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SOCIAL ANXIETY AND SOCIAL AVOIDANCE: A DEVELOPMENTAL MODEL OF
NEGATIVE CASCADE IN FIRST-SEMESTER UNIVERSITY STUDENTS

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ABSTRACT

Using person-specific methodology, this study examined social anxiety in vulnerable university freshman as they adjusted to the first semester of college. Following existing cognitive behavioral theories, it was proposed that fear of negative evaluation leads to maladaptive cognitive processes (anticipatory processing and rumination) which influence socially avoidant behaviors. It was further hypothesized that a number of across time processes affect future social anxiety and social avoidance. Accordingly, time series analyses were conducted in which both within time and across time relations were examined. An aggregated model confirmed the within time hypotheses and indicated stability in social anxiety over time. However, individual models, using person-specific analyses, indicated more complex and variable results. The hypothesized within time relations generally held for individuals with variability in the models being most commonly centered on the influence of one of the two cognitive factors. However, for a few individuals a separation between affective processes and behavioral processes was evident. Across time, stability of social anxiety was found for half of the participants. A number of other across time relations emerged, but with high variability between subjects. This study demonstrates the important of utilizing person-specific methodology in order to assess the validity of the processes found in aggregated models (using groups or samples) for specific individuals. Important differences in individual models have major implications for treatment and intervention.

TABLE OF CONTENTS

List of Tables	v
List of Figures	vi
Introduction	1
Social Anxiety	2
Developmental Models of Social Anxiety	5
Situational Models of Social Anxiety	7
Aims of this Study	10
Social Anxiety and the Transition to College	12
Social Anxiety in this Study	17
Method	26
Participants	26
Assessment	27
Measures	29
Results	31
Measurement Validity	31
Social Anxiety Cascade Model – Group Model	35
Social Anxiety Cascade Model – Individual Model	36
Comparison of Group and Individual Model Findings	47
Discussion	48
Conceptualizing and Measuring Components of Social Anxiety Within Individuals	49
Individual Variability in the Dynamics of Daily Feelings of Social Anxiety	51
Individual Variability in the Dynamics of Social Avoidance	53
Future Research and Application	56
Appendix: Social Interaction Daily Diary	58
References	61

List of Tables

Table 1. Number of Participant Daily Assessments	28
Table 2. Comparative Fit Index for Confirmatory One-factor Measurement Models by Subject.....	32
Table 3. Variable Means by Subject.....	33
Table 4. Correlations of all Variables for Group and Individuals	34

List of Figures

Figure 1. Hypothesized Social Anxiety Cascade Model	24
Figure 2. Aggregated/Group Model.....	35
Figure 3. Subject 1 Individual Model	37
Figure 4. Subject 2 Individual Model	38
Figure 5. Subject 3 Individual Model	30
Figure 6. Subject 4 Individual Model	40
Figure 7. Subject 5 Individual Model	41
Figure 8. Subject 6 Individual Model	42
Figure 9. Subject 7 Individual Model	43
Figure 10. Subject 8 Individual Model	44
Figure 11. Subject 10 Individual Model	45

Social Anxiety and Social Avoidance: A Developmental Model of Negative Cascade in First-Semester University Students

Researchers within all fields of psychology seek to scientifically validate theories and find empirical support for the understanding of relationships between psychological phenomena. To do so, requires application of the scientific method using systematic analyses based on accurate, logical assumptions. One particular assumption that lies at the heart of nearly all statistical methods employed by researchers is the assumption of generalization from samples to populations. Current statistical methods allow for an assessment of the validity of such an assumption. However, another assumption often made, albeit often informally, is that findings from samples generalize to individuals. In this case, there are few assessments and little knowledge of whether or not such assumptions are valid.

To apply our research findings in work with individual children, adolescents, and adults, we must assume that findings acquired through research using samples apply, at least in some general sense, to the individual. Yet recent examinations of the criteria under which group findings can validly be applied to individuals suggests that most current assumptions regarding the applicability of group findings to individuals are invalid (Molenaar & Campbell, 2008).

The condition under which group findings can be validly generalized to individuals requires homogeneity in the population in all aspects influential to the phenomenon of interest, as well as stability in the process of influence over time (Hannan, 1970). Given that these criteria rarely exist in the phenomenon of interest to researchers, and particularly so in developmental research where lack of stability of process is often a fundamental assumption, we must find ways of validating what we have learned in groups as applicable to individuals. Indeed, much of our developmental research is specifically intended for application in the

understanding of and treatment of specific individuals. Thus it is critical that we engage in assessing whether our current understandings can be applied to individuals.

To do so, this dissertation research involved applying person-specific methodology to a social developmental phenomenon of interest with major implication in the clinical field. Specifically this research examined the factors involved in the process of social interactions for individuals with high levels of social anxiety and examined the role of certain cognitive and behavioral variables that may influence change in social anxiety over time. Additionally this research focused on the transitional period created when young emerging adults leave their homes and communities and engage in university life. The processes involved in social interaction during anxiety-provoking situations, and how those factors contribute to social anxiety and social avoidance over time was examined. Methodologically, this research also sought to achieve three goals; 1) to validate measures used in group studies for use with individuals, 2) to provide support, or adjustment if necessary, to our understanding of the process of social interaction for socially anxious individuals; or in other words to validate group findings for individuals, 3) to examine, within individuals, which variables have the potential for long-term changes in social anxiety.

Social Anxiety

Social anxiety disorder (SAD), also known as social phobia, affects 13.3% of the general adult population. The terms Social Phobia and Social Anxiety Disorder are used interchangeably in the DSM-IV, with a trend in favor of SAD (Ollendick & Hirshfeld-Becker, 2002). According to the DSM-IV (American Psychiatric Association, 1994), social phobia/SAD is characterized by a “marked and persistent fear of social or performance situations” in which one is exposed to unfamiliar people or potential scrutiny from others. Hallmark characteristics include fears of

negative evaluation from others, concerns about embarrassing or humiliating oneself in front of others, negative cognitions about one's social abilities and expected performance, as well as expectations of rejection and criticism and related social-evaluative fears (Hudson & Rapee, 2000). SAD can refer to a pervasive pattern of fear in a broad range of social situations, known as generalized subtype, or to social fear in one or a few situations, known as specific subtype. Prevalence rates reflect mostly generalized social anxiety rather than the specific subtype (Ollendick & Hirshfeld-Becker, 2002).

Etiology of Social Anxiety

An attempt to understand the development of the maladaptive cognitions and behaviors that underlie social-anxiety pathology begins with identifying and describing factors that contribute to early vulnerability. Research on the etiology of social anxiety has focused on a search for developmental risk factors that can be linked to adult social anxiety disorders. Several types of factors have been hypothesized to contribute, including genetic and biological factors as well as various environmental factors (see Ollendick & Hirshfeld-Becker, 2002 for a review).

Biological factors. Biological factors that have been examined with regards to the etiology of social anxiety include genetics and temperamental influences. Research focused on genetic factors has examined heritability in both first degree-relatives (Mannuzza, Schneier, Chapman, Liebowitz, Klein, & Fyer, 1995; Stein, Chartier, Kozak, King, & Kennedy, 1998) and twins (Kendler, Neale, Kessler, Heath, & Eaves, 1992). Rates of heritability for social anxiety disorder have been estimated to be between 30-50% (Kendler, et al., 1992; Kendler, Karkowski, & Prescott, 1999). While research has lent support for hereditary influences in SAD, more often heritability has been linked with general anxiety proneness, as well as other anxiety and affective

disorders, suggesting that heritability is a viable factor as a broad vulnerability to experiencing anxiety (Ollendick & Hirshfeld-Becker, 2002).

Another biologically-based influence, temperament, has also been examined. More specifically, the temperamental type known as behavioral inhibition has been linked to SAD in several empirical studies (e.g. Biederman, Rosenbaum, Hirshfeld, Faraone, Bolduc & Gersten, 1990). However, it is unknown if temperament is specifically a risk factor for social anxiety or, as with heritability, a risk factor for more general anxiety-proneness, depression, etc. Although behavioral inhibition is often viewed as a direct precursor of social anxiety, most children classified as behavioral inhibited early in childhood do not develop SAD, and of those that do, not all of them were classified as behaviorally inhibited previously (Turner, Beidel, & Wolff, 1996).

Environmental factors. While biological factors are certainly implicated in social anxiety, environmental factors also play a large role (see Ollendick & Hirshfeld-Becker, 2002 for a review). One important developmental factor in the etiology of social anxiety is parental influences. The influence of parents may affect childhood development of social anxiety in many ways. Those that have been examined and found to be empirically supported can be grouped into three types. First is direct parental modeling, such as when a socially anxious parent responds to social situations with fear thereby communicating to their child that social encounters are threatening. Another less direct influence, albeit still a powerful influence, is parental attitudes and actions. Although parents may not be socially anxious, they may communicate that the social world is not safe by being low in affection and warmth, by being over-protective, excessively restrictive, or by responding to their child with rejection, criticism, and/or shame inducement. Attitudes that demonstrate over-concern with social-evaluation, as

well as those that facilitate or encourage social avoidance and/or fail to foster social interaction may also be problematic. Finally parental influence may take the form of failing to provide a secure base for the child. The development of attachment is considered an evolutionary-driven response in which infants seek proximity to caregivers as a means of reducing harm, and all children experience some anxiety associated with separation from the caregiver early in life. An insecurely attached child is thought to have experienced insensitive or unresponsive care and thus becomes unable to develop trust that the caregiver will come to his/her aid. Chronic vigilance and anxiety may then be observed in the child even under benign circumstances and may lead to disordered anxiety later in life (Warren, Huston, Egeland & Sroufe, 1997). Empirical research has found that insecurely attached children, particularly of the insecure/ambivalent type, often resort to passive, withdrawn, dependent behaviors in order to avoid rejection (Calkins & Fox, 1992; Erickson, Sroufe, & Egeland, 1985; Shulman, Elicker, & Sroufe, 1994).

Conditioning events, beyond parental modeling, have also been observed in many patients with SAD. Traumatic events of social humiliation can leave their mark, as can vicarious conditioning via social learning theory. Information transfer in which the individual does not witness, but hears about the social catastrophes of others and socialization experiences including peer rejection and neglect have all been reported by SAD patients as key elements in the development of their anxiety (Ollendick & Hirshfeld-Becker, 2002).

Developmental Models of Social Anxiety

In an overview focused on social withdrawal, Rubin, Coplan and Bowker (2009) outline the developmental relations between these various risk factors in a model of social vulnerability across childhood that could account for a number of maladaptive outcomes, especially social anxiety and social phobia. In their model, early vulnerability factors, include infant irritability

and low arousal threshold, are hypothesized to lead to wary and inhibited temperament in older infants, mediated by the vigilance, concern, and solicitousness of parents. Early inhibited temperament interacting with parenting then leads to problematic social skills, social reticence, and the beginnings of negative self-regard. Mediated again by the protectiveness, intrusion, and controllingness of parents, and the rejection of peers, these preschool vulnerabilities then lead to social withdrawal in middle childhood along with continued negative self-regard and recognition of social failures. Additional rejection, exclusion, and victimization by peers is then hypothesized to interact with the child's own social concerns and lead to loneliness, social anxiety, depression, and difficulty initiating and maintaining relationships in early adolescence and into adulthood. While this model takes a broad developmental approach, most research has focused on the proposed elements individually.

Need for Causal Molecular Process Models

While various biological and environmental factors may play a role in the development of social anxiety, most research linking them to SAD is correlational and does not provide a clear picture of the process whereby these influences may take their toll. Although an individual may enter young adulthood with a biological propensity for anxiety, a temperamental style that is often correlated with social inhibition, may have experienced problematic parental modeling, attitudes, and messages, and may have suffered traumatic social experiences; all this does not necessarily equate a social anxiety disorder. Furthermore, while the Rubin, et. al. (2009) model is highly informative, developmental, and extensive in its scope, the model hypothesizes links between general vulnerabilities across large spans of time but fails to describe the more molecular processes functioning at each developmental level that potentially explain and account for the relations in the overall model. For example, relations between individual self-schema

construed in response to recognition of social failures and how these influence the individual's perception of negative responses by peers is not addressed. Furthermore the molecular processes and timing of critical transitions that likely also affect how and when interactional processes result in stable patterns of behavior is not addressed. Understanding important critical and causal *individual processes* is the missing link. It is the goal of this research to contribute to this endeavor by assessing causal individual processes involved in social interaction for those with pre-existing vulnerabilities as they enter and navigate an important developmental transition.

Situational Models of Social Anxiety

Attempts to understand the molecular processes relating to social interaction for those vulnerable to social anxiety have been provided by several cognitive-behavioral models (see Musa & Lépine, 2000, for a review). Taken together these models form a general description of the cognitive and behavioral characteristics comprising the process of social anxiety as the individual engages in an anxiety-provoking situation. Clark & Wells' (1995) model begins with the role of anticipatory processing prior to the situation during which the individual, in anticipation of the social interaction, recalls negative aspects of past social encounters concurrent with negative beliefs about the self and one's abilities, thereby creating an expectation of poor performance and negative outcomes for the up-coming social event. Beck, Emery, & Greenberg (1985) also refer to a similar concept in their description of cognitive sets—mental compositions or schemes of expectations, interests, and concerns organized from past experiences—which are activated upon encounter of the anxiety-provoking situation.

According to the various models, upon encountering the feared situation, vulnerable individuals are likely to be influenced by several dysfunctional beliefs, including 1) the belief that others are inherently critical, 2) that others' positive appraisal is of immense importance and

value 3) that they must meet acceptable standards and norms (although the standards and norm that they perceive as acceptable are usually excessively high standards), 4) that they are inadequate and likely to act inept or unacceptably, and 5) that if they do, they will be rejected and disliked by others (Beck, et al., 1985; Clark & Wells, 1995; Rapee & Heimberg, 1997). These dysfunctional beliefs provoke anxiety in the vulnerable individual upon encountering a situation where social evaluation may occur.

Anxiety then functions to focus the individual's attention on perceptions of threat. As such, in the anxiety-provoking situation, the vulnerable individual experiences hypersensitivity to any possible sign of threat or danger. Given the nature of social interaction which entails performance on the part of the individual, focused attention on one's internal state and external performance are also heightened. The intensity of vigilance for threat, as well as the attentional focus on one's internal states and performance, leaves the individual with diminished capacity to attend to other information in the social environment. This diminished ability to attend to social cues, combined with hypersensitivity to threat, results in the anxious individual being more likely to make false positive errors regarding threat, including interpreting ambiguous social cues as more negative than a non-anxious individual.

Using the information gathered regarding the potential for negative evaluation, the anxious individual then forms a perception of how they are evaluated by others. The idea that individuals rely on their own perceptions of themselves to infer others' impressions has long been supported in empirical research (McEwan & Devins, 1983; Bruch, Gorsky, Collins, & Berger, 1989). For the anxious individual, the heightened focus on his/her own internal states and perceived self-performance coupled with negative expectations for performance, is thought to result in an over-reliance on his/her own distorted perception in inferring others' impressions

and perceptions of him/her. Furthermore, with diminished attention to non-threatening social cues, the opportunity to perceive others' actual responses is undermined. In addition, the focus on one's internal states of anxiety may also lead to increased anxiety as one frets about and falsely perceives the visibility of one's anxiety symptoms, and uses this information to infer others' negative evaluation.

Rapee and Heimberg (1997) propose that the anxious individual in the social situation forms a mental representation of how he/she appears to others, compares this representation to the (often excessively high) standards against which he/she feels judged, and estimates the discrepancy between the audience perceived performance and the audience perceived standard. Given that anxious individuals often set unrealistic standards for themselves and consistently underrate their own performance they typically anticipate negative evaluation, attach serious consequences to the perceived negative evaluation, and experience anxiety commensurate with the perceived direness of those anticipated (or remembered) negative social consequences.

In addition, Clark and Wells (1995) suggest that anxious individuals often engage in safety behaviors during the social encounter as a means of coping with expectations of negative evaluation (e.g. avoiding eye contact to minimize perceived negative responses). However, these in-situation safety behaviors often serve to support and maintain anxiety patterns due to the fact that they hinder disconfirmation of the individual's negative expectations (e.g. failure to perceive the positive non-verbal responses due to averted eye contact). Furthermore, in-situation safety behaviors can also elicit more anxiety (e.g. muscle tension used to stabilize shaking may result in more self-perceived internal anxiety) and can contribute to a self-fulfilling prophecy effect in that they may elicit negative responses from others (e.g. limited eye contact may convey unfriendliness and elicit avoidance from others).

Finally, Clark and Wells (1995) propose that anxious individuals engage in a “post-mortem” following an anxiety-provoking event. Memories of internal anxiety states and negative self-performance during the social event are often the focus of this post-event rumination, because these aspects of the experience received greater encoding and stronger storage in memory, due to their high attentional salience in vulnerable individuals. In fact research has supported the negativity and rumination quality of post-event processing in socially-anxious individuals (Dannahy & Stopa, 2007; Kocovski, Endler, Rector, & Flett, 2005).

Unfortunately, the characteristic negative cognitive appraisals and avoidant behavioral patterns of the socially-anxious individual create a vicious cycle of focus on self-perceived negative physiological and behavior symptoms that reinforce perceptions of social incompetence, high monitoring of threat and unsubstantiated interpretations of criticism, less ability to process and respond to positive social cues, and elicit negative reactions of others which serve to confirm fears and support pathology (Beck, et al., 1985).

Aims of This Study

While the cognitive-behavioral models discussed above describe the cyclical processes thought to occur in social-anxiety-disordered individuals, a developmental perspective suggests that the elements comprising models of social anxiety in the situation may change in importance over time and may influence different aspects of the model in various ways leading to the development of more adaptive or more maladaptive outcomes over time. Such a cyclical escalation model is the basis of this study. Furthermore, whereas many of the components of the cognitive-behavioral model have received support in prior research comparing high and low anxious groups, an affective-cognitive-behavioral cascade model has not been tested directly, or within individuals. That is, whereas research documenting group differences validates the

existence of the model components in the population of anxious individuals, it does not offer information about how the process of anxiety functions within an individual. Verification of a model of social anxiety as it operates in an individual can only be accomplished through examination of the within-person process. Addressing the need for verification of the process within-person is the focus of this study.

Person-Specific Methodology

To understand the development and escalation from vulnerability to social-anxiety-disorder patterned behavior we must examine the processes of social anxiety at an individual level in a person-specific longitudinal time series design. This study takes a step toward understand the individual developmental process by using research methodology that examines the individual processes that unfold within the person. Person-specific research methodology as utilized in this study will focus closely on the processes underlying social anxiety in a few individuals (rather than a large sample) with the aim of identifying the critical components that lead to increased dysfunctionality in social interaction.

The focus on statistical analysis of individuals allows for modeling of intra-individual variation, variation that is essentially discarded in aggregate studies. Person-specific modeling can thus lead to greater precision in identifying and clarifying the critical components of the developmental process. The use of individual-level analyses in this study will allow for examination of the *process* of social anxiety development as it occurs over time in individual university freshmen. Such studies are the initial steps in identifying precisely how social anxiety functions and are critical for informing individual treatment and intervention efforts.

Furthermore, person-specific methodology is critical in verifying findings obtained at the group level for use with individuals. By applying models to both individuals and groups we can

assess the degree of validity of the group model. Where group models are closely replicated within individuals, confidence in the applicability of nomothetic findings to individuals is elevated. Additionally, individual-level processes can also inform nomothetic research by identifying groups of similar individuals and through identifying important individual differences (Hamaker, Dolan, & Molenaar, 2005; Nesselroade & Ram, 1994).

Social Anxiety and the Transition to College

Entering university life is a major transition for many young adults, involving new domains of independence, increased academic expectations, new environments, and often involves leaving familial and friendship support networks behind. While most students about to enter the university appear to approach these changes with joy, positive anticipation, and expectations of growth (Jackson, Pancer, Pratt, & Hunsberger, 2000), many experience considerable difficulty in their adjustment to university life. Loneliness (Medora & Woodward, 1986) and homesickness (Fisher & Hood, 1987) are experienced by most college freshman; and as many as 30% of first-year students drop-out of the university as a result of the difficulties they experience (Gerdes & Mallinckrodt, 1994; Rickinson & Rutherford, 1995, 1996).

Social interaction is especially important during the transition to university life as it affords the opportunity for individuals to communicate with and connect with others. Such connections lead to social support which has been found to be particularly important during adolescence and young adulthood and consistently found to be of paramount importance to psychological well-being and adjustment during stressful and transitory life events (Billings & Moos, 1982; Schaefer, Coyne, & Lazarus, 1981; Nelson, 1990).

Given the importance of social support in major life transitions, it is not surprising that increases in one's social network (Gall, Evans, & Bellerose, 2000) and quality of new

friendships (Buote, Pancer, Pratt, Adams, Birnie-Lefcovitch, Polivy, et al., 2007) are important predictors of positive adjustment to university life. However, developing new friendships and replenishing one's social network are tasks that pose significant difficulties for some first-year students.

For shy individuals and those who experience anxiety in social situations, traversing new social environments and rebuilding social networks can be particularly stressful. Social anxiety leaves one feeling vulnerable and doubtful that social interactions will be enjoyable or have positive endings. Yet seeking out social interaction and participating in social events are critical to building social relationships, dealing with social concerns, improving one's social skills, and expanding one's social network, as well as reducing one's social anxiety (Beidel & Turner, 1998).

While some research has examined how social anxiety impacts university life, no known research has specifically addressed the university transition for first-year socially-anxious students. Yet given that the prevalence of social anxiety in university students is quite high and has been found to be linked with problematic adjustment (Beidel, Turner, Stanley, & Dancu, 1989; Strahan & Conger, 1998; Strahan, 2003), understanding how socially-anxious first-year undergraduates traverse the transition is particularly important.

While 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), Beidel and colleagues (1989) found that 19% of their sample of undergraduates met criteria for social phobia. Strahan and Conger (1998) also found that as many as 33% of their sample of undergraduate men reported social anxiety symptoms as severe as those diagnosed with social phobia, and Strahan (2003) reported clinical levels of social anxiety in 22% of their first-year

undergraduate sample. Comparisons of social-phobia-diagnosed clinical populations with non-clinical participants reporting clinical levels of social anxiety have found few differences in the cognitive and physiological responses exhibited (Turner, Beidel, & Larkin, 1986). These findings suggest that clinical levels of social anxiety do indeed exist in the undergraduate university population and at rates higher than those diagnosed in the general populous.

Thus, the transition occurring during the first semester of college is an important developmental timeframe during which social-evaluative concerns are likely to escalate and adult patterns of social interaction are likely to develop for a number of reasons. First, although social evaluative concerns emerge as early as 8 years old, social acceptance and social evaluation take on new meaning and velocity during the adolescent years. Increased understanding of social nuance contributes to increased anxiety in the adolescent years and this is a period of onset for many social anxiety clinical cases. Additionally, the late adolescent years which involve the transition to new social surroundings such as to university or work life are especially important because they often involve a significant break from the established social patterns, cultural roles, and on-going relationships, thereby opening up new opportunities as well as new pressures to establish functional social relationships. Younger children's social interactions are often encouraged and facilitated by parents and teachers. During the adolescent years the responsibilities of social interaction begin to shift to the adolescent, becoming the sole responsibility of the adolescent once he/she leaves home to go to the university. Whereas parents may have supported social relationships (and prevented social isolation) during childhood, few such supports exist for the new university student (Rao, Beidel, Turner, Ammerman, Crosby & Sallee, 2007).

Furthermore, there is good reason to expect that social anxiety makes the transition to college life stressful for the individual given the importance of social participation to both academic and personal outcomes. Research regarding the impact of social anxiety on academic adjustment to the university was conducted in a two-year longitudinal study that examined college GPA and academic persistence. Strahan (2003) examined drop-out rates, GPA, social anxiety, and social skills during a two year study with a sample of 55 undergraduates who scored within the clinical range for social anxiety disorder. While social anxiety did not predict GPA or academic persistence, findings did indicate that social anxiety was associated with self-rated social communication difficulties, including verbal expression and the ability to engage in social discourse with others, role-playing ability and social self-presentation skills, and social sensitivity in interpreting the verbal communication of others.

In a study conducted by Turner, Beidel, Dancu, & Keys (1986) 85% of students with social phobia reported academic adjustment problems including poor grades due to lack of class participation, avoidance of public-speaking requirements, deciding not to attend graduate school, and transferring to another college to avoid oral presentations.

Other evidence of university adjustment difficulties associated with social anxiety includes findings documenting significant levels of discomfort and dissatisfaction with undergraduate experience among honors students with high trait social anxiety (Langston & Cantor, 1989). In addition, students high in social anxiety engage in more emotion-focused coping rather than task-oriented coping and report greater levels of academic strain than their non-anxious peers (Zeidner, 1994), and socially anxious students are more susceptible to peer influence regarding alcohol consumption (Neighbors, Fossos, Woods, Fabiano, Sledge & Frost, 2007).

Taken together, these studies indicate that social anxiety is a significant problem for vulnerable university students and can lead to some serious outcomes. It is highly plausible that social concerns affect the transition of new students during their first-year of college, and, given the social challenges posed during this transitional period, failure to resolve social difficulties may contribute to the development of maladaptive patterned behaviors of social anxiety and avoidance that carry into adulthood, as well as to poor academic outcomes and other internalizing and externalizing behaviors.

University entry provides an especially viable timeframe to examine the developmental course of social anxiety for vulnerable students and to document factors central to the escalation from vulnerability to maladaptive social behavioral patterns and cognitions. Understanding how socially-anxious individuals respond to the social challenges of new university environments is important in determining which factors lead to positive university adjustment, and which factors may lead to adaptive or maladaptive social adjustment more broadly. In addition to negatively affecting academic outcomes and social comfort at the university, increased social anxiety and withdrawal over time may contribute to a negative cascade of anxiety and social avoidance that results in debilitating fears and avoidant behavioral patterns that may affect the individual well beyond the university years. Thus, identifying the critical factors that decrease social engagement and lead to increased social anxiety and social avoidance is vital in informing interventions aimed at preventing the development of lifetime social avoidance patterns and social anxiety disorders as well as in identifying effective interventions aimed at assisting vulnerable students in making a positive adjustment to university and adult life. Accordingly, this study examines the social challenges of vulnerable first-year university students and seeks

determine the role that different variables play in their daily experience of social anxiety and in their behavioral choices.

Social Anxiety in this Study

To work towards an understanding of the process of maladaptive social anxiety within individuals, this study examines the course of social anxiety in everyday life using a daily social interaction assessment procedure. Existing cognitive behavioral models of social anxiety are utilized to provide a foundation for identifying factors influencing the development of social interaction patterns within the person. Factors utilized in this study that are hypothesized to influence the individual's inclination to experience anxious distress and engage in behavioral avoidance include: 1) the degree of general vulnerability to social anxiety and fear of negative evaluation, as it operates within the individual, 2) the anticipatory processing of threat and anxiety undertaken in anticipation of a social event, 3) the extent of post-event rumination following the social interaction, and 4) the degree of engagement in or avoidance of the social interaction.

Through examining the relations between these daily factors, as well as how these factors evolve and cascade over time during the transition to university life, this research seeks to determine the role that these variables play in the daily experience of vulnerable individuals by determining what processes are functioning to motivate the individual in the moment to be more likely to engage in social interaction versus exhibiting greater social avoidance and withdrawal. It also seeks to determine the relations between factors over time that lead to increased affective vulnerability and patterns of social avoidance.

Socially-Anxious Vulnerability

As indicated previously, individuals susceptible to social anxiety likely suffer from a host of early biological, temperamental, and environmental risk factors. At the heart of this vulnerability is a fundamental fear of negative evaluation from others. Much research has established that fear of negative evaluation is a central feature of SAD, and central to the diagnosis of disorder. Hence, the measurement of feelings of social anxiety, in general, and fear of negative evaluation, in particular, represent a central dependent variable in the negative cascade model.

In this study we seek to assess daily experiences of socially-anxious feelings and fear of negative evaluation, as a central marker of an individual's progression toward or away from a diagnosis of SAD. In testing the negative cascade model, we seek to demonstrate how this socially-anxious vulnerability is influenced over time as a function of one's daily social interaction experiences and the cognitive and behavioral responses one employs.

Social Behavior: Engagement vs. Avoidance

In addition to anxious affect and fears of negative evaluation, individuals with SAD are characterized by high rates of socially avoidant behaviors and social isolation. The behavioral response of social avoidance has long been identified as a problematic symptom of social anxiety disorder in that it furthers the lack of social connection that an individual experiences and destroys support and assistance networks. One of the ways this occurs is through the mechanism whereby social avoidance seems to perpetrate future avoidance. Avoidance reduces the immediate anxiety by removing the threat associated with engaging in social interaction and thereby likely reinforces future avoidant behavior. In a similar manner, engagement in social interactions with positive outcomes likely supports future engagement and decreases future

anxiety. However, the positive effects of social engagement are contingent on the individual participating in the interaction until the initial anxiety has decreased and positive outcomes can emerge (Beidel & Turner, 1998).

Fully experiencing the feared social setting allows the anxious individual to experience the fear and to acclimate to it, eventually bringing about habituation. Accordingly, exposure to fear in the social interaction until habituation has occurred has been found to be the central component of effective treatment for social phobia (Beidel & Turner, 1998). Thus full engagement in social interactions is likely an important component of managing social anxiety. Yet, socially anxious individuals often engage in behaviors aimed at reducing the risk involved in social interactions, such as avoiding eye contact, maintaining a stance at the periphery of a group, speaking softly and limitedly, or engaging in other attempts to control their anxiety (Rapee & Heimberg, 1997). However, these behaviors have been proposed to undermine the reduction of social anxiety through a number of potential paths. First, these safety/protective behaviors have been hypothesized to limit the processing of external feedback and thereby focus future recall of social interactions on the anxious internal states and concerns. Second, safety/protective behaviors may create additional anxiety associated with maintaining them. Third, they may create a self-fulfilling prophecy whereby the safety/protective behaviors actually evoke the feared response from others (Clark & Wells, 1995), for example avoiding eye contact may lead other participants to end the social interaction prematurely.

Cognitive Factors – Anticipatory Processing and Post-Event Rumination

Cognitive processes are thought to function as important factors affecting the maintenance and escalation of both the affective dimensions of SAD (feelings of social anxiety and fear of negative evaluation) and the behavioral dimensions (social avoidance).

Anticipatory processing. As previously indicated, anticipatory processing plays a central role in cognitive behavioral models of social anxiety. Several studies have also supported the role of anticipatory processing in social anxiety. Vassilopoulos (2008) examined participants thoughts and memories processed in anticipation of a social-anxiety provoking event and found that high socially-anxious individuals retrieved less positive autobiographical memories and reported more negative thoughts and feelings whereas low socially-anxious individuals reported more positive autobiographical memories. This finding supports other studies that have suggested that those low in social anxiety may prepare for anxiety-provoking interactions in more positive ways, such as by activating positive views of oneself (Mansell & Clark, 1999). High socially-anxious individuals were found to engage in more 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. Furthermore, high socially-anxious individuals were more likely to generate plans to reduce anxiety or to make it less visible, rather than engaging in plans to improve performance.

In one study examining cognitive processing of threat and control, Rapee (1997) assessed processing of the perceived likelihood of a negative outcome, the threat of such an outcome, perceived ability to prevent or avoid the outcome, and the expected fear or anxiety associated with the outcome, for 10 hypothetical situations. Social anxiety was found to be mediated by the processing of perceived consequences of the threat, as well as perceived control.

Hinrichsen & Clark (2003) also examined anticipatory processing by conducted semi-structured interviews assessing thoughts and feelings experienced prior to a social-anxiety provoking event. They found that high socially anxious individuals recalled more perceived

failures than successes, engaged in more analyses of what might happen, thought more about how they would look to others, prepared for what they thought might happen, and thought more about ways to escape or avoid the situation. A follow-up experimental manipulation revealed that engagement in such anticipatory processing lead 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 socially anxious individuals that, in part, leads to greater anxiety in the feared situation.

In addition to its impact on social anxiety, the extent of one's anticipatory processing—the degree to which one engages in negative thoughts and dwells on the threat or risk associated with the anticipated social event—likely influences one's choice to avoid or engage in the activity. In addition it may influence coping responses and safety behaviors initiated to protect oneself from negative consequences. Accordingly, this study will examine the relation between anticipatory processing and the degree of social engagement or avoidance, as well as examine this relation over time to assess how changes in this relation may be related to future outcomes.

Post-event rumination. Much research has pointed to post-event rumination as being an important variable in the maintenance of social anxiety (Abbott & Rapee, 2004; Dannahy & Stopa, 2007; Mellings & Alden, 2000). Post-event rumination is hypothesized to result from preoccupation with thoughts, feelings, and ambiguous information experienced in anxiety-provoking social interactions (Clark & Wells, 1985) and has been found to be experienced more negatively in individuals high in social anxiety (Mellings & Alden, 2000).

In support of similar previous research, Dannahy and Stopa (2007) found that post-event processing was linked to the extent of anxiety experienced and to negative appraisals of performance. Indeed, additional research has supported the claim that socially-anxious

individuals show negative-bias in assessing their own performance (Abbott & Rapee, 2004; Rapee & Lim, 1992) and that this biased perception of their performance during the social interaction mediates the relation between anxiety and post-event rumination. Post-event processing was also found to predict open-ended recall of negative self-related information and negative bias in self-judgments, as assessed the day following a laboratory social interaction (Mellings & Alden, 2000).

In a study on post-event rumination in which a diary method was used, Lundh & Sperling (2002) found that both same-day post-event processing and next-day post-event processing scores were positively correlated with social anxiety. In addition, greater same day post-event processing was highly correlated with greater next day post-event processing, suggesting that post-event rumination may be a maladaptive patterned response contributing to the development and maintenance of social anxiety over time (Mattick & Clarke, 1998).

Social Anxiety Developmental Cascade Model

The social anxiety developmental cascade model proposed in this study is based upon the general cognitive behavioral models and research presented above with a focus on the affective experiences, cognitive processing, and behavioral choices that represent the core symptoms of SAD. Specifically, this study focuses on socially anxious affective vulnerability, herein referred to as social anxiety, and engagement in safety/protective behaviors, herein referred to as social avoidance, as two particularly important outcomes influencing the development of SAD. For the purposes of this study, social anxiety and social avoidance are conceived of as markers of development towards or away from a diagnosis of SAD and are therefore conceived of as outcomes in this study. However, they are also conceived as interacting variables in the social anxiety process at work on a daily basis within an individual. Indeed, it is proposed that it is the

interplay of social anxiety, cognitive processing, and social avoidance, over time, that leads to increasing or decreasing levels of social anxiety and social avoidance. However, examination of the relations between these affective, cognitive and behavioral variables as they interact within and around a single given social encounter is also important in understanding the process of social anxiety. Hypotheses of this study can therefore be organized around two levels of examination. The first being the within time or situational process that unfolds as an individual encounters an anxiety-provoking social situation and responds affectively, cognitively, and behaviorally. The second is the across time process that unfolds as the individual experiences daily anxiety-provoking social interactions and responds in ways that are influenced by and built upon previous social encounters, thereby accumulating, transforming, and developing stable, increasing, or decreasing patterns of social anxiety and social avoidance.

Depiction of the hypothesized model is presented in Figure 1. Within time hypotheses, each of which will be described in detail in the following paragraph, are depicted on the left side of the figure with numbered pathways. Across time hypotheses (also detailed below) are depicted as pathways leading from the left side to the right side of Figure 1 and are identified with letters. The right side of Figure 1 reiterates the within time relations depicted in the left side of the figure, albeit at the next time point.

Within time hypotheses. Within the situational process occurring in response to a single anxiety-provoking social event, it is hypothesized that maladaptive cognitive processing (i.e. anticipatory processing and post-event rumination) is influenced by one's social anxiety. Specifically, social anxiety is hypothesized to predict anticipatory processing (See Figure 1, Path 1), and to predict post-event rumination (Path 2). It is also hypothesized that maladaptive cognitive processing fuels social avoidance. Accordingly, anticipatory processing is

hypothesized to predict social avoidance (see Path 3); with post-event rumination also hypothesized to predict social avoidance (Path 4). Furthermore, as maladaptive cognitive processes, anticipation and rumination are expected to be moderately correlated (Path 5).

Across time hypotheses – Social anxiety. Focusing first on social anxiety as an outcome, there are likely a number of processes and relations that account for stability or change in social anxiety over time. It is herein proposed that, for vulnerable college students, social anxiety is somewhat stable across time as factors such as genetics, early parent-child interactions, and personal history are thought to underlie such vulnerability. Accordingly it is hypothesized that social anxiety at a subsequent time point (Time +1) is predicted by social anxiety at the preceding time point (Time). See path (A) in Figure 1.

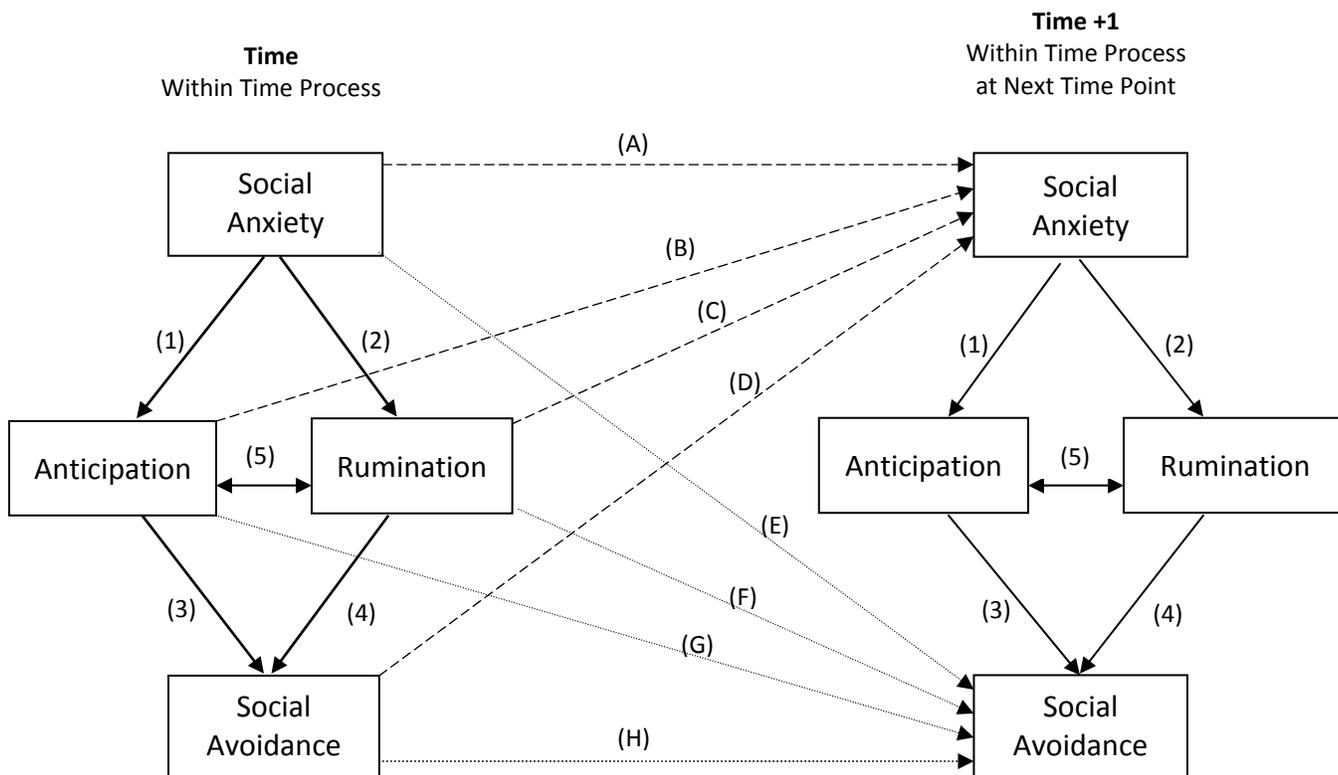


Figure 1. Hypothesized Social Anxiety Cascade Model

Maladaptive cognitive processing is also hypothesized to influence social anxiety across time through a process whereby focusing on negative thoughts and feelings both before and after an event leads one to be more likely to assess new social experiences as threatening and potentially negative. Accordingly, it is hypothesized that social anxiety at the subsequent time point is predicted by anticipatory processing at the preceding time point (Figure 1, Path B); and also predicted by post-event rumination at the preceding time point (Path C).

Furthermore, in a process of negative coping involving maladaptive social avoidance, socially avoidant protective/safety behaviors may provide some relief from within situation anxiety. Such relief may fuel a negative reinforcement cycle maintaining social avoidance via decreasing social anxiety. Accordingly, social anxiety at the subsequent time point is hypothesized to be negatively related to social avoidance at the preceding time point (Path D). While this may translate into what appears to be decreasing social anxiety across time, such adjustments should be viewed as maladaptive and limited in their usefulness. Over time social avoidance likely facilitates negative cognitive processing and may affect other processes not addressed in this study, eventually breaking down social relationships and leading to increased social anxiety issues.

Across time hypotheses – Social avoidance. With regard to social avoidance as an outcome, it is expected that social anxiety is positively related to social avoidance in that social anxiety drives the behavioral attempt to control/reduce social anxiety through engagement in protective/safety behaviors of avoidance. It is therefore hypothesized that social anxiety predicts subsequent social avoidance across time (Figure 1, Path E).

Additionally, maladaptive cognitive processing theoretically focuses the individual on negative thoughts and feelings about social interactions, precluding preparation for more

adaptive behavioral responses, and motivating individuals to engage in behaviors that avoid threat and protect the self. Accordingly, in this study, it is hypothesized that maladaptive cognitive processing, both before and after social interaction is positively related to social avoidance across time. Specifically, social avoidance at the subsequent time point is hypothesized to be predicted by anticipatory processing at the preceding time point (Path G) and by post-event rumination at the preceding time point (Path F).

Finally, due to the process of avoidant negative reinforcement, it is hypothesized that the use of social avoidant behaviors leads to increased social avoidance over time. Specifically, social avoidance at the subsequent time point is predicted by social avoidance at the preceding time point (Path H).

Method

Participants

Participants for this study were pre-screened from a large introductory course at a mid-Atlantic university. As a means of selecting participants facing the challenge of adjusting to university life outside of their previous social support structures, criteria for participation in the study included enrollment status as a first-semester university freshman having never attended college previously, having come to the university from an outside community, and currently living in the university dormitories. Additionally, participants were selected based on a preliminary assessment of social anxiety vulnerability assessed with the Social Avoidance and Distress (SAD) scale. The SAD scale is a 28 item true/false measure which includes items such as “I often find social occasions upsetting”, “I usually feel relaxed when I meet someone for the first time” (reversed), and “I usually feel uncomfortable when I am in a large group of people”. The SAD scale has been shown to be correlated with a fear of negative evaluation, $r = 0.75$, and

has shown sufficient reliability (Watson & Friend, 1969). Previous studies have utilized scores of 11 or 13 as a cut-off for high versus low socially anxious groups (see Watson & Friend, 1969; Mellings, & Alden, 1999). In this study, criteria for participation included scoring 12 or higher on the SAD scale.

Of approximately 200 freshman students who completed the SAD scale screening, 21 scored above the cut-off and were invited to participate in the study. Twelve students agreed to participate. However, one withdrew after two weeks and another failed to follow instructions resulting in unusable data. Thus, the study involved the data from 10 qualified participants.

The majority of participants were female (one male participated) and appeared to represent a wide range of ethnic backgrounds. Pre- and post-assessments using the SAD scale, and the Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998) indicated that all participants continued to exhibit social anxiety vulnerability across the semester.

Assessment

Daily assessments were taken throughout 13 weeks of the participants' first semester. Assessments were completed online during the participant's own time and at their convenience. While daily completion of the assessment was emphasized, participants were also given a goal of completing the daily assessment on at least 60 occasions. The number of assessments completed by each participant is presented in Table 1. Participants were also instructed that assessments were to be spaced at least 24 hours apart. Participants were provided with cash incentives after the completion of 15, 30, 45 and 60 assessments and received additional tokens of appreciation for their participation throughout the semester.

During the daily assessment, participants responded to questions and provided information about the salient social-anxiety producing situations that they encountered each day.

At each assessment, participants were asked to briefly describe the setting of the most salient social event they experienced/encountered each day and respond to questions regarding their general socially-anxious affectivity, the degree to which they experienced anxiety and perceived threat as they anticipated the social event, whether or not they avoided or participated in the event, and which coping and safety behaviors they used. They were also asked to report on the extent of their rumination following the event.

Table 1. Number of Participant Daily Assessments

Participant	Assessments Completed
Subject 1	63
Subject 2	27
Subject 3	60
Subject 4	66
Subject 5	68
Subject 6	60
Subject 7	69
Subject 8	26
Subject 9	62
Subject 10	31

Given the effort required from participants in association with daily assessments, measures were condensed from full versions of established scales. Additionally, the rating scales for the various assessment measures used were modified to have two specified poles (e.g. “not at all” and “very much”) and ten unspecified response points. This was done to allow for more sensitive variation in scoring than existed in the original rating scales. The reliability and validity of the modified and condensed measures are presented in the results section.

Measures

Fear of Negative Evaluation

Individuals differ in the degree to which they experience general social anxiety as it relates to social interaction and high and low socially-anxious groups have often been created on the basis of individuals' scores on the Fear of Negative Evaluation scale (FNE; Watson & Friend, 1969). While fear of negative evaluation does not imply a concern with inferiority, it does imply apprehension, distress, and negative expectations regarding other's evaluations. As such it is often a central marker of social anxiety vulnerability.

In this study, daily assessments of affective socially-anxious vulnerability were taken using the 8 positively-worded items from the Brief Fear of Negative Evaluation scale (BFNE; Leary, 1983), including "I worried about what kind of impression I would make", and "I worried I would say or do the wrong things". Use of the 8 positively-worded items as a viable scale has been validated in research involving factor analysis of the BFNE which indicated a two-factor solution with positively-worded (or straightforward) items creating one factor and the reversed or negatively-worded items creating another. Further analyses of the straightforward items as a scale 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, Heimberg, Fresco, Hart, Turk, Schneier, et al., 2005).

Event Selection

Following the modified FNE scale, an open-ended question asked participants to consider the opportunities that they had each day to interact with unfamiliar others and to select the most salient anxiety-provoking social interaction opportunity they encountered. To help guide the

selection of relevant experiences, participants were given a list of types of potential experiences (i.e. informal opportunity to initiate a conversation with an unfamiliar person), and were asked to indicate which type of interaction they participated in. The participant was also asked to briefly describe the opportunity/event they selected.

Anticipatory Processing

After selecting a relevant social interaction, participants were then asked to consider and reported on their thoughts associated with the event. Participants were first asked to report on thoughts and feelings occurring prior to the event which were associated with anticipating the event. Anticipatory processing, including the degree of perceived threat, was assessed with six items taken from the 12-item Anticipatory Social Behaviors Questionnaire (ASBQ; Hinrichsen & Clark, 2003). Items 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 analyses of the ASBQ in high and low socially-anxious groups indicated higher scores and greater endorsement of nearly all items for the high socially-anxious group (Hinrichsen & Clark, 2003).

Post-Event Rumination

Participants were also asked to respond to questions regarding the extent to which they thought about (ruminated over) the event since it occurred. Negative post-event rumination was assessed using 5 items from the Post-Event Processing Questionnaire (PEPQ; Rachman, Gruter-Andrew, & Shafran, 2000) including “Thoughts about the event interfered with my concentration” and “My feeling about the event got worse and worse”. The PEPQ has shown excellent internal reliability ($\alpha = .87-.85$) and higher scores in social-anxious clinical samples as compared to non-clinical samples. Regression analyses using depression, anxiety, stress and

rumination to predict state anxiety found that post-event processing, as assessed by the PEPQ, was the only significant predictor (Rachman, Gruter-Andrew, & Shafran, 2000).

Social Avoidance

For each daily social interaction, participants were also asked to report on the degree and quality of their participation in the social interaction. As cognitive behavioral models of social anxiety propose that socially-anxious individuals often engage in safety/protective behaviors to avoid negative evaluation, social avoidance was assessed with the following items: “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.

The full online assessment consisted of a login page, five separate assessment pages participants navigated while completing the measures, and a verification of completion page. The assessment pages are presented in the Appendix.

Results

Measurement Validity

In order to verify the validity of the constructs as measured in this study, all data for each construct was submitted to a confirmatory one-factor model analysis and model fit indices were examined. Specifically, the comparative fit index (CFI), which is a robust fit index especially appropriate for small samples, was examined. A CFI above .90 indicates a good fitting model, while a CFI above .95 indicates an excellent fit.

Analysis of fear of negative evaluation verified an excellent fit to a one-factor model, CFI = 0.97; as was also the case for anticipatory anxiety, CFI = 0.98; post-event rumination, CFI =

0.96; and social avoidance, CFI = 0.99. Furthermore, reliability coefficients for each construct were also computed using Cronbach's alpha: for fear of negative evaluation, $\alpha = 0.97$; anticipatory anxiety, $\alpha = 0.99$, post-event rumination, $\alpha = 0.99$, social avoidance, $\alpha = 0.98$.

Reliability and validity is high for the measures as used in this study. Yet of additional importance to the goals of this study, is the validity of the measures for use with individual subjects. Accordingly, a confirmatory one-factor model was fit for each of the variables for each individual participant. Examination of the model fit indices indicated that all variables for all participants satisfactorily fit a one-factor model. The CFI's for each variable for each participant are presented in Table 2.

Table 2. Comparative Fit Index for Confirmatory One-factor Measurement Models by Subject

	FEAR of NEGATIVE EVALUATION	ANTICIPATORY ANXIETY	POST-EVENT RUMINATION	SOCIAL AVOIDANCE
Subject 1	.95	1.00	0.99	1.00
Subject 2	0.94	0.96	0.94	1.00
Subject 3	0.96	1.00	0.97	0.99
Subject 4	0.96	0.96	0.98	0.94
Subject 5	0.93	0.95	0.97	0.95
Subject 6	0.96	0.89	0.92	0.97
Subject 7	0.96	0.93	0.98	0.98
Subject 8	0.99	0.95	0.95	0.96
Subject 9	0.98	0.98	0.99	1.00
Subject 10	0.98	0.95	0.93	0.94
ALL	0.97	0.98	0.96	0.99

Descriptive data for fear of negative evaluation, anticipatory processing, post-event rumination, and social avoidance were also examined. Specifically, the mean level of each

variable, as well as the mean level of each variable for each participant, was examined. For each variable, scores range from 1-10 with higher scores indicating higher levels of the construct.

Means are presented in Table 3.

Table 3. Variable Means by Subject

	FEAR of NEGATIVE EVALUATION	ANTICIPATORY ANXIETY	POST-EVENT RUMINATION	SOCIAL AVOIDANCE
Subject 1	5.61	6.56	4.44	5.62
Subject 2	6.41	5.05	4.58	4.87
Subject 3	5.12	5.36	4.20	4.80
Subject 4	5.09	3.18	3.44	2.83
Subject 5	3.00	3.51	2.22	4.00
Subject 6	3.21	2.37	1.65	3.16
Subject 7	8.44	7.60	5.98	6.74
Subject 8	7.45	5.24	6.40	4.57
Subject 9	2.72	4.08	2.76	4.31
Subject 10	4.17	4.22	3.06	3.30
ALL	5.12	4.72	3.87	4.42

Next, preliminary analyses of the relations between variables were examined. To do so, factor scores for each of the four variables at each time point were computed for the overall data, as well as for each participant. Correlations between the four variables for each participant, as well as the aggregated (group) data, were then examined and are presented in Table 4.

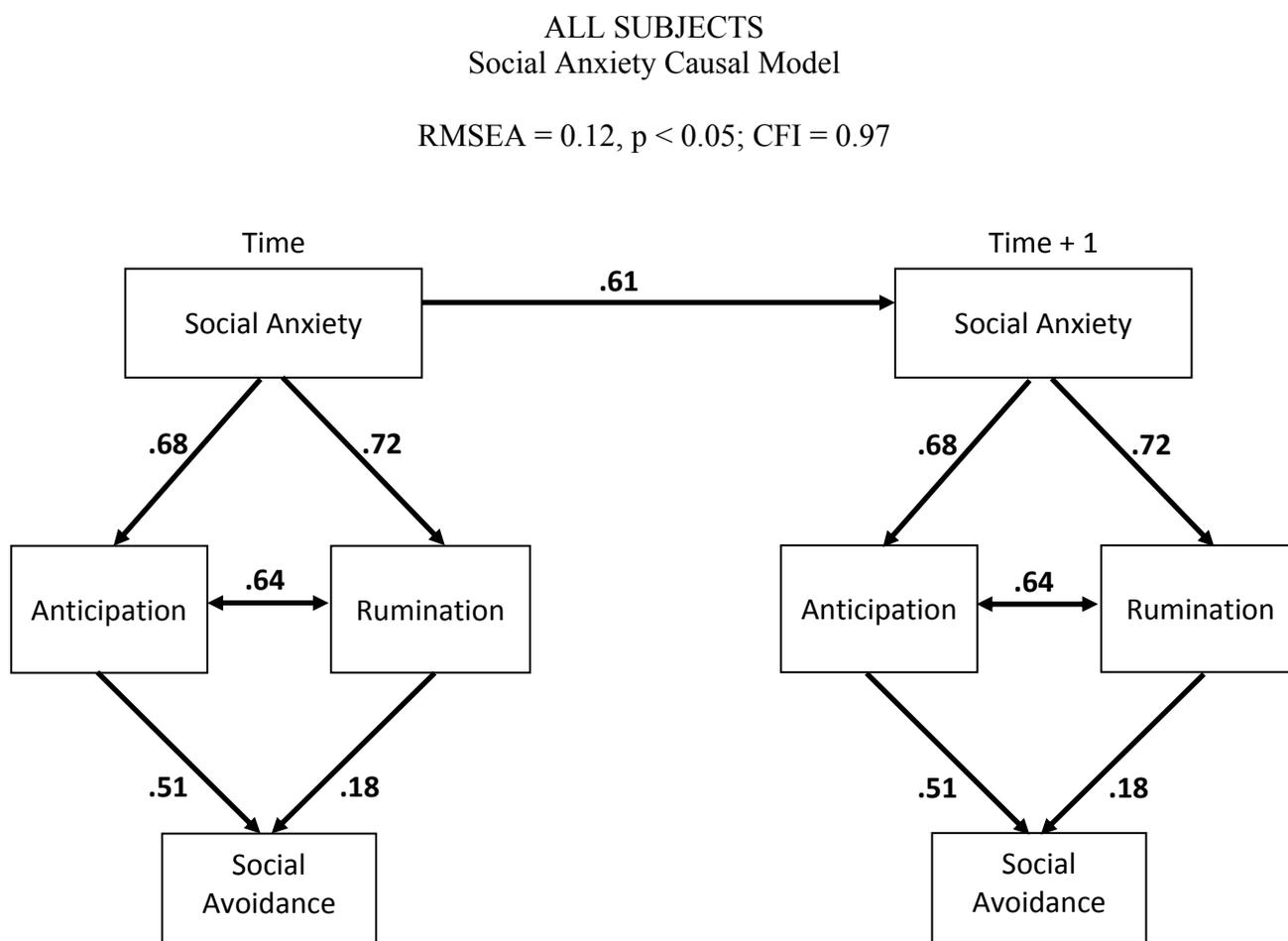
While the aggregated data shows moderate correlations between all variables, a number of these correlations are non-existent in individual participants. This difference is explored further in comparisons between the hypothesized model as fit to aggregated (group or sample) data and the hypothesized model as fit to individual data.

Table 4. Correlations of all Variables for Group and Individuals

		Fear of Negative Evaluation	Anticipatory Anxiety	Post-Event Rumination
Anticipatory Anxiety	All	0.68		
	Subj. 1	0.66		
	2	0.63		
	3	0.28		
	4	0.47		
	5	0.62		
	6	0.02		
	7	0.97		
	8	-0.02		
	9	0.22		
	10	0.54		
Post-Event Rumination	All	0.72	0.64	
	Subj. 1	0.59	0.54	
	2	0.75	0.65	
	3	0.09	0.28	
	4	0.67	0.55	
	5	0.38	0.32	
	6	-0.01	0.03	
	7	0.79	0.86	
	8	0.56	0.24	
	9	0.03	0.07	
	10	0.79	0.56	
Social Avoidance	All	0.49	0.63	0.50
	Subj. 1	0.01	0.08	0.08
	2	0.24	0.31	0.51
	3	0.05	0.54	0.33
	4	0.40	0.42	0.56
	5	0.47	0.60	0.28
	6	0.18	0.33	-0.05
	7	0.84	0.86	0.79
	8	-0.07	0.30	0.24
	9	-0.05	0.27	0.13
	10	0.61	0.62	0.73

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 sample of participants, time series analyses were used to fit the hypothesized model to the full aggregated data. The fit of the group data to the full hypothesized model was excellent; CFI = 0.97. Significant relations are presented in Figure 2.



- Thick dark lines = Significant relations

Figure 2. Aggregated/Group Model

Within Time Relations – Group Model

As hypothesized, within time, the cognitive variables were strongly related to social anxiety. Anticipation was predicted by social anxiety, $\beta = 0.68$; and rumination was predicted by social anxiety, $\beta = 0.72$. As also expected, the cognitive variables predicted social avoidance. Anticipation moderately predicted social avoidance, $\beta = 0.51$, while rumination also predicted social avoidance, although less robustly, $\beta = 0.18$. As also hypothesized, anticipation and rumination were moderately correlated, $r = 0.64$.

Across Time Relations - Social Anxiety – Group Model

Examination of the across time hypothesized relations emerging in the group model, indicated only one significant relation. Social anxiety was found to evidence stability across time. That is, social anxiety at a subsequent time point was significantly predicted by social anxiety at the preceding time point, $\beta = 0.61$. The hypothesized relations between the cognitive variables at time and social anxiety at the next time point, and between social avoidance at time and social anxiety at the next time point were not significant.

Across Time Relations – Social Avoidance – Group Model

No significant across time relations emerged predicting social avoidance.

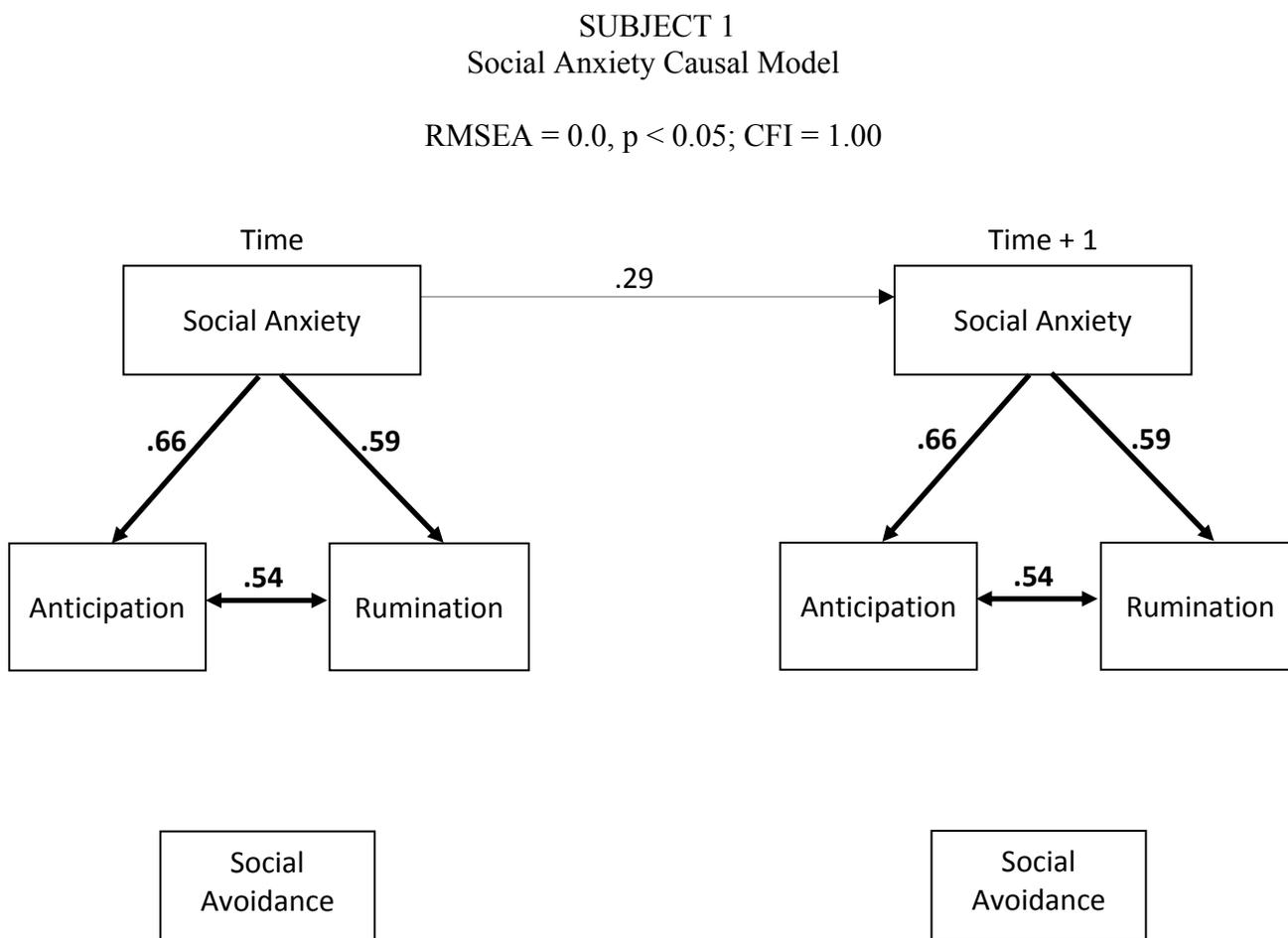
In summary, the group model confirmed the hypothesized social anxiety cascade model. All within time processes were significant. However, the only significant across time relation to emerge was the prediction of social anxiety from one time point to the next.

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 social anxiety over time, the primary goal of this study was to determine whether models and results obtained through general aggregated data (group or sample data) could be applied to individuals. Accordingly, the hypothesized model was also fit

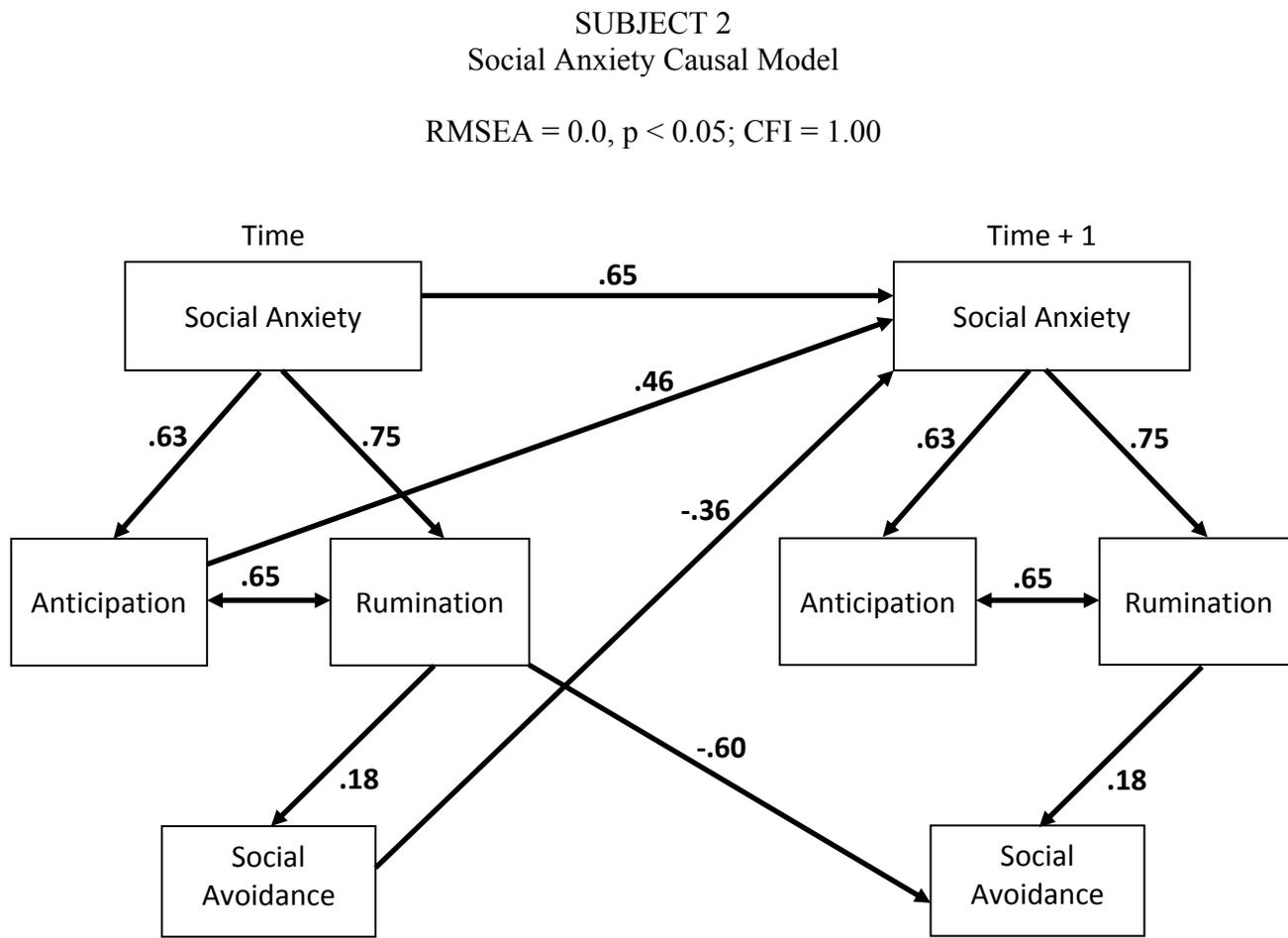
separately to each of the individual participants' data. For one participant (Subject 9), the model was clearly not an adequate fit to the data, CFI = 0.42, and is not presented further. For the other nine participants, model fit indices vary, but most indicated that the social interaction cascade model was a good explanation of relations in the data; CFI range 0.72-1.00. Individual models are presented in Figures 3-11.

Figure 3. Subject 1 Individual Model



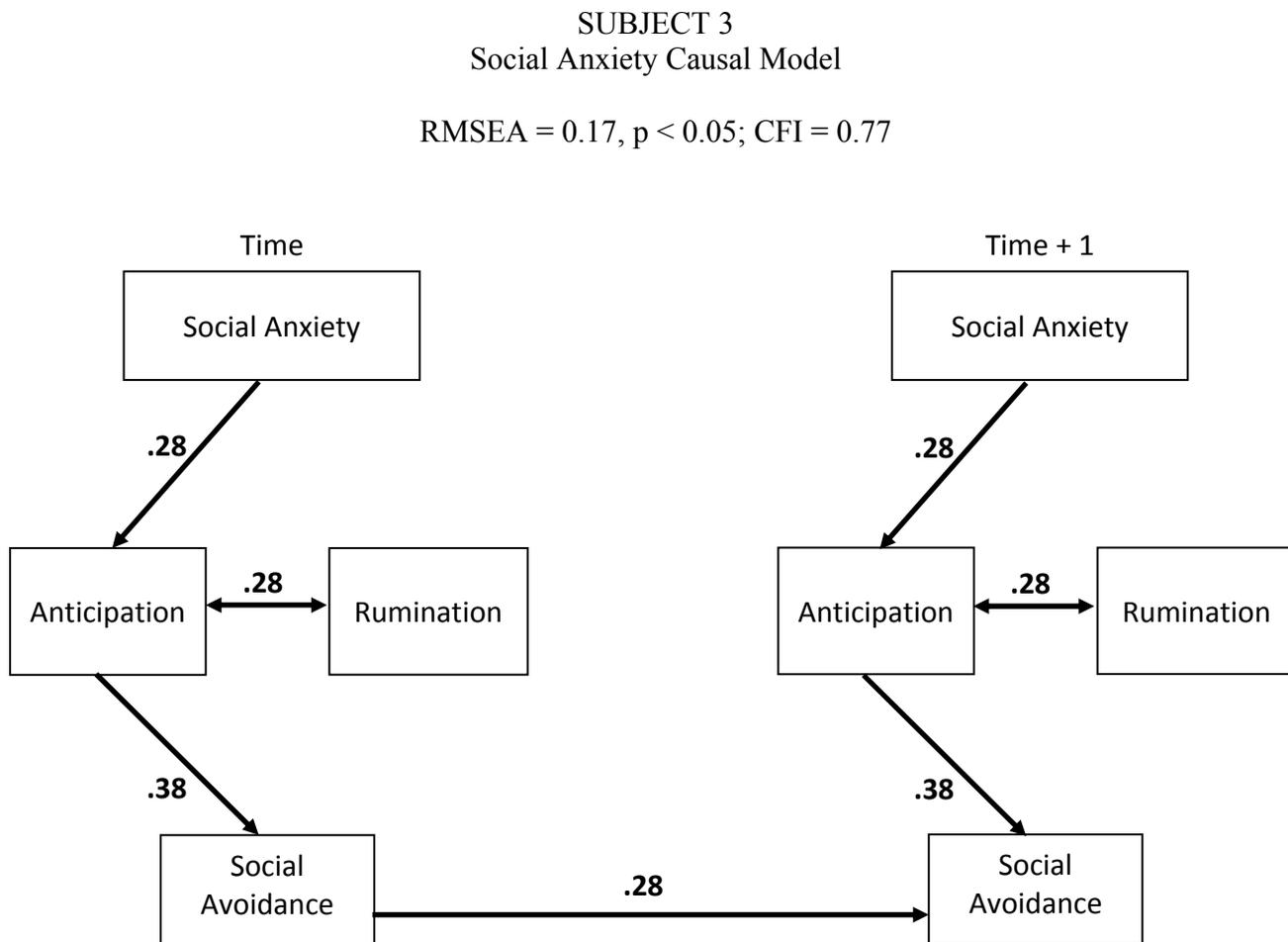
- Thick dark lines = Significant relations
- Thin lines = Trend relation

Figure 4. Subject 2 Individual Model



- Thick dark lines = Significant relations

Figure 5. Subject 3 Individual Model



- Thick dark lines = Significant relations

Figure 6. Subject 4 Individual Model

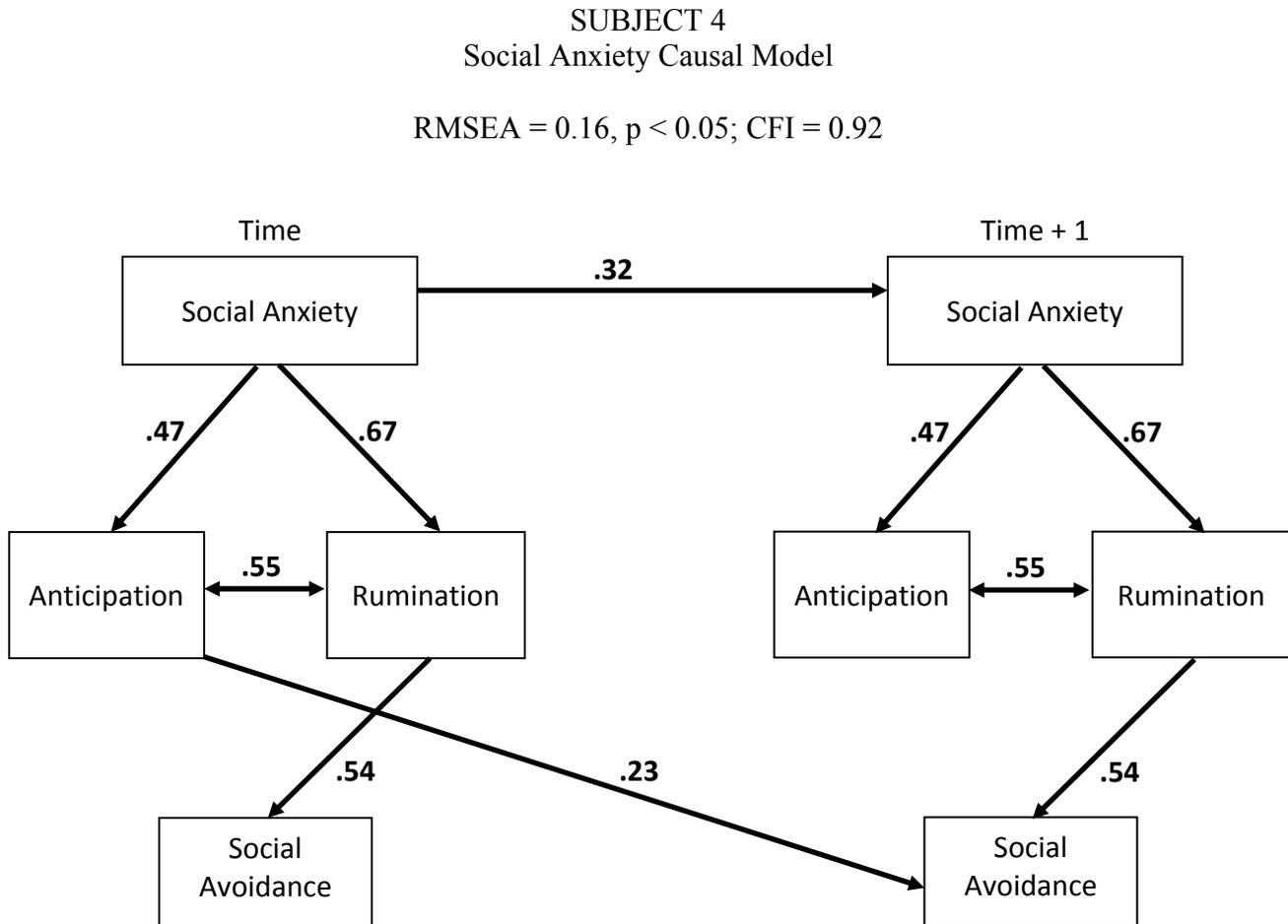
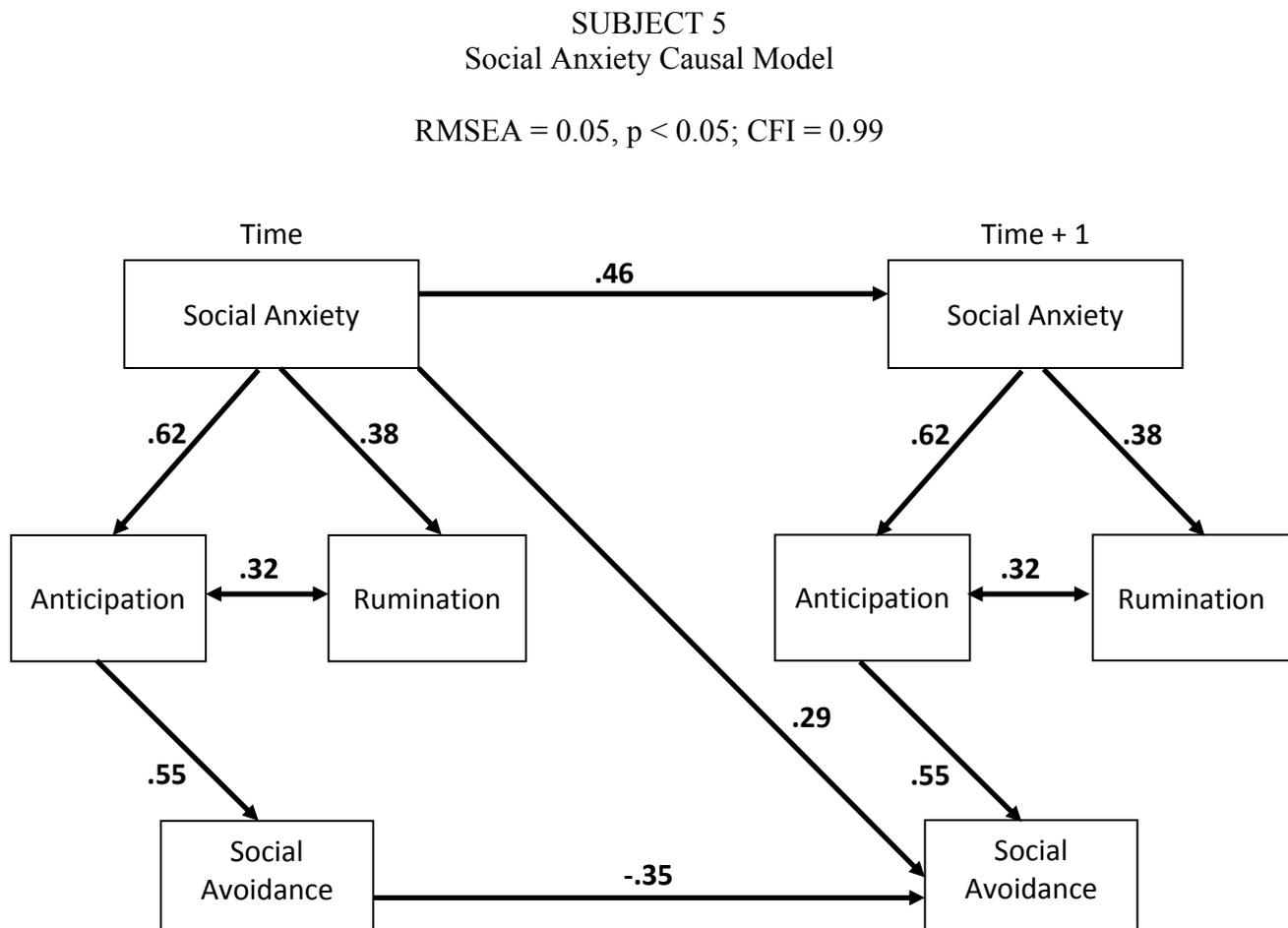
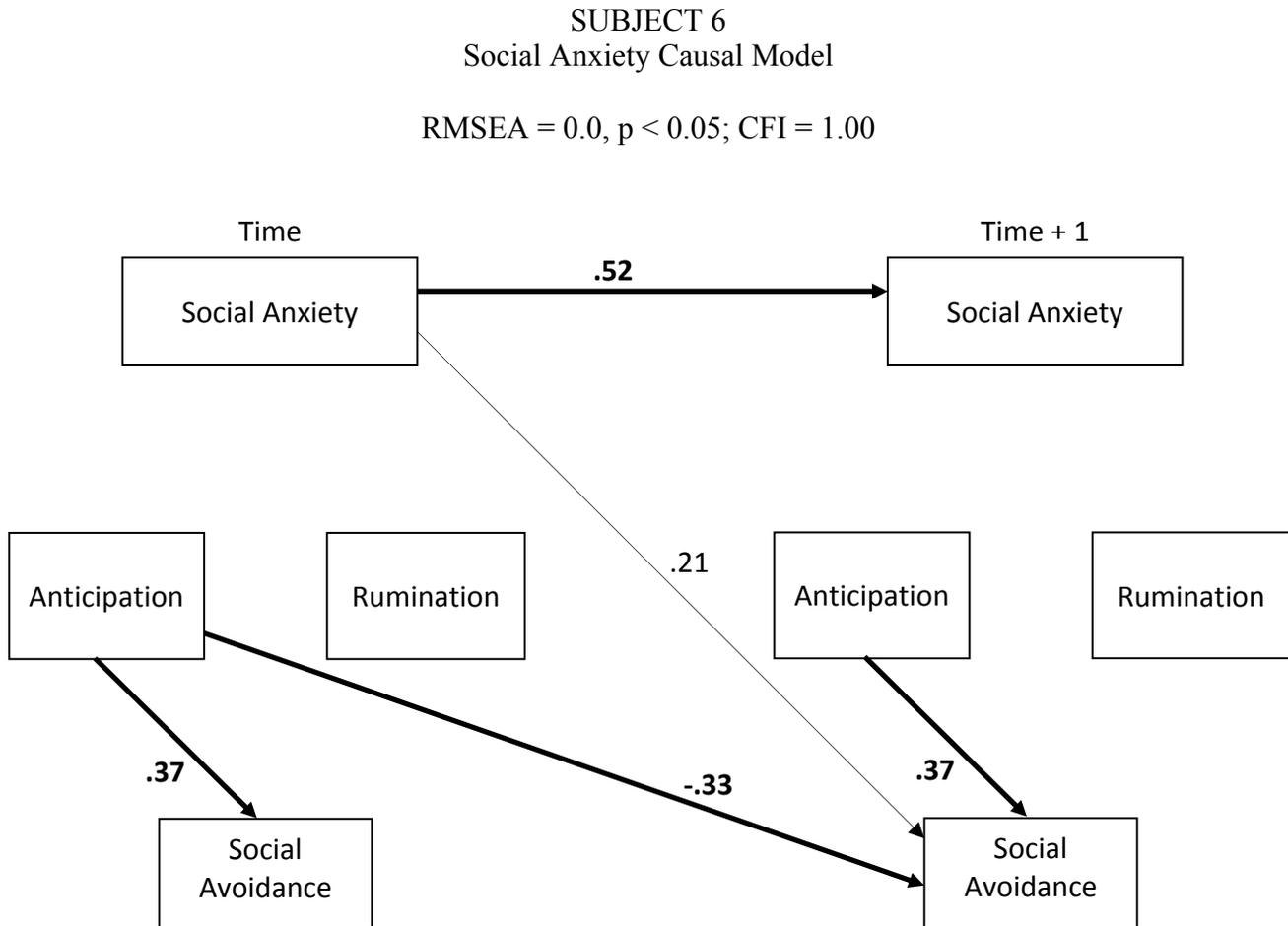


Figure 7. Subject 5 Individual Model



- Thick dark lines = Significant relations

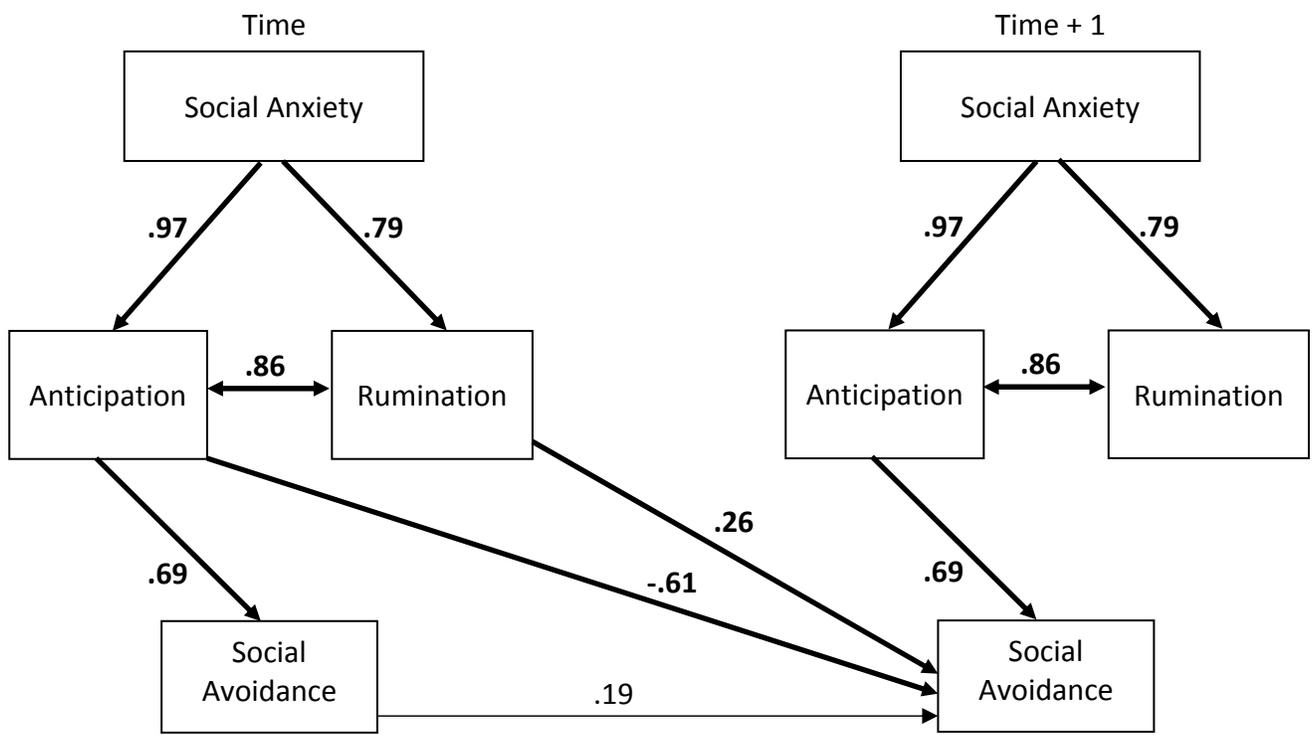
Figure 8. Subject 6 Individual Model



- Thick dark lines = Significant relations
- Thin lines = Trend relation

Figure 9. Subject 7 Individual Model

SUBJECT 7
Social Anxiety Causal Model
RMSEA = 0.0, p < 0.05; CFI = 1.00

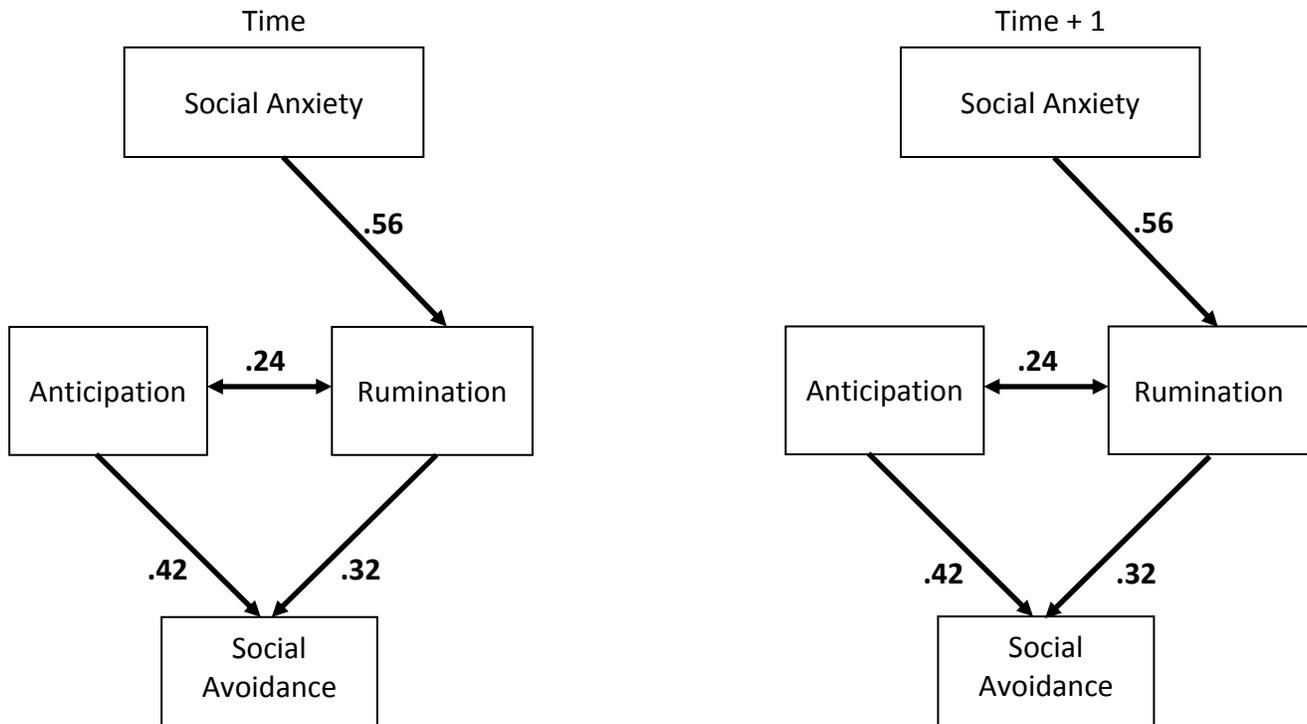


- Thick dark lines = Significant relations
- Thin lines = Trend relation

Figure 10. Subject 8 Individual Model

SUBJECT 8
Social Anxiety Causal Model

RMSEA = 0.19, $p < 0.05$; CFI = 0.72

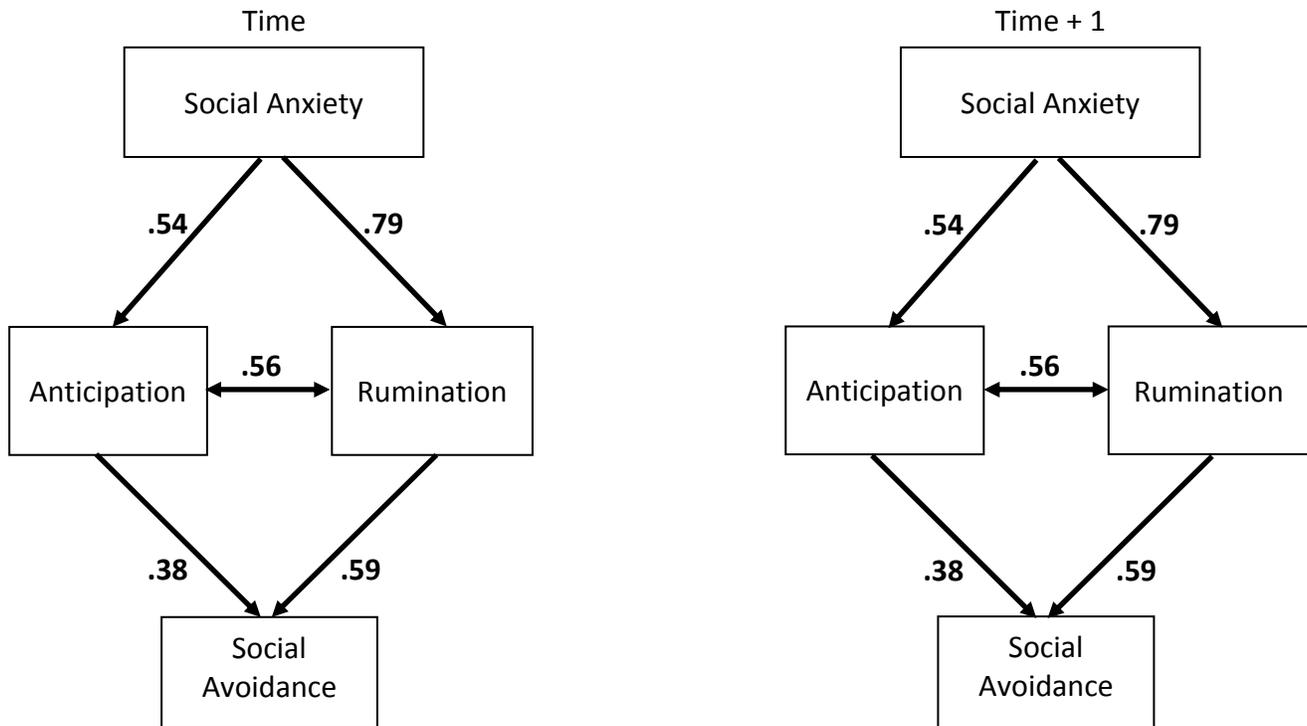


- Thick dark lines = Significant relations

Figure 11. Subject 10 Individual Model

SUBJECT 10
Social Anxiety Causal Model

RMSEA = 0.0, $p < 0.05$; CFI = 1.00



- Thick dark lines = Significant relations

Within Time Relations – Individual Models

As was the case for the group model, examination of the significant within time relations in individual models confirmed a general approximation of the hypothesized relations. All within time hypothesized relations significantly held for one individual (Subject 10). However, most individual models evidenced some variability from the within time hypothesized model.

For 60% percent of participants, individual models contained significant paths from social anxiety to anticipation and from social anxiety to rumination. Additionally, one participant evidenced a relation between social anxiety and anticipation, but no significant relation between social anxiety and rumination. Another participant evidenced a relation between social anxiety and rumination, but no significant relation between social anxiety and anticipation. Only one of the nine participants failed to evidence any of the expected within time relations with regard to social anxiety.

The full hypothesized model which included both within time hypothesized relations between the cognitive variables (anticipation and rumination), and social avoidance held for two of the participants, 20%. Additionally, another 40% of participants demonstrated a partial version of this hypothesized model with links evident between anticipation and social avoidance while the other 20% showed an alternative partial version of the model with links evident between rumination and social avoidance. Only one participant failed to evidence any of the expected within time relations with regard to social avoidance.

Furthermore, as hypothesized, anticipatory processing and post-event rumination were significantly correlated in 80% of participants; correlations ranged from $r = 0.24$ - 0.86 .

Across Time Relations – Social Anxiety – Individual Models

Examination of the significant across time relations evidenced in individual models confirmed that the stability of social anxiety found in the group model also held for 50% of the participants' individual models. Only one participant evidenced other significant relations across time with regard to social anxiety. A significant path from anticipation to social anxiety confirmed the expected influence of anticipation over time for Subject 2. Additionally, a significant negative relation between social avoidance and social anxiety confirmed the hypothesized negative coping relation for this same participant.

Across Time Relations – Social Avoidance – Individual Models

With regard to social avoidance, findings were mixed. Only 20% of participants evidenced a relation between social anxiety and social avoidance across time. Thirty percent of participants evidenced a relation between anticipation and social avoidance over time. However, for two of these three participants the relations were negative, for the other it was positive. Two participants also evidenced a relation between rumination and social avoidance. However, again, one of these relations was positive and one was negative. Finally, two participants evidenced support for the avoidant reinforcement hypothesis showing stability in social avoidance over time. However, an additional participant evidenced a negative relation in social avoidance over time.

Comparison of Group and Individual Model Findings

Comparison of the group model with the individual models indicated that the within time process whereby social anxiety predicted maladaptive cognitive processing, which in turn predicted social avoidance, generally held for individuals. While some variability in the within time process was evident, for most individuals, this variability consisted of one of the two

cognitive factors, anticipation or rumination, evidencing influence while the other did not. However, for two individuals the hypothesized within time process was incomplete. One evidenced a within time process for only social anxiety, while the other evidenced only a relation between anticipation and social avoidance. Furthermore, one individual evidenced no influence of rumination whatsoever.

While the within time process appeared to be somewhat generalizable, the across time processes showed extreme variability from one individual to the next. The only consistent pathway evidenced in some, but not all, individuals was stability in social anxiety from one time point to the next. Other hypothesized pathways emerged in individual models, but consistency was not clearly apparent and even the effect of influence (positive or negative) between factors varied among individuals.

Discussion

The goal of this study was to explore the applicability of the dynamic social interaction cascade model of social anxiety to vulnerable individuals who were making the transition to university life. This model was originally developed based upon findings in group data, and this study examined the degree to which the constructs in the model and their associations characterized the behaviors and feelings of ten socially anxious individuals. While there are clear limitations in the extent to which a single study can accomplish the vast goal of validating a dynamic model of social anxiety for individuals, a number of important steps were accomplished in this research. The following sections discuss the contribution of the present research to our understanding of: 1) the conceptualization and measurement of the constructs implicated in the dynamic cascade model of social anxiety within individuals, 2) the nature of individual variability in the dynamics of daily experiences of social anxiety, and 3) the nature of individual

variability in the dynamics of social avoidance. Implications and limitations of the current research are also discussed.

Conceptualizing and Measuring Components of Social Anxiety Within Individuals

The constructs of social anxiety, anticipatory processing, post-event rumination, and social avoidance as measured in this study were found to be valid, cohesive constructs within individuals. This is an important finding because often constructs that appear cohesive when examined with group data fail to replicate within individuals. Indeed, one would not expect constructs that hold for groups to necessarily also hold for the individuals within those groups except in situations in which populations are homogeneous in all essential elements and the constructs of interest are stationary. Particularly 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. Furthermore, given the multiple influential factors that operate to affect each individual's development and adaptation, including genetics, temperament, parenting and personal history, heterogeneity clearly exists between participants in this study with regard to the features that set the stage for their social anxiety and reactivity to the new social demands of college. During the period of heightened novelty and challenge associated with college entry, one might particularly expect variation among individuals in their social perceptions, affect, and behaviors, and hence in the way their social anxiety is construed and experienced.

Furthermore, past research suggests that constructs based upon group data rarely replicate within individuals. For example, the Big Five personality traits, which have consistently been found in group samples, have not been replicated in individuals. Instead, as evidenced in

research on the Big Five traits in individuals, more complex constructs tend to emerge instead (Molenaar & Campbell, 2009).

The finding in this study that the constructs of social anxiety, anticipatory processing, post-event rumination, and social avoidance, as measured, were applicable within individuals is an important first step in validating our existing knowledge of social anxiety. Furthermore, the reliability and validity of the measures used in this study suggest that they are viable tools for the assessment of an individual's social anxiety and can be utilized as we move forward in studying the development and maintenance of social anxiety within individuals.

The cohesiveness of the measurement model 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 did not significantly reduce the reliability of measurement. These abbreviated scales make the use of the daily diary method feasible in the study of social anxiety, and offer a tool that might also be helpful in tracking the progress of individuals undergoing treatment for social anxiety, in order to assess responsiveness to the intervention in a time-sensitive manner.

Additionally, the results of this study support the conceptualization of social anxiety as a process that functions within and around specific social interaction episodes, as reflected in the strong evidence supporting within-time relations among the constructs in all but one of the individuals studied. Yet, comparisons of individual models to the aggregated group model in this

study make it clear that the process is more varied among individuals than group models would suggest. Accordingly, these findings underscore the value of using person-specific methodologies to validate and expand our current understanding and knowledge.

Individual Variability in the Dynamics of Daily Feelings of Social Anxiety

Some individual consistencies as well as variations emerged in the process of social anxiety surrounding a single episode. Even greater individual variability emerged in processes related to the maintenance and escalation of social anxiety over time, 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 general feelings of social anxiety and maladaptive cognitive processing. With one exception, every individual 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 –either anticipatory worry with negative self-appraisals and/or post event rumination. For some individuals, these cognitive processes also generated safety/avoidant behaviors (discussed in the next section). These findings suggest that the way individuals worry about specific social interaction challenges before or after the fact, play a key role in fueling the level of social anxiety experienced on a given day (and vice versa).

Interestingly, however, few relations emerged linking these coherent episodes of social anxiety to feelings or thoughts with subsequent social interactions experienced the next day. The strong coherence of within time episodes of social anxiety combined with the limited across time

associations suggest that the social anxiety interaction process surrounding an event has greater predictive power with regard to occurrence of socially anxious affect than across time stabilities, often referred to as traits. While across time stabilities are indicated in some individuals, particularly with regard to fear of negative evaluation, the within time processes are also strong in these individuals. Recognizing the power of the situation and processes operating within the situation is vital in uncovering specific elements that can potentially be modified in an attempt to interrupt the process and establish more adaptive processes. Merely reducing social evaluative fears is unlikely to lead to long-term effects unless doing so also includes modifying the situational processes that functions at the level of social interaction. These findings suggest that cognitive-behavioral interventions that focus on the use of thought-stopping and positive re-framing in the immediate context of the anticipation or post-event rumination that occurs relative to specific social challenges may be key in effective reduction of feelings of social anxiety. 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 have in these situations.

While recognition of the within time process is critical, the across time stability of fear of negative evaluation evidenced in some individuals is also of interest. The existence of this across time stability while accounting for the within time process suggests that more than situational influences are driving social anxiety for some individuals. It may be that this stability indicates a more general vulnerability to anxiety associated with biological and temperamental roots or the development of trait-like social anxiety that is well solidified by emerging adulthood. Effective intervention with such individuals must focus on the factors that underlie this pervasive

vulnerability, as well as focusing on strategies and direct training designed to manage their cognitions and behavioral responses in daily encounters.

Individual Variability in the Dynamics of Social Avoidance

For a majority of the individuals studied (70%), associations emerged between at least one of the cognitive processes studied and their use of socially avoidant behaviors during daily (within time) episodes of social interaction. For five of these individuals (50%), it was the cognitive process of anticipatory worry prior to a particular social challenge that predicted social avoidance behaviors during that social event. 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. For two participants, events in which they behaved in an avoidant manner also elicited heightened levels of post-event rumination. For three participants, no associations emerged between their feelings or cognitions about a particular social encounter and their avoidant behavior. These individual variations suggest that while the cognitive processes of anticipation and rumination play an important role in affecting socially avoidant behaviors, the specific dynamic processes linking these cognitions to behavior are quite variable across individuals.

Although only 30% of the individuals studied showed a lack of associations between feelings and cognitions associated with social anxiety and the behavioral manifestation of social avoidance, this pattern deserves some discussion. 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 avoidance manifest in engaging in safety/protective behaviors during social interaction. For example, such separation of processes is supported by the pattern of relations

between variables in Subject 1, where social avoidance is not predicted by the cognitive variables or social anxiety. For this individual the experience of social anxiety may fuel maladaptive cognitive processes, but these cognitions do not appear to influence his/her behaviors. Research on social anxiety and social skills seems to support the conceptualization of separate affective and behavior components for some individuals (Erath, Flanagan, & Bierman, 2007).

Recognizing the potential for separation between socially anxious affect and maladaptive social skills is important in understanding diverse outcomes for different individuals. When social anxiety acts as a separate process from social avoidance, the individual may experience high levels of distressing affect, but experience protection from negative social interactions and social rejection. Others may not experience high levels of distressing affect, but come to fear social interaction due to negative social experiences and social rejection resulting from their avoidant behaviors. Again, understanding the potential for separation of these two processes and correctly identifying the processes at work within an individual is paramount in selecting effective treatments and interventions.

The stability of social avoidance evidenced in some individual models suggests that the safety/protective behaviors assessed in this study may be learned patterns of behavior that are engaged in somewhat automatically. 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. In the case of socially avoidant behaviors, 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. Perhaps they are habitual patterns that have been

over-learned or perhaps are initiated in response to a lack of other interactional strategies. Regardless, understanding the stability of social avoidant behaviors is an important future research goal with implications for social skills development, social anxiety treatment, and other areas. Notably, however, only two participants in the present study evidenced stability of social avoidance, whereas five participants evidenced stability of social anxiety; again suggesting greater individual variability in the determinants of social behavior.

Furthermore, whereas two individuals evidenced positive stability in social avoidance with safety/protective behaviors leading to additional safety/protective behaviors across time, one individual model indicated a pattern of negative stability in social avoidance across time (high levels of safety/protective behaviors predicting lower levels of safety/protective behaviors at the next occasion, and vice versa), and three others evidenced a negative relation from cognitive variables to social avoidance across time. One mechanism that may account for this seemingly contradictory finding is an adaptive cognitive feedback loop operating over time. It may be that as individuals encounter social interactions and respond behaviorally with safety/protective actions, they may also activate behavioral standards for positive social interaction and note the discrepancy between the standards and their own behavior. This recognition may lead them to make greater attempts at the next occasion to avoid engaging in safety/protective behaviors. For example, post-event rumination predicted reduced social avoidance in the subsequent social interaction for Subject 2. Likewise, for Subjects 5 and 6, anticipatory worry predicted increased social avoidance in the same interaction, but reduced social avoidance the following day. Although this cognitive feedback loop should lead to decreasing social avoidance, such effortful control in the face of social anxiety and maladaptive

cognitive processing likely has limitations resulting in safety/protective behaviors rebounding at subsequent occasions.

Finally, with regard to the variability found in relations involving the cognitive variables, it is important to recognize that we have much to learn regarding how cognitive processes influence affectivity and behavioral choices in social interaction. While generally the findings of this study support the role of anticipatory processing and post-event rumination in social anxiety, it seems evident that these cognitive processes function differently and influence different components of the interactional process in various individuals.

Future Research and Application

While 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. There is still much work to be done in validating and building on our understanding of social anxiety within individuals. Additionally, more studies using person-specific methodology are needed in all areas where individual treatment is informed by research findings.

Furthermore, this study has implications for future research utilizing both nomothetic and idiographic approaches. As the processes within and surrounding a social interaction episode are 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 focused on 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. Finally, this study is 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.

The implications of this study for individual treatment of social anxiety are another important area for future focus. For example, using a similar daily social interaction assessment procedure, clinicians seeking to treat socially anxious clients could gather valuable information about the central factors and processes operating within the client with regard to their anxiety-provoking social interactions. Such assessments could then guide the clinician's focus and choice of interventions and treatments. For example, in individuals demonstrating only a cognitive component, without behavioral reinforcement, effective treatment would focus on modifying cognitive processes contributing to the social anxiety. Meanwhile, individuals for whom the behavioral component is the driving influence would likely benefit more from acquiring new behavioral responses and strategies. For some individuals, a mixed approach to treatment may be optimal. Of primary importance, the use of person-specific methodology and statistical modeling allows for the tailoring of treatment and intervention to specific individual needs.

Appendix

Social Interaction Daily Diary

* UserID

General Daily Mood

These questions are about how you feel in general today. As you read each question, please mark the degree that you agree or disagree with each of the following statements today:

* I worried about what kind of impression I made.

not at all - - - - - - - - - - very much

* I was afraid that others would not approve of me.

not at all - - - - - - - - - - very much

* When talking with someone, I worried about what they may be thinking about me.

not at all - - - - - - - - - - very much

* I was afraid that people would find fault with me.

not at all - - - - - - - - - - very much

* I worried that I would say or do the wrong things.

not at all - - - - - - - - - - very much

* I was afraid of other people noticing my shortcomings.

not at all - - - - - - - - - - very much

* I worried about what people would think of me even when I knew it wouldn't make any difference.

not at all - - - - - - - - - - very much

* I think I am too concerned with what other people think of me.

not at all - - - - - - - - - - very much

 Page Break

Social Interaction

Each day we have opportunities to interact with others in situations where they form impressions of or evaluate us. Think about the different types of opportunities you have had today (or during the last 24 hours) to interact with other people where they may have formed impressions of you or evaluated you in some way. From those opportunities, *choose the one that caused you the most concern about how others would perceive you.*

What type of opportunity was it?

- An informal opportunity to interact with others or participate in a conversation
 An organized social event (i.e. a party or social gathering)
 A required or planned interaction (i.e. a meeting or appointment, etc.)
 Other (Please specify)

* Briefly describe the opportunity. How many unfamiliar people were involved? How many people you knew were involved?

(1000 characters remaining)

* What was it about the interaction or situation that contributed to your being concerned about how others perceived you?

* Spoke softly, hesitantly, or mumbled

not at all - - - - - - - - - - - very much

* Engaged in other avoidant or protective behaviors

not at all - - - - - - - - - - - very much

* If you engaged in other avoidant or protective behaviors describe them here.

Page Break

After the Event:

Since the event occurred, rate the degree to which you experienced the following:

* Thoughts about the event interfered with my concentration.

very little or not at all - - - - - - - - - - very much or a lot

* Even though the event is over, I found myself thinking about it a lot.

very little or not at all - - - - - - - - - - very much or a lot

* My feelings about the event got worse and worse.

very little or not at all - - - - - - - - - - very much or a lot

* I found it difficult to forget about the event.

very little or not at all - - - - - - - - - - very much or a lot

* I tried to resist thinking about the event.

very little or not at all - - - - - - - - - - very much or a lot

Continue ONLY when finished. You will be unable to return or change your answers.

Submit

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Publications

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 Molenaar, P. C. M. & Campbell, C. G. (2008). Discussion of the special issue on growth models for longitudinal data in education research. *Educational Research and Evaluation, 14*(4), 377-390.

Teaching Experience

Lock Haven University

August 2007 to present – Instructor. Courses include: Introduction to Psychology, Child Development and Adolescent Development.

The Pennsylvania State University

Aug. 2007 to May 2008 - Head Teaching Assistant/Lab Instructor for Research Methods
 Jan. to May 2007 & Aug. to Dec. 2005 - Lab Instructor for Research Methods
 Aug. 2004 to May 2005 - Teaching Assistant for Cognitive Development, Sensation & Perception, and Child Development.

University of Utah

Aug. 2003 to May 2004 - Instructor for the Supplemental Instruction Program for students in Introductory Psychology.
 Aug. to Dec. 2002 - Undergraduate Teaching Assistant for Social & Personality Dev.