual models were grouped together based on degree of similarity to the group model.

As depicted in Figure 3, five individuals (participants A-E) showed patterns of association that were similar to the group model. Each showed the hypothesized within time relations linking fear of negative evaluation with negative anticipatory processing and post-event rumination. Four of the five also evidenced the hypothesized relationship between anticipatory processing and social withdrawal. For two, the hypothesized relation between fear of negative evaluation and social withdrawal was fully mediated by anticipatory processing, while for the other two the direct (unmediated) path, significant in the group model, also emerged. The expected correlations between the cognitive factors anticipation and rumination only reached significance for two of these five participants (4 participants total).

Across Time Relations – Individual Models. Individual variation also emerged in the cross-time associations of these five participants. Parallel to the group model, three individuals (A, C, and E) demonstrated stability over time in their fear of negative evaluation. For participant C, subsequent social withdrawal (T+1) was predicted by fear of negative evaluation and post-event rumination, however these relations are qualified by a negative relationship between social withdrawal on a given day and social withdrawal at the next time point (T+1). For participant D, anticipation and rumination influenced social withdrawal over time; however, rumination was positively related whereas anticipation was negatively related. Participant E also showed a complex pattern of multiple cross-time influences. For this participant, greater anticipatory processing predicted increased fear of negative evaluation over time, but greater post-event rumination led to reductions in social withdrawal. Interestingly, and in contrast to the hypothesized relation, greater social withdrawal (T) predicted subsequent decreases in fear of negative evaluation (T + 1).

As depicted in Figure 4, three other individuals (participants F, G, and H) also showed some patterns of within-time associations that paralleled the group model, but these individuals differed from the group model in that one of the four factors was not related. For participant F, social withdrawal was unrelated to any other factors, within time and across time. For participants G and H, post-event rumination was unrelated to other factors, with the exception of a correlation between rumination and anticipatory processing for participant G. For participant H only three relations

were significant, anticipatory processing predicating same day and subsequent social withdrawal and stability in the across time relation for fear of negative evaluation. Participant G showed stability in the across time relation for social withdrawal.

For the last two participants, I and J, the data clearly did not fit the hypothesized model. Nonetheless, a few significant relations did emerge. For both participants, anticipatory processing predicted same day social withdrawal. The expected within time relation between fear of negative evaluation and post-event rumination also emerged for participant I and post-event rumination predicted subsequent fear of negative evaluation for participant J.

Discussion

The goal of this study was to explore the applicability of a social interaction cascade model of social anxiety to characterize the behaviors, cognitions, and feelings of individuals high in social anxiety making the transition to university life. Although there are clear limitations in the extent to which a single study can accomplish this goal, a number of important steps were accomplished in this research. The following sections discuss the contribution of the present research to our understanding of the conceptualization and measurement of the constructs implicated in social anxiety within individuals and the nature of individual variability in the dynamics of social anxiety. Implications and limitations of the current research are also discussed.

Conceptualizing and Measuring Components of Social Anxiety Within Individuals.

The findings in this study indicated that the constructs of fear of negative evaluation, anticipatory processing, post-event rumination, and social withdrawal, as operationalized, could be reliably measured with brief daily diary questionnaires. The internal consistency and factorial validity of scores obtained in this study using the abbreviated scales, both at the group and individual level, suggest that these modified scales are viable tools for the assessment of an individual's social anxiety and can be utilized as we move forward in our understanding of the development and maintenance of social anxiety within individuals.

Confirmation of a one-factor measurement model for each participant for each variable is particularly notable because the standard scales designed to tap these constructs required extensive modification for use in this study. The standard measures are designed for periodic use, and employ many items to assess each construct. In order to create a measure that could be used on a daily basis and tap multiple constructs, it was necessary to reduce the burden and repetitiveness of each of the scales by selecting a few items to represent each construct, rather than using the entire scale. The results of this study suggest that the abbreviation necessary to attain daily reports resulted in satisfactory measurement of each construct. These abbreviated scales make the use of a daily diary method feasible in the study of social anxiety, and offer a tool that might also be helpful in tracking the process and progress of individuals undergoing treatment for social anxiety.

Additionally, the results of this study support the conceptualization of social anxiety as a process that functions within and around specific social interaction episodes (Clark & Wells 1995; Rapee & Heimberg 1997), as reflected in the evidence supporting within-time relations among the constructs. Yet, comparisons of individual models to the aggregated group model in this study also indicate that the process is more varied among individuals than group models would suggest. Such evidence signifies the need for more person-specific research to validate and expand our current understanding and knowledge of individual processes, and to access the degree to which group data analyses yield general principles that remain relevant at the individual level.

Individual Variability in the Dynamics of Social Anxiety

Overall, a comparison of the individual models supported the expected within time relations between fear of negative evaluation, maladaptive cognitive processing (anticipation and rumination), and social withdrawal, although most models also reflected some variation in the expected within time processes. Across-time relations between the four factors varied widely across participants, suggesting that important individual differences exist. Although some relation patterns indicated complexity beyond our current level of understanding and theory, a number of important conclusions and inferences can be drawn from these individual models.

First, fairly robust support emerged for the hypothesized within time relations between fear of negative evaluation and maladaptive cognitive processing. With two exceptions, most individuals demonstrated reactions to daily social challenges that showed coherent associations between the general level of fear of negative evaluation they experienced and at least one (or both) cognitive reactions to the challenge episode. These findings are consistent with previous research linking maladaptive cognitive processing and social anxiety (Hinrichsen & Clark, 2003; Kocovski et al., 2005; Mellings & Alden, 2000).

For some individuals, the cognitive processes surrounding anticipation also generated social withdrawal behaviors. For a majority of the individuals studied (8 out of 10), associations emerged linking fear of negative evaluation to social withdrawal during daily episodes of social interaction, either through anticipatory worry or with both fear of negative evaluation and anticipatory worry as unique predictors. The more these individuals worried about how they would perform or be evaluated during the event, the greater the likelihood that they would withdraw, remain on the side-lines, avoid eye contact, and use other behaviors that minimized their social engagement. These findings support cognitive-behavioral models (Clark & Wells, 1995; Rapee & Heimberg, 1997) and suggest that the way individuals worry about specific social interaction challenges before the fact, plays a key role in the level of social anxiety experienced on a given day and, for most, also influences their behavioral choices.

Interestingly, however, few relations emerged linking these contained episodes of social anxiety to feelings, thoughts or behaviors with subsequent social interactions experienced at the next time point. The coherence of factors within single episodes of social anxiety in combination with the limited across-time associations suggests that the social anxiety interaction process surrounding the situation-specific event has predictive power. Specific events appear to trigger these sets of affective, cognitive, and behavioral responses that remain embedded in the social context, in contrast to those experienced with the continuity associated with traits. While some studies have evidenced continuity (Abbott & Rapee, 2004; Lundh & Sperling, 2002), in the current study across time stabilities were evident in some individuals more than others, suggesting that the degree to which the set of reactions associated with social anxiety are embedded as stable proclivities may vary across individuals at this particular period of developmental transition when adolescents leave home to attend college for the first time. Recognizing the power of the situation, and processes operating within the situation, is vital in identifying specific elements that can potentially be modified in an attempt to interrupt the maladaptive processes and establish more adaptive ones. The daily diary method and measures used in this study might assist the intervention process by helping to identify the sorts of situations that stimulate anticipatory worry or post-event rumination for a given individual, and in tracking an individual's progress in reducing the problematic cognitive reactions they experience in these situations.

Further research is needed to determine whether the individual variations in cross-time predictability and stability have implications for student outcomes and intervention planning. Although not tested here, it is possible that individuals who show greater stability across time in their experiences of social anxiety are involved in negative cascade processes that are likely to lead to worsening social anxiety over time relative to individuals for whom social anxiety appears more situation specific. It may be that this stability indicates a more general vulnerability to anxiety associated with biological and temperamental roots, or it may reflect the development of trait-like social anxiety that is becoming well solidified by emerging adulthood.

The stability of social withdrawal, while evidenced in only a few of the individual models, is also of interest. Again, stability across time in a model that accounts for within time processes indicates that the influence of the stable variable is occurring above and beyond the situational factors occurring in the moment. Most individual models show instability of social withdrawal, suggesting the importance of situational factors in the utilization of social withdrawal behaviors. However, for some individuals, it may be that avoiding eye contact, seeking out more obscure and protective positions, and other safety/protective behaviors are motivated by more than the affective and cognitive components available in the moment and are perhaps habitual patterns that have been over-learned or are initiated in response to a lack of other interactional strategies. While not examined in this study, avoiding social interaction all together is a strategy that may likewise vary in stability across individuals, with implications for engaging in or avoiding subsequent social interaction opportunities for some individuals, but perhaps without future implications for other individuals. Regardless, understanding the stability (and lack thereof) of social withdrawal is an important future research goal with implications for social skills development and social anxiety treatment.

It is possible that for some individuals the affective component of social anxiety may be a wholly separate process from the behavioral component of social withdrawal. For example, such separation of processes is supported by the pattern of relations between variables shown by participant F, whose mean level of social withdrawal was high but was not predicted by social anxiety (directly nor through anticipation). For this individual the affective experience of social anxiety does not appear to influence his/her behaviors; also see relational patterns for participants E and H. These findings are comparable with prior research documenting a lack of correlation between social anxiety and social skills in children (Cartwright-Hatton, Hodges, & Porter, 2003; Erath, Flanagan, & Bierman, 2007) and may suggest conceptualization of separate affective and behavior components for some individuals. Additional research is needed to understand in how socially-anxious affect and social behavior function together or separately within a social interaction episode and to determine the degree to which differences in individual processes exist.

Limitations and Future Research

Although this study makes an important contribution in validating nomothetic knowledge of social anxiety as applicable to idiographic interests, it does so for only one model focused on a limited set of constructs, measured in a restricted manner with modified scales. While measurement of a single latent variable for each of the revised scales was confirmed, the degree to which the latent variable captured the same construct as the original measure is unknown. Additionally, individual models were examined for only ten participants, nine of which were female. The small number of participants used in this study represents a compromise between the constraints of fitting and comparing individual models, while also including enough participants to provide a group model for comparison. While some conclusions have been inferred in light of previous research and theory, these interpretations should be considered with caution.

Furthermore, it is important to note that samples for the individual models are relatively small and in some cases only just adequate for modeling. Indeed only six of the ten participants' data resulted in good-fitting models which may, in part, be a function of sampling limitations. Obtaining adequate samples is one of the challenges of person-specific modeling wherein the sample consists of multiple occasions of measurement within a single person and as such is particularly vulnerable to participant fatigue and compliance constraints. Additionally, as in sampling from a population of individuals, sampling from a population of occasions (within individuals) may result in more or less representative samples. In this study, participants were given the freedom to choose when within a given day, as well as on which days, they completed the measures, and to decide upon which anxiety-provoking event to report. While these methods were selected to address real-world constraints associated with measuring an irregularly-occurring process, multiple times within the same participant, across a relatively lengthy time frame (13 weeks), they also resulted in non-random samples that may not fully represent the full range of socially-anxious episodes the participant experiences. Methods that require less effort from participants and allow for more direct and frequent measurement may be more successfully in obtaining larger, representative, random samples.

This study has implications for future research utilizing both nomothetic and idiographic approaches. As the processes within and surrounding a social interaction episode appear to be central components of social anxiety for many individuals, more research is needed on situational factors that heighten social anxiety. For example, one such area of focus is the understanding of how perceptions of the outcome of a given social interaction influence affective, cognitive, and behavioral responses. Furthermore, additional research studying the occurrence and implications of a separation in affective and behavioral processes of social anxiety would help to uncover how such a separation develops and the degree to which it is adaptive or represents increased vulnerabilities. More research is also needed to clarify the role of cognitive processing on both affective and behavioral outcomes. Better conceptualization of anticipatory processing and post-event rumination is needed to uncover precisely how these cognitive processes lead to vulnerabilities in affect and behavior. This study is also one of the first to examine the role and implications of safety/protective behavioral responses in the process of social anxiety. Much more research is needed in understanding precisely how the behavioral component influences affectivity, cognitive processing, and future behavioral choices.

Finally, the findings of this study and the use of person-specific methods for modeling social anxiety within individuals may have implications for treatments and intervention in the clinical field. Using a daily social interaction assessment procedure and person-specific data analysis, clinicians seeking to treat clients high in social anxiety could potentially gather valuable information about the central factors and processes operating within the client and use such information to tailor and modify treatment and intervention to specific individual needs. Future research is needed to

determine whether a consideration of the dynamics of an individual's social anxiety elucidated by these person-specific methods might result in more effective intervention than standard approaches that assume that the group model fits all individuals equally.

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Table 1
Variable Means (Standard Deviations in Parentheses) and Confirmatory One-factor Measurement Model Fit Indices

| Participant | N | Fear of Negative Evaluation | | | | Anticipatory Anxiety | | | | Post-Event Rumination | | | | Social Avoidance | | | |
|-------------|-----|-----------------------------|---------------|------|------|----------------------|---------------|------|------|-----------------------|---------------|------|------|------------------|---------------|------|------|
| | | M (SD) | CFA Model Fit | | | M (SD) | CFA Model Fit | | | M (SD) | CFA Model Fit | | | M (SD) | CFA Model Fit | | |
| | | | CFI | SRMR | GFI | | CFI | SRMR | GFI | | CFI | SRMR | GFI | | CFI | SRMR | GFI |
| A | 27 | 6.41 (1.42) | 0.94 | 0.05 | 0.80 | 5.05 (1.98) | 0.96 | 0.05 | 0.85 | 4.58 (1.78) | 0.94 | 0.05 | 0.89 | 4.23 (1.08) | 1.00 | 0.06 | 0.94 |
| B | 66 | 5.09 (1.51) | 0.96 | 0.04 | 0.86 | 3.18 (1.46) | 0.96 | 0.06 | 0.94 | 3.44 (2.29) | 0.98 | 0.02 | 0.90 | 2.63 (1.40) | 0.94 | 0.07 | 0.93 |
| C | 67 | 3.00 (2.33) | 0.93 | 0.06 | 0.84 | 3.51 (2.42) | 0.95 | 0.06 | 0.91 | 2.22 (2.58) | 0.97 | 0.03 | 0.90 | 3.64 (1.91) | 0.95 | 0.05 | 0.91 |
| D | 31 | 4.17 (2.16) | 0.98 | 0.06 | 0.85 | 4.22 (1.83) | 0.95 | 0.05 | 0.85 | 3.06 (2.17) | 0.93 | 0.03 | 0.78 | 2.94 (1.64) | 0.94 | 0.07 | 0.90 |
| E | 68 | 8.44 (2.54) | 0.96 | 0.01 | 0.81 | 7.60 (2.73) | 0.93 | 0.03 | 0.79 | 5.98 (2.97) | 0.98 | 0.02 | 0.93 | 5.82 (2.36) | 0.98 | 0.04 | 0.95 |
| F | 59 | 5.12 (0.98) | 0.96 | 0.06 | 0.89 | 5.36 (1.30) | 1.00 | 0.05 | 0.96 | 4.20 (1.23) | 0.97 | 0.04 | 0.95 | 4.23 (1.25) | 0.99 | 0.05 | 0.97 |
| G | 26 | 7.45 (1.92) | 0.99 | 0.04 | 0.84 | 5.24 (3.51) | 0.95 | 0.04 | 0.83 | 6.40 (2.87) | 0.95 | 0.04 | 0.88 | 4.68 (2.74) | 0.96 | 0.06 | 0.92 |
| H | 63 | 5.61 (1.85) | 0.95 | 0.05 | 0.84 | 6.56 (2.25) | 1.00 | 0.04 | 0.96 | 4.44 (3.00) | 0.99 | 0.01 | 0.94 | 5.40 (2.28) | 1.00 | 0.05 | 0.97 |
| I | 60 | 3.21 (0.86) | 0.96 | 0.07 | 0.89 | 2.37 (0.63) | 0.89 | 0.09 | 0.93 | 1.65 (1.16) | 0.92 | 0.04 | 0.88 | 2.92 (1.31) | 0.97 | 0.07 | 0.97 |
| Z | 62 | 2.72 (0.74) | 0.98 | 0.06 | 0.91 | 4.08 (1.74) | 0.98 | 0.05 | 0.95 | 2.76 (1.08) | 0.99 | 0.04 | 0.97 | 3.95 (1.41) | 1.00 | 0.04 | 0.99 |
| Group | 532 | 4.97 (2.54) | 0.98 | 0.02 | 0.91 | 4.71 (2.61) | 0.99 | 0.02 | 0.97 | 3.71 (2.64) | 0.96 | 0.03 | 0.91 | 4.06 (2.08) | 0.99 | 0.02 | 0.99 |

Note. Means for individual participants are the average scores, ranging from 1 to 10 on each measure, averaged across all assessments. Means for the group are the average score of all assessments for all participants for each measure.

Table 2
Betas for the Group Model and Individual Models

| Parameter | Group Model | A | B | C | D | E | F | G | H | I | J |
|--|-------------|-------|-------|--------|--------|--------|-------|-------|--------|-------|-------|
| <u>Within Time Relations:</u> | | | | | | | | | | | |
| 1 – FNE to Anticipation | 0.68* | 0.47* | 0.54* | 0.62* | 0.97* | 0.64* | 0.66* | 0.28* | 0.02 | -0.02 | 0.22 |
| 2 – FNE to Rumination | 0.72* | 0.67* | 0.79* | 0.38* | 0.79* | 0.75* | 0.59* | 0.09 | -0.01 | 0.56* | 0.03 |
| 3 – Anticipation to Withdrawal | 0.53* | 0.27* | 0.47* | 0.48* | 0.66* | 0.25 | 0.11 | 0.43* | 0.37* | 0.49* | 0.28* |
| 4 – FNE to Withdrawal | 0.16* | 0.32 | 0.45* | 0.11 | 0.19 | 0.32 | -0.02 | -0.05 | 0.07 | -0.03 | -0.19 |
| 5 – Anticipation and Rumination | 0.15* | 0.24* | 0.13 | 0.09 | 0.10* | 0.18 | 0.16* | 0.26* | 0.03 | 0.25 | 0.06 |
| <u>Across Time Relations:</u> | | | | | | | | | | | |
| A – FNE predicting FNE | 0.61* | 0.32* | 0.14 | 0.46* | -0.05 | 0.65* | 0.29 | 0.04 | 0.52* | 0.02 | -0.08 |
| B – Anticipation predicting FNE | 0.04 | -0.21 | -0.24 | -0.03 | -0.04 | 0.47* | 0.01 | -0.03 | 0.01 | 0.19 | 0.12 |
| C – Rumination predicting FNE | -0.07 | -0.26 | 0.48 | -0.23 | -0.05 | -0.38 | -0.18 | 0.05 | 0.02 | -0.05 | 0.32* |
| D – Withdrawal predicting FNE | -0.07 | 0.12 | -0.39 | -0.14 | 0.21 | -0.36* | -0.03 | -0.08 | 0.10 | -0.09 | -0.12 |
| E – FNE predicting Withdrawal | -0.06 | -0.01 | 0.03 | 0.26* | 0.19 | -0.17 | -0.25 | -0.10 | 0.18 | 0.13 | -0.18 |
| F – Rumination predicting Withdrawal | -0.01 | 0.17 | -0.34 | 0.20* | 0.26* | -0.67* | -0.08 | 0.10 | -0.03 | -0.30 | 0.22 |
| G – Anticipation predicting Withdrawal | 0.00 | 0.15 | 0.05 | 0.04 | -0.69* | 0.15 | 0.14 | 0.00 | -0.33* | -0.23 | 0.02 |
| H – Withdrawal predicting Withdrawal | 0.06 | -0.08 | 0.37 | -0.34* | 0.21 | 0.28 | 0.01 | 0.26* | 0.15 | -0.14 | -0.06 |

Note. FNE = Fear of Negative Evaluation; * $p < 0.05$

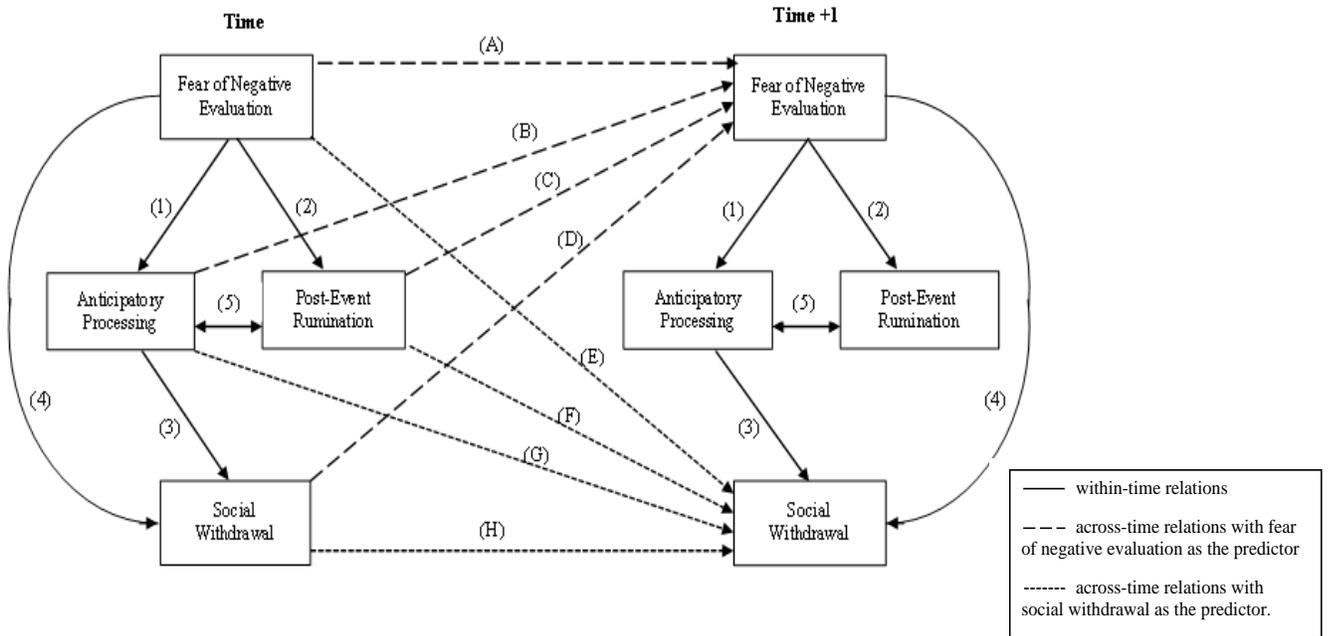


Figure 1. Hypothesized social anxiety cascade model. Hypothesized within time relations, relations between constructs within a single day (time) are numbered, whereas hypothesized across time relations, between constructs on a given day and the subsequent day (time+1), are indicated with letters.

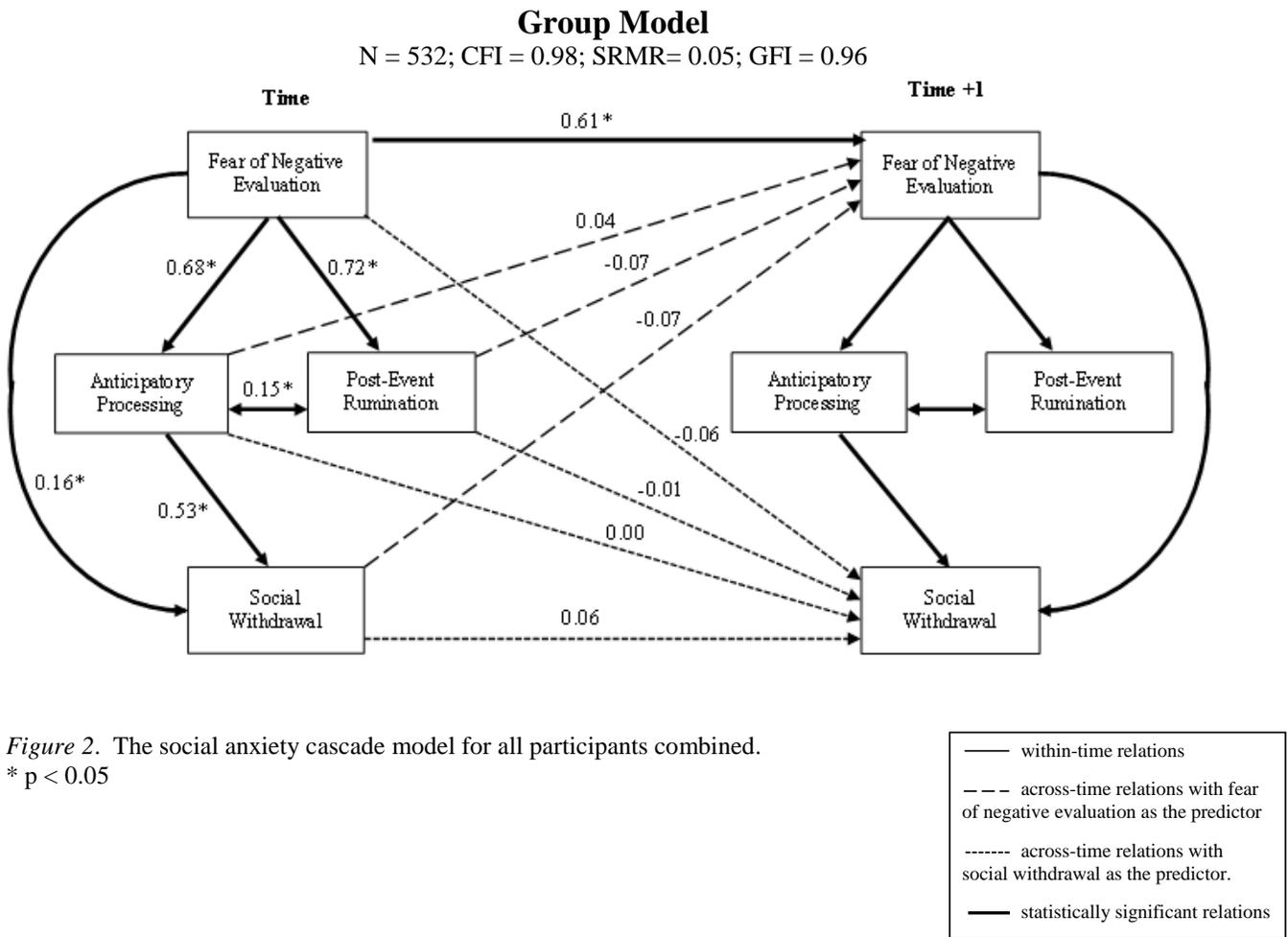


Figure 2. The social anxiety cascade model for all participants combined.
* p < 0.05

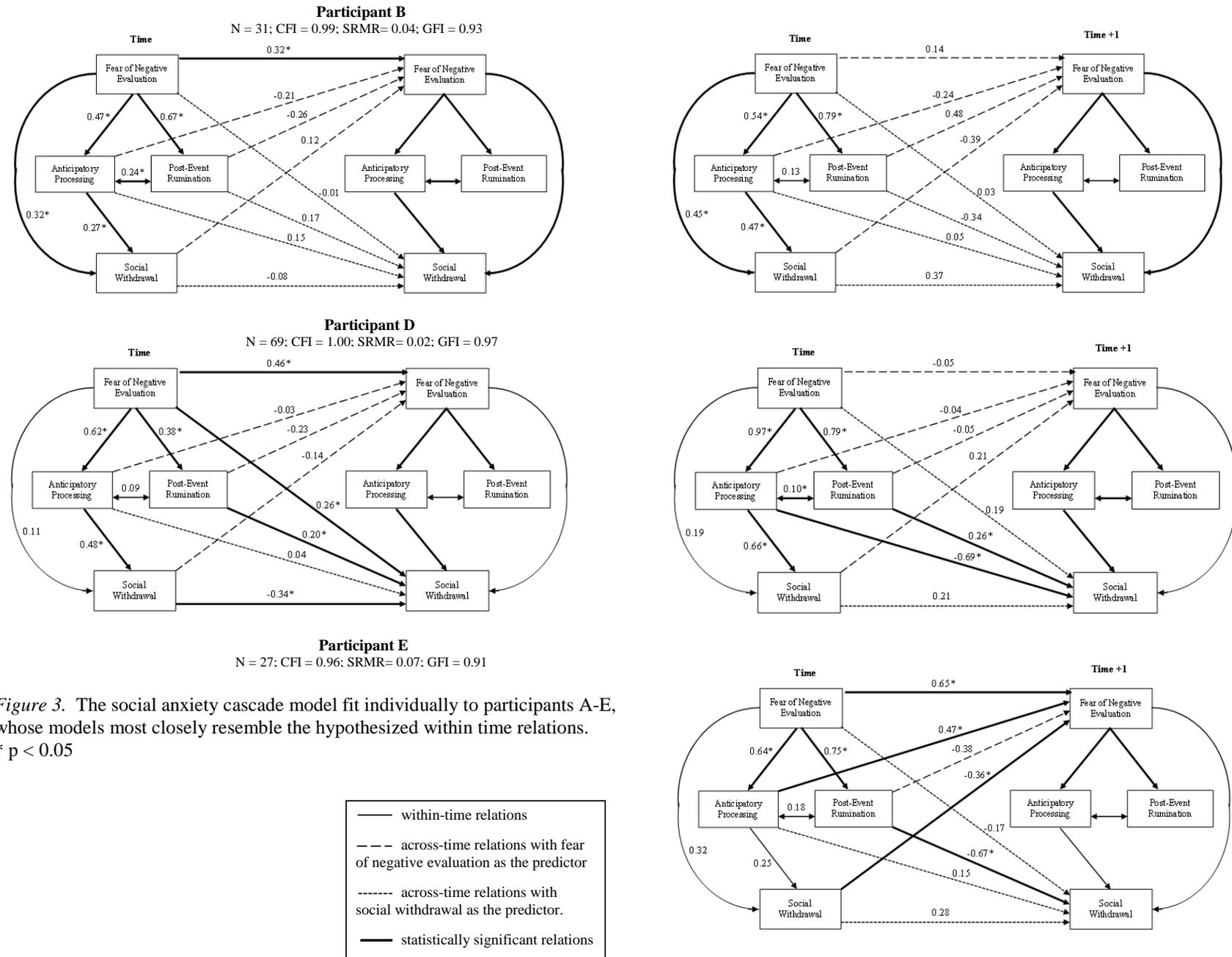


Figure 3. The social anxiety cascade model fit individually to participants A-E, whose models most closely resemble the hypothesized within time relations. * $p < 0.05$

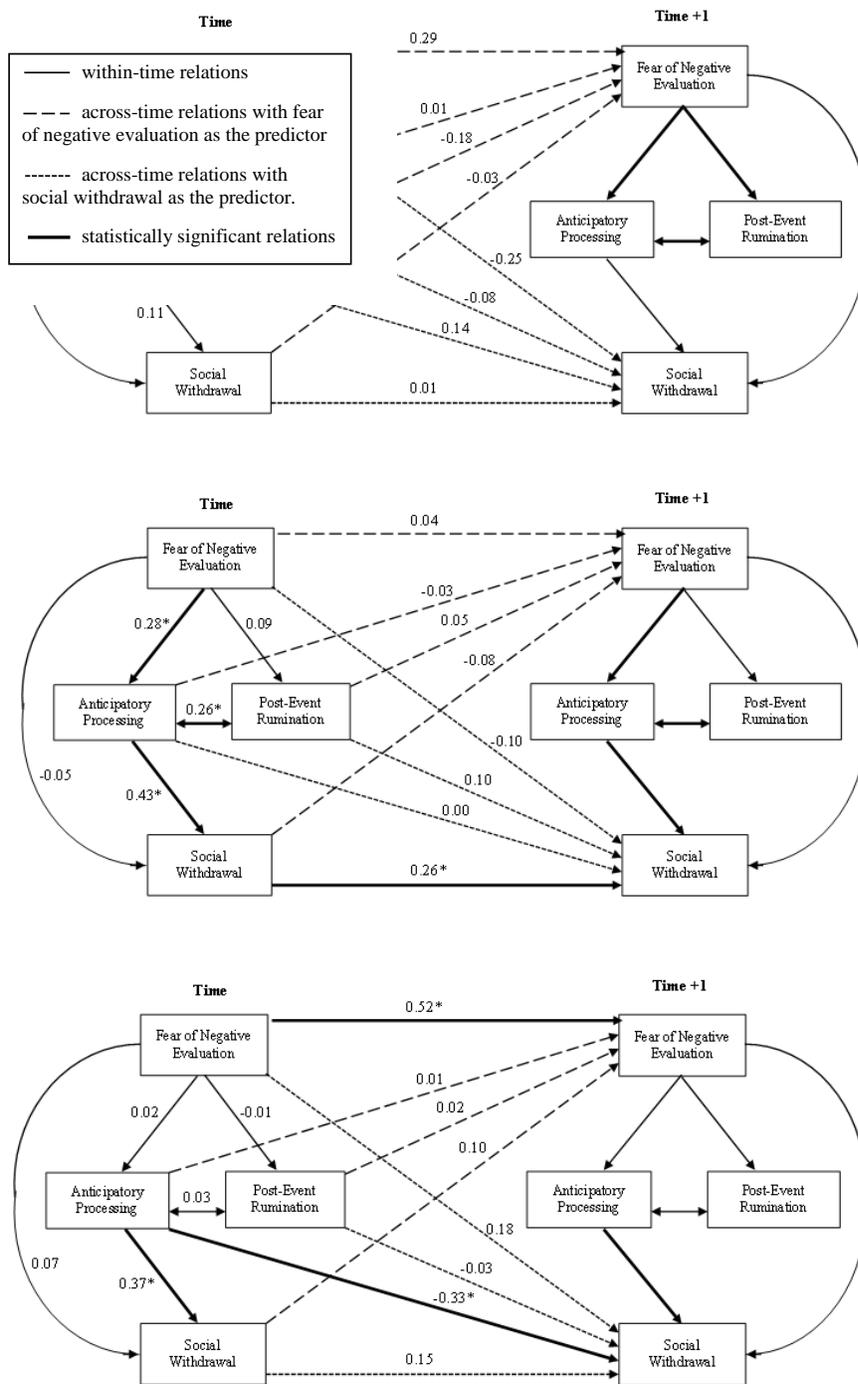


Figure 4. The social anxiety cascade model fit individually for participants F, G, and H, whose models evidence the hypothesized within time relations with some variation.

* $p < 0.05$

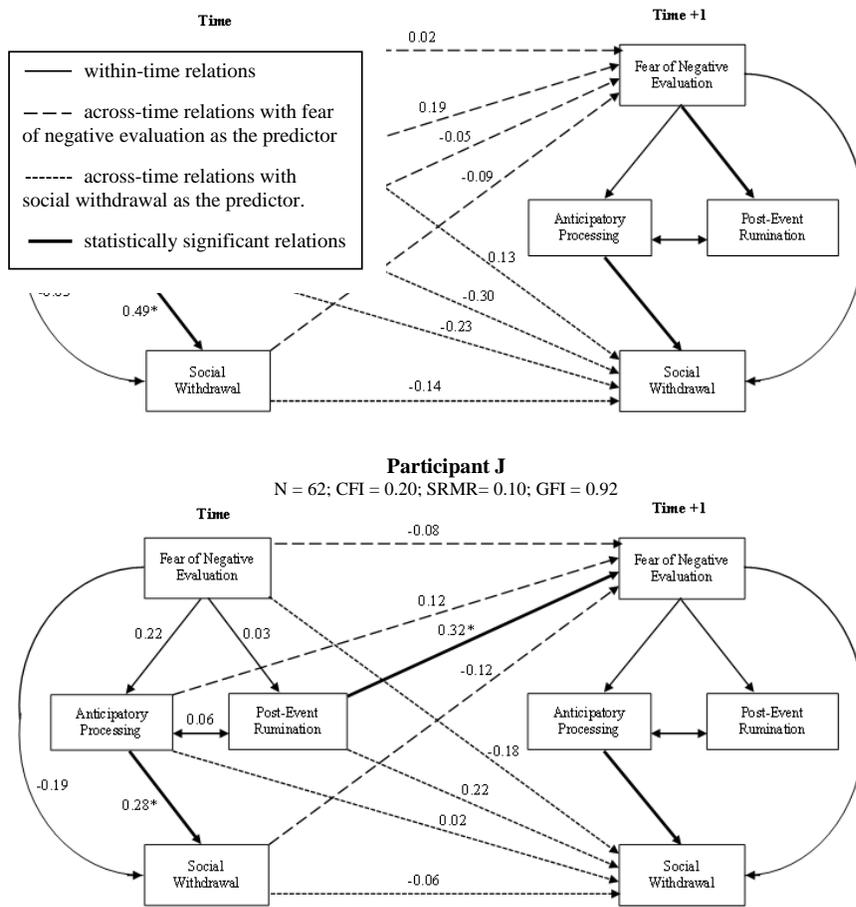


Figure 5. The social anxiety cascade model fit individually for participants I and J, whose data was not represented by the hypothesized model.

* p < 0.05