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Paranoia, a continuum of clinical and subclinical experiences in which other people are assumed or suspected to have negative and harmful intentions, is a key symptom of schizotypy (including schizophrenia spectrum disorders). Subclinical paranoia is less well-understood than its clinical expression, but is estimated to occur in around 10% of the general population and is a source of social impairment. Paranoia also shares features with social anxiety, such as social discomfort and fear of humiliation in social situations; however, paranoia is differentiated from social anxiety by the belief that other's motives are malevolent.

The current research examined the nature, boundaries, and expression of paranoia across a broad continuum of severity by assessing its relation to schizotypy and social anxiety. In the first study, 862 college students completed measures of paranoia, social anxiety, and schizotypy in order to test hypothesized models of the relation of these constructs using confirmatory factor analyses. As hypothesized, the data were best described by a four factor model including positive schizotypy, negative schizotypy, social anxiety, and paranoia. Furthermore, paranoia was more strongly associated with positive schizotypy than with the other factors.

The second study employed experience sampling methodology to examine the expression of paranoia and social anxiety in daily life in a subset of 240 participants. Paranoia and social anxiety were both associated with more daily reports of negative affect, self-consciousness, and negative social perceptions. Paranoia—but not social anxiety—was characterized by more anger, persecutory beliefs, and self-reference in daily life. People higher in social anxiety experienced improvements in mood when in close social encounters; relationships between mood and the situation did not change across levels of paranoia. Identification and study of paranoia can clarify the role of environmental factors that contribute to decompensation into schizophrenia spectrum

disorders, and can lead to better targets for prophylactic interventions used to prevent the development of clinical disorders.

A CONTINUUM OF SUSPICIOUSNESS AND ITS RELATION TO  
SCHIZOTYPY AND SOCIAL ANXIETY

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## CHAPTER I

### GENERAL INTRODUCTION

#### *Overview: Schizotypy and Paranoia*

Schizotypy is a continuum of clinical and subclinical impairment presumed to be the expression of the neurodevelopmental vulnerability for schizophrenia (Kwapil, Barrantes-Vidal, & Silvia, 2008; Lenzenweger, 2006). People with symptoms of schizotypy are vulnerable to developing schizophrenia and related disorders. Although the exact mechanisms are not fully understood, this vulnerability is presumed to result from an accumulation or interaction of multiple genetic, neurodevelopmental, and psychosocial factors. These risk factors produce symptoms that fall along a continuum of schizophrenic-like adjustment referred to as schizotypy, with expressions that range from relative health to subclinical deviance to schizophrenia spectrum disorders such as schizotypal personality disorder, schizophrenia, and schizoaffective disorder. Thus, schizophrenia is presumed to be the most extreme manifestation of the schizotypy continuum. Meehl (1990) estimated that about 10% of the population is schizotypic (a rate supported by taxometric studies [e.g., Lenzenweger & Korfine, 1992]) and that about 10% of schizotypes transition into schizophrenia. However, there is considerable debate about whether schizotypy is best conceptualized as a taxon that is discontinuous in nature or a personality dimension that is continuous in the general population (Claridge, 1997).

Identifying people with schizotypy improves our understanding of the etiology of schizophrenia and related disorders. Furthermore, identification and study of people at risk for spectrum disorders can clarify the role of environmental factors that contribute to decompensation, and can lead to better targets for prophylactic interventions in order to prevent

the development of schizophrenia. Social impairment is widely described as a feature of the prodromal, active, and residual phases of schizophrenia, and it is a central feature of schizophrenia-spectrum conditions such as schizoid and schizotypal personality disorders (American Psychiatric Association, 2000). Furthermore, evidence is emerging that disruptions in social functioning in childhood and adolescence may be an early marker of psychosis risk, and thus a particularly important aspect of schizotypy (see Tarbox & Pogue-Geile, 2008).

Given that social dysfunction may be a key predictor of risk for psychosis, researchers must disentangle the different types of social disruptions present in those with schizotypy, as well as investigate the causes of these disruptions. Paranoia is one aspect of schizotypy with consequences for social functioning. A number of terms have been used to label aspects of this construct, including suspiciousness, persecutory ideation, and paranoia. For the purposes of the proposed studies, the term “paranoia” will refer to a continuum of clinical and sub-clinical experiences in which other people are assumed or suspected to have negative and harmful intentions. This continuum extends from trait-like suspiciousness to nonpsychotic clinical manifestations to full-blown paranoid delusions. Paranoia’s impact on social functioning across the schizotypy spectrum is not well understood. In addition, paranoia has not been differentiated from other sources of social disruption such as social anxiety, which is phenomenologically related to paranoia and frequently comorbid with schizotypy.

In summary, there is a need in the literature to understand the impact of paranoia in the lives of people at risk for schizophrenia spectrum disorders, which would contribute to early identification and intervention of these disorders. Thus, the present research examined the nature, boundaries, and expression of paranoia across a broad continuum of severity. These studies will examine the relation of paranoia with current conceptions of schizotypy and social anxiety.

Furthermore, the second study will examine the expression of paranoia and social anxiety in daily life.

### *A Continuum of Paranoia*

Paranoia can have profound consequences for social relationships and quality of life. Experiences of paranoia, which range from mild, unjustified suspiciousness about the intentions of others, to firmly entrenched convictions of conspiracy, are common in people with many clinical disorders. However, there is more to paranoia than its clinical manifestations. Strauss (1969) argued that paranoia and other psychotic experiences were best understood as lying on a continuum with normal behavior, challenging the common view of that era that psychotic experiences were categorically distinct from nonpsychotic experiences. Recent studies have supported this notion and provided preliminary prevalence data for subclinical paranoia. For example, Johns et al. (2004) found that 9% of subjects in a large survey of over 8000 British citizens—after excluding those with probable psychosis—reported mild versions of paranoid thoughts. Similarly, Freeman, Garety, Bebbington, Smith et al. (2005) found that mild paranoid thoughts occurred commonly in about a third of college students. Furthermore, they found that more extreme paranoid thoughts hierarchically built upon more common suspicious thoughts, suggesting a continuum of paranoia. In other words, milder paranoid experiences such as “people are watching me” preceded and were endorsed by people who also endorsed more extreme paranoia. Thus, recent findings support that paranoia is best conceptualized as occurring along a continuum of severity, with milder forms occurring in at least 10% of the general population. Studies of clinical paranoia have found higher prevalence in males than in females; however, subclinical studies generally have not found sex differences (e.g., Johns et al., 2004).

### *Clinical Paranoia*

Persecutory delusions, which are self-referential and unfounded beliefs that a persecutor is currently harming or intending to harm the subject, are common and widely studied features of clinical psychosis (Freeman, 2007). Persecutory delusions differ from persecutory ideas in the degree of conviction with which they are held, despite clear evidence that contradicts their legitimacy. A study of people making initial contact with mental health resources in ten countries found that persecutory delusions were the second most common type of delusion, after delusions of reference, and occurred in about 50% of people with psychosis (Sartorius et al., 1986). Delusions and ideas of reference involve a person perceiving environmental cues to be specifically directed towards him or her; for example, perceiving that a particular song lyric is meant to send a special message.

Delusions/ideas of persecution are closely related to referential thinking, as paranoia often involves believing that benign or unrelated events are self referential (in a threatening or demeaning fashion). Self-reference is a key feature of paranoia; however, delusions must also be suspicious in nature to be considered persecutory; for example, beliefs about being spied on, followed, threatened, or plotted against. Self-referential thinking can be understood as a more clinically deviant form of self-consciousness specific to positive schizotypy and a necessary—but not sufficient—aspect of paranoia. Reflecting this understanding of the centrality of self-referential thoughts in the understanding of paranoia, some researchers have conceptualized paranoia as a two-factor construct, with one factor reflecting persecutory thoughts and one factor reflecting self-reference (e.g., Green et al., 2008).

Persecutory delusions are heterogeneous, varying in the content of the perceived threat, the degree of conviction with which they are held, how distressing and preoccupying they are perceived, the extent to which they cause impairment, and the extent to which they are bizarre or

nonbizarre. To clarify, bizarre delusions are clearly implausible—for example, the belief that aliens are removing private thoughts from one’s head—whereas nonbizarre delusions are false, but plausible given our understanding of the world. Nonbizarre delusions may derive from ordinary life experiences—for example, the belief that one’s family member is plotting against them. Paranoia and persecutory delusions occur most frequently in schizophrenia spectrum disorders such as schizophrenia, but also occur (albeit much less frequently) in neurological disorders such as dementia, and in mood and anxiety disorders such as major depression, bipolar, and posttraumatic stress disorders (Freeman, 2007).

Persecutory delusions and paranoia may occur not only within the course of disorders, but also as primary features of clinical attention. Paranoid personality disorder (PPD), a pervasive and nonpsychotic pattern of unjustified suspiciousness that others are harming or deceiving the subject, is a schizophrenia spectrum disorder estimated to be present in 1-3 % of the population (Bernstein, Ubeda, & Siever, 1993). Like persecutory delusions, paranoid thinking in PPD is self-referential and unwarranted. Unlike persecutory delusions, PPD is not characterized by full-blown delusions, formal thought disorder, marked decline in functioning, or other symptoms of psychosis, such as pronounced negative symptoms. Thus, paranoia in PPD is often triggered by common experiences in daily life, such as feeling betrayed or undermined by people in one’s environment.

In contrast, delusional disorder, persecutory type (formerly known as Paranoia Disorder), is a schizophrenia spectrum disorder that is characterized by paranoid delusions, resulting in a well-defined “system” of nonbizarre beliefs that specific people or groups are intending to harm or deceive the subject. For example, a person with delusional disorder may believe they are being poisoned and followed by a covert branch of the government, whereas a person with PPD may exhibit a lifelong pattern of not trusting others and perceiving insults and threats in routine social

situations. In contrast to schizophrenia, odd thinking and bizarre perceptual experiences in delusional disorder are limited to the specific persecutory belief “system” and not otherwise present. Furthermore, delusional disorder does not involve the marked decline in functioning seen in schizophrenia; on the contrary, people with delusional disorder may function surprisingly well outside the context of their delusions. To summarize, paranoia that is the focus of clinical attention—both persecutory delusions and its variants—are part of several disorders described in the DSM-IV-TR (American Psychiatric Association, 2000) and comprise the extreme end of a continuum of paranoia.

#### *Subclinical Paranoia*

What is known about the nature of paranoia in the majority of the population without clinical diagnoses? Although the extent to which it occurs and causes impairment has not been resolved in the literature, one important task in understanding the paranoia continuum is distinguishing “normal” and justified suspiciousness from unwarranted suspiciousness and clinical paranoia. Certainly one can argue that justified suspiciousness, like other psychological phenomenon, can be adaptive when it protects people from danger in situations in which others legitimately intend harm. It is when suspiciousness repeatedly occurs without justification that it should be considered part of the paranoia continuum. Fenigstein and Venable (1992) defined subclinical paranoia as a pattern of thinking characterized by exaggerated self-referential thinking, mistrust, suspiciousness, and feelings of ill will or resentment. Freeman, Garety, Bebbington, Smith et al. (2005) built upon this notion, describing a ‘hierarchy’ of paranoia that ranged from mild social evaluative concerns, to self-referential ideas, to persecutory beliefs concerning varying degrees of threat. Taking together these accounts of clinical and non-clinical paranoia, “paranoia” can best be understood not solely as a clinical entity, but rather as a continuum of thinking, affect, and behaviors in which *other people are assumed or suspected to*

*have negative and harmful intentions* when no such negative intentions can be reasonably assumed to exist, or when the beliefs are well beyond the reality of any actual threat. This common thread underlies a range of expressions from mild suspiciousness to persecutory delusions, with severity dependent upon the chronicity, degree of conviction and delusion, resulting distress, and behavioral sequelae of these paranoid thoughts. Given that non-clinical schizotypy symptoms are shown to be predictive of later development of psychotic disorders (Chapman, Chapman, Kwapil, Eckblad, & Zinser, 1994; Myin-Germeys, Krabbendam, & van Os, 2003), knowledge about the full range of paranoid experiences can assist in understanding etiology and in developing interventions for associated clinical disorders.

#### *The Multidimensionality of Schizotypy*

Because paranoia usually occurs within the context of the schizophrenia spectrum, it is useful to examine how paranoia is understood within the symptom dimensions of schizotypy. Schizotypy—and, by extension, schizophrenia—is thought to be a heterogeneous, multidimensional construct. Given that schizophrenia is conceptualized as an extreme expression of schizotypy, the symptom dimensions of schizophrenia should be the same as those identified across the spectrum of schizotypy. Researchers studying the symptom structure of schizophrenia typically have identified three separable dimensions: psychoticism/positive symptoms (characterized by delusions, hallucinations, and paranoid and self-referential thinking), negative symptoms (characterized by anhedonia, affective flattening, and avolition), and disorganization (characterized by bizarre behavior and inappropriate affect). These results have been found in a number of samples (Bilder, Mukherjee, Rieder, & Pandurangi, 1985; Grube, Bilder, & Goldman, 1998; Peralta, Cuesta, & Farre, 1997), although controversy surrounds the labeling of the third or “disorganization” factor. Some work has found a third dimension best characterized to be a “disorder of relating,” rather than a disorganization factor (Lenzenweger, 1991).

Similar findings have emerged in the literature on schizotypy across the spectrum of impairment. Two to six factors have been identified, with a three-factor solution receiving the most support. An extensive literature has identified three factors that describe less severe forms of schizotypy and are parallel to those of schizophrenia: positive, negative, and disorganized symptom dimensions (Andreasen, Arndt, Miller, & Flaum, 1995; Liddle, 1987; Raine, Reynolds, Lencz, & Scerbo, 1994; Vollema & Hoijtink, 2000). In studies employing the widely used Chapman schizotypy scales (Chapman, Chapman, & Raulin, 1976, 1978; Eckblad & Chapman, 1983), exploratory and confirmatory factor analyses of schizotypy have found that two factors—positive and negative schizotypy—account for about 80% of the variance in these scales, although researchers acknowledge that these scales do not directly measure disorganization or paranoia (Brown, Silvia, Myin-Germeys, Lewandowski, & Kwapil, 2008; Lewandowski et al., 2006).

*Paranoia and the schizotypy dimensions.* In the majority of factor analytic studies that supported three-factor solutions, paranoia comprised part of the positive schizotypy symptom dimension along with other types of unusual thoughts and odd perceptual experiences (e.g., (Andreasen et al., 1995; Vollema & Hoijtink, 2000). Given both the odd beliefs and negative affect associated with paranoia, it makes conceptual sense that it would be considered part of positive schizotypy. However, recent studies using factor analyses in normal populations have found support for a four-factor model of schizotypy consisting of positive, negative, disorganized, and paranoid thinking factors. Suhr and Spitznagel (2001) conducted an exploratory factor analysis and examined the responses on the Schizotypal Personal Questionnaire (SPQ; Raine, 1991) in a subset of high-risk college students. They found not only the typical three factors, but also a fourth factor that included suspiciousness and ideas of reference, which they labeled a paranoid factor, consistent with the idea that self-reference is a key aspect of paranoia. Similarly,



Stefanis et al. (2004) conducted a confirmatory factor analysis with 1,355 Greek conscripts who completed the SPQ, and found support for a four-factor model that included a paranoia factor.

The majority of factor analytic studies have not found a relationship between paranoia and negative schizotypy symptoms. However, a recent study by Kwapil, Barrantes-Vidal, and Silvia (2008) found that positive and negative schizotypy dimensions were both related to paranoid personality disorder symptoms, which raises questions about the relationship of paranoia with negative symptom schizotypy. Conceptually, the ideational component of paranoia fits better with negative schizotypy, whereas the behavioral component—particularly aversiveness—may fit better with positive schizotypy. Thus, findings about the relationship of paranoid symptoms with positive and negative symptoms appear inconsistent. The study reported in chapter 2 will address these questions.

### *Social Anxiety and Paranoia*

Paranoia and social anxiety share a number of common features, including self-consciousness, social fear, and discomfort with social interaction. Given these similarities, comparing and contrasting social anxiety and paranoia can help to clarify the boundaries of paranoia and its place within clinical disorders. Social anxiety is a central feature of two clinical disorders, social phobia and avoidant personality disorder (APD). Social phobia—also referred to as social anxiety disorder—is an anxiety disorder with an estimated lifetime prevalence of 7% to 13% (Furmark, 2002). The DSM-IV-TR defined social phobia as a marked and persistent fear of social or performance situations, exposure to which provokes immediate anxiety. Feared situations are heterogeneous in nature, and can include both public performance situations and social situations such as dating, parties and conversations. APD, on the other hand, is a pervasive pattern of social inhibition, feelings of inadequacy, and hypersensitivity to negative evaluation. Symptoms of APD overlap a great deal with social phobia, generalized type; thus, APD may be

best conceptualized as a more severe and chronic variant of social phobia. Along these lines, Tillfors, Furmark, Ekselius, and Fredrikson (2004) argued that the high degree of comorbidity between social phobia and APD (20-89%) lends support to the idea that that these disorders represent different points on a social anxiety continuum. In addition to these clinical disorders, there are nonclinical expressions of social anxiety not captured by the diagnostic nomenclature, including shyness, behavioral inhibition, social withdrawal, and introversion. Milder versions of social anxiety such as shyness and behavioral inhibition predict the development of social phobia and APD (Merikangas, Lieb, Wittchen, & Avenevoli, 2003).

Both clinical and non-clinical forms of social anxiety share features with paranoia. Social anxiety, like paranoia, can be thought to occur along a continuum ranging from mild experiences of social concern at one end to severe clinical symptoms at the extreme end (Stein, Torgrud, & Walker, 2000). Both paranoia and social anxiety involve fear and the anticipation of threat from social stimuli, although the source of perceived threat differs. In contrast to paranoia, the primary source of social discomfort in social anxiety is a fear of rejection or humiliation, rather than a fear of being exploited or harmed. Furthermore, this fear of humiliation in social anxiety primarily derives from a sense of personal inadequacy, not from expected malevolence of others. Both paranoia and social anxiety are consistently associated with lower positive and higher negative affective states and mood. Furthermore, both paranoia and social anxiety are characterized by heightened self-consciousness, which disrupts cognitive processing, probably because it demands attentional resources (Heinrichs, Hoffman, & Hofmann, 2001; Hope & Heimberg, 1988; Stopa & Clark, 2000). Self-consciousness may increase paranoia, as suggested by studies showing that experimental manipulations of self-consciousness predicted increases in paranoia (Fenigstein, 1984; Fenigstein & Venable, 1992). As addressed previously, self-reference—an extreme version of self-consciousness—is a key feature of paranoia.

Given these similarities in phenomenology, it is not surprising that a moderate to strong relation of anxiety—both social and general—with paranoia has been found in the literature (Fowler et al., 2006; Martin & Penn, 2001). A study by Huppert and Smith (2005) compared subtypes of anxiety and schizophrenia symptoms and found that self-reported paranoia symptoms were significantly associated with self-reported social phobia symptoms. Similarly, studies using non-clinical samples have found that paranoid thoughts often build upon relatively common interpersonal worries and anxiety (Freeman, Garety, Bebbington, Slater et al., 2005; Freeman & Garety, 2003). As noted by Freeman (2007) in a comprehensive review of persecutory delusions, these findings are consistent with other work showing greater sensitivity to stress in people with psychosis (Myin-Germeys, Delespaul, & van Os, 2005). Thus, paranoia has been found to be related consistently to both general and social anxiety.

Although research supports a relation between the phenomenology of paranoia and social anxiety, less is known about the underlying nature of this relation. Freeman and colleagues (Freeman & Garety, 2003; Freeman, Garety, Bebbington, Smith et al., 2005) conducted virtual reality studies in which pre-programmed computer avatars interacted with participants in a pair of studies designed to examine the nature of the relationship between paranoia and social anxiety. They found that about a third of the non-clinical sample reported unjustified persecutory thoughts towards the avatars, and that persecutory thoughts were predicted by anxiety and interpersonal sensitivity. Furthermore, they examined differential predictors of social anxiety and paranoia, and found that what distinguished those who had paranoid thoughts from those who had socially anxious thoughts was the presence of anomalous experiences such as hallucinations. In other words, these studies provided preliminary evidence that the interaction of social anxiety and schizotypy symptoms—particularly positive schizotypy symptoms—is associated with paranoia.

Another distinction between people high in paranoia versus social anxiety is the type of negative affect experienced, as well as their views about themselves and others. In the case of social anxiety, high negative affect is likely a consequence of the negative self-schema and low self-esteem that also drive fears of being rejected. In other words, socially anxious people fear rejection not because they perceive other people as generally hostile, but because they perceive themselves as unappealing, socially inept, and unlikable, and such beliefs predispose a person towards high negative affect. Thus, people high in social anxiety have schemas predisposing them to negative views of themselves, but not to negative views of other people. Baldwin (1992) posited that negative self schemas and low self-esteem develop because socially anxious people have a great deal of experience with others disliking and disapproving of them; thus, future social cues activate negative schemas and contribute to negative affect. This is supported by an experimental study demonstrating that, for socially anxious people, negative social feedback is linked to negative self-information (Baldwin & Main, 2001).

Paranoia, on the other hand, is associated with the tendency to have disproportionately negative beliefs about and emotional responses to other people, with negative affect characterized by anger, blame, and hostility (Combs, Penn, Chadwick et al., 2007). Specifically, paranoia is associated with expectations of past, current, and future harm that is attributed to the malevolence of others and to the belief that the actions and intentions of others have thwarted successes in the world. Accordingly, paranoia is characterized by negative schematic views of other people. In other words, people with paranoia have a general tendency to view other people as threatening, hostile, bad, lazy, and unpleasant (Fowler et al., 2006). The relation between paranoia and negative views of the self is unclear in the literature. Paranoia is associated with low and unstable self-esteem in some non-clinical and clinical samples (Combs & Penn, 2004; Ellett, Lopes, & Chadwick, 2003; Martin & Penn, 2001). On the other hand, some studies have reported normal or

high self-esteem in people with paranoia (Candido & Romney, 1990; Lyon, Kaney, & Bentall, 1994). These inconsistencies have contributed to the theory that there are two subtypes of paranoid referred to as “poor me” and “bad me” paranoia, the former of which is thought to be characterized by defensively high self esteem and the latter of which is characterized by low self-esteem and a belief that one deserves to be persecuted (Trower & Chadwick, 1995). This theory, too, has received mixed support (Melo, Taylor, & Bentall, 2006). An explanation that integrates these findings is that although people with paranoia have lower self-esteem, they also experience greater fluctuations in self-esteem than non-paranoid people (Thewissen, Bentall, Lecomte, van Os, & Myin-Germeys, 2008).

#### *Social Anxiety & Schizotypy*

Social anxiety commonly co-occurs with schizophrenia spectrum disorders. Pallanti, Quercioli, and Hollander (2004) reported a 36% comorbidity rate of social anxiety in a sample of outpatients with schizophrenia. Furthermore, social anxiety often occurs among non-schizophrenic people presumed to be on the schizophrenia spectrum, including nonpsychotic relatives of patients with schizophrenia and people with schizotypal personality disorder. Torgersen, Onstad, Skre, Edvardsen, and Kringlen (1993) reported that excessive social anxiety was more common in nonpsychotic dizygotic and monozygotic cotwins of patients with schizophrenia than among control participants. Social anxiety is also one of the diagnostic criteria for schizotypal personality disorder, although the nature of social anxiety in the disorder has evolved. The Diagnostic and Statistical Manual of Mental Disorders-3<sup>rd</sup> Edition (American Psychiatric Association, 1980) broadly described social anxiety as a diagnostic criterion of schizotypal personality disorder. However, the current edition (American Psychiatric Association, 2000) has limited this to social anxiety that is fueled by paranoid expectations of mistreatment.

Thus, social concerns driven by paranoia are considered an essential feature of several schizotypic spectrum disorders, whereas social anxiety is non-essential but often co-occurring.

Researchers have examined the relation of social anxiety with the schizotypy symptom dimensions. Although Raine et al. (1994) initially categorized social anxiety as part of negative schizotypy, inconsistent results led to the suggestion that social anxiety may constitute a third factor separate from positive and negative schizotypy known as “disorganization/social impairment” (Bentall, Claridge, & Slade, 1989; Raine, Lencz, & Mednick, 1995; Venables & Bailes, 1994). A recent study by Brown et al. (2008) suggested that social anxiety constitutes a separate factor apart from positive and negative schizotypy; however, social anxiety was more strongly related to positive, rather than negative, schizotypy. Given that positive schizotypy is characterized by affective reactivity, whereas negative schizotypy is characterized by affective flattening and social disinterest, it comes as no surprise that social anxiety and positive schizotypy were moderately correlated. In summary, schizotypy research suggests that social anxiety is related to, but not a part of, positive schizotypy, and marginally related to negative schizotypy. The study described in chapter 2 will expand upon the first study by examining the relationship of social anxiety with the schizotypy dimensions and paranoia.

#### *Experience Sampling Methodology: Paranoia, and Social Anxiety in Daily Life Experiences*

Another way to examine the nature, boundaries, and expression of paranoia compared to social anxiety is to examine the expression of both in daily life. Researchers have recently begun using experience sampling methodology (ESM) to explore the daily life experiences of people with schizophrenia and non-clinical schizotypy, and the contexts in which these experiences occur (see Myin-Germeys, Delespaul, & van Os, 2003, for a review). ESM is a widely used, within-day self-assessment technique in which participants are prompted at random intervals to complete a brief questionnaire. ESM has been used in clinical and social psychology research,

and offers several powerful advantages to traditional data collection procedures (e.g., Csikszentmihalyi & Larson, 1987; deVries, 1992; Reis & Gable, 2000). Specifically, ESM (1) repeatedly assesses participants in their normal daily environment, thereby enhancing ecological validity, (2) assesses the participants' experiences at the time of the signal (or in the moment), thereby minimizing retrospective bias, (3) allows for an examination of the context of participants' experiences, and 4) allows for the use of sophisticated multilevel statistics.

Several recent studies have used ESM in a sample of putatively schizotypic college students. Verdoux, Husky, Tournier, Sorbara, and Swendsen (2003) reported that change in social contact was associated with increased positive symptoms of psychosis on the Community Assessment of Psychic Experiences Scale (Stefanis et al., 2002). Husky, Grondin, and Swendsen, (2004) reported that schizotypy was associated with increased negative affect when with social partners, but decreased negative affect in secure environments. They suggest that these associations may reinforce social withdrawal and anxiety in schizotypic people.

Brown, Silvia, Myin-Germeys, and Kwapil (2007) recently examined the relationship of social contact, affect, and functioning across levels of social anhedonia and social anxiety. As predicted, social anhedonia was associated with increased time alone, a preference for solitude, and decreased positive affect. Social anxiety, on the other hand, was associated with increased negative affect and unassociated with time alone. Furthermore, social anxiety was associated with greater self-consciousness and preference to be alone while interacting with unfamiliar people. It was uncorrelated with suspiciousness in daily life ( $r = .02$ ). Positive schizotypy, on the other hand, was moderately associated with suspiciousness ( $r = .22, p < .001$ ). Kwapil et al. (2009) replicated some of these findings in a sample of 56 undergraduates, reporting that people higher in social anhedonia were more likely to be alone, prefer solitude, and interact with less intimate

groups of people. Furthermore, they found that people higher in social anhedonia reported improvements in affect when alone, further indicating a preference for solitude.

Thewissen et al. (2008) conducted the only published study specifically examining paranoia in daily life. They studied paranoia in both clinical and non-clinical participants, and found that people higher in paranoia reported lower general self-esteem and more fluctuations in their self-esteem. To date, no studies have been published that examine the expression of both paranoia and social anxiety in daily life using ESM. The study described in chapter 3 will address this topic.

#### *General Summary and Goals*

The present studies examined the nature, boundaries, and expression of paranoia across a continuum of severity. In particular, the relationship of paranoia to social anxiety is a topic largely unexamined in the research. Thus, the present study examined paranoia and its relation to social anxiety and schizotypy (Study 1) and its expression in daily life (Study 2). Specific goals and hypotheses for each study are offered below.



## CHAPTER II

### STUDY 1

#### Introduction

##### *Goals and Hypotheses*

The primary goal of this study was to examine the relation of paranoia with social anxiety, positive schizotypy, and negative schizotypy. This study expanded upon previous research in a number of ways. First, it used confirmatory factor analysis techniques that compared the dominant competing models of the factor structure of schizotypy and relation to paranoia and social anxiety. Second, it used multiple measures of schizotypy, social anxiety, and paranoia, thus providing better estimates of these constructs. Third, it specifically addressed the relation of paranoia with negative schizotypy. A central question of the study was whether paranoia and positive schizotypy would form a single factor or be best characterized by separate, but highly correlated factors. It was hypothesized that the data would be best described by a four factor model including positive schizotypy, negative schizotypy, social anxiety, and paranoia, and that the positive and paranoia factors would be strongly associated. It was also hypothesized that both positive schizotypy and paranoia would be moderately correlated with social anxiety. Negative schizotypy was hypothesized to have modest to minimal correlations with the other factors. Although paranoia and negative schizotypy can involve interpersonal aversiveness and withdrawal, their origins are much different. Social withdrawal in negative schizotypy is driven by disinterest in the world and lack of reward, whereas paranoia is driven by expectations of harm. As noted, the ideational and referential nature of paranoia is much more akin to positive than negative schizotypy.

## Method

### *Participants*

Usable data was collected from 862 college students (659 women and 203 men) enrolled in General Psychology courses at the University of North Carolina at Greensboro (UNCG) during three semesters. Consistent with student demographics at UNCG, the sample was 64% Caucasian, 25% African American, 4.5% Asian, 3% Hispanic, 1% Native American, and 3.5% other. The mean age of the sample was 19.5 years ( $SD = 3.1$ ). Males and females did not differ in age or ethnicity.

College students provide an appropriate sample for examining the relation between schizotypy and paranoia. Although college graduates have a slightly lower lifetime prevalence of schizophrenia than the general population (Robins, 1984), longitudinal studies have reported that psychometrically identified schizotypic college students are at heightened risk for developing psychotic disorders and schizophrenia-spectrum illnesses that often include paranoid symptoms (e.g., Chapman et al., 1994; Kwapil, 1998).

### *Materials and Procedures*

Participants completed a brief demographic questionnaire; the Chapman schizotypy questionnaires: the Revised Social Anhedonia, Physical Anhedonia (Chapman et al., 1976), Perceptual Aberration (Chapman et al., 1978), and Magical Ideation (Eckblad & Chapman, 1983) Scales; the Schizotypal Personality Questionnaire (SPQ; Raine, 1991); the Paranoia Checklist (Freeman, Garety, Bebbington, Smith et al., 2005); the Persecutory Ideas Subscale of Scale 6 of the Minnesota Multiphasic Personality Inventory- Second Edition (MMPI-2; Hathaway & McKinley, 1989); and the Social Phobia Scale (SPS; Mattick & Clark, 1998). Items from the MMPI-2-Persecutory Ideas Subscale were intermixed with those of the SPQ. The items on the Chapman schizotypy scales were intermixed with a 13-item measure of infrequent responding

(Chapman & Chapman, 1983). The infrequency scale was included to screen out participants who responded in a random or “fake-bad” manner. Consistent with the recommendations of Chapman and Chapman, participants who endorsed more than two infrequency items were dropped from further study.

The Revised Social Anhedonia Scale consists of 40 items that tap asociality and indifference to others, while the Physical Anhedonia Scale includes 61 items that measure deficits in sensory and aesthetic pleasure. The anhedonia scales generally tap aspects of negative symptom schizotypy, although the Revised Social Anhedonia Scale is also associated with positive schizotypy (Kwapil, Barrantes-Vidal, & Silvia, 2008). The Perceptual Aberration Scale consists of 35 items that tap schizotypal perceptual experiences and bodily distortions, while the Magical Ideation Scale is made up of 30 items that measure belief in implausible or invalid causality. The Perceptual Aberration and Magical Ideation Scales assess positive symptom schizotypy.

The schizotypy scales were constructed using Neill & Jackson's (1970) method for rational scale development. All items were carefully selected to ensure high item-scale correlations while ruling out correlations with acquiescence and social desirability. The coefficient alpha internal consistency reliabilities of each scale are in the .80's in college student samples and they are reported to have test-retest reliability of .75 to .84 over a six week interval (Chapman, Chapman, & Miller, 1982). The Chapman scales have been widely used in cross-sectional and longitudinal studies of schizotypy. Groups identified as at-risk by the scales tend to show psychological and physiological deficits similar to those seen in schizophrenic and to be at an elevated risk for developing schizophrenia-spectrum disorders (Chapman et al., 1994; Kwapil, 1998).

The SPQ contains 74 yes/no items that comprise 9 subscales that map onto the DSM-IV criteria for schizotypal personality disorder: ideas of reference, magical thinking, perceptual aberration, odd thinking and speech, suspiciousness, constricted affect, odd behavior, lack of close friends, and social anxiety. The Suspiciousness (8 items), Ideas of Reference (9 items), and Excessive Social Anxiety (8 items) subscales were used in Study 1. The Paranoia Checklist is an 18-item scale measuring a range of clinical and non-clinical paranoia. For each item, participants are asked to rate the frequency, distress, and degree of conviction. The MMPI-2 is a measure widely used for personality assessment. The Persecutory Ideas Subscale of the MMPI-2 Scale 6 (MMPI-Persecutory) consists of 17 true-false items measuring beliefs that others have harmful intentions. Coefficient alpha is reported to be .71 for the SPQ-Ideas of Reference Subscale, .72 for the SPQ-Excessive Social Anxiety Subscale, .78 for the SPQ-Suspiciousness Subscale, .90 or above for the Paranoia Checklist, and .75 to .80 for the MMPI-2-Persecutory Ideas Subscale.

The SPS is a 20 item scale that assesses socially phobic concerns of being scrutinized or judged during routine activities. Coefficient alpha is reported to be .94 for the SPS (Mattick & Clarke, 1998).

All questionnaires were administered on scannable forms developed using the Teleform data entry system. Measures are provided in the Appendix. Participants completed these measures (along with measures not used in this study) as part of departmental mass-screening sessions. The assessments lasted between 1-1/2 to 2 hours and participants received course credit.

## Results

Analyses were computed using Amos Version 16 statistical software package. Given the large sample size and number of analyses alpha level was set at .001 for all of the analyses in order to minimize the risk of Type I error and to reduce the likelihood of reporting statistically significant, but inconsequential findings, due to the large sample size. Furthermore, effect sizes

were noted when possible. Analyses were presented for the male and female participants combined, because specific hypotheses were not offered regarding sex (however, note that the results were substantively unchanged when computed separately by sex).

#### *Relationships between Paranoia, Social Anxiety and Schizotypy*

The mean, standard deviation, distribution, and reliability for each scale in the present sample are presented in Table 1. Table 2 displays the bivariate correlations of scores on the schizotypy, paranoia, and social anxiety scales. Given the large sample size, even trivial correlations can be significant; therefore, it can be useful to consider effect sizes. Consistent with earlier findings (Chapman, Chapman, & Miller, 1982), the Revised Social Anhedonia and Physical Anhedonia Scales were significantly positively correlated and had large effect sizes, as were the Perceptual Aberration and Magical Ideation Scales. The Physical Anhedonia Scale was uncorrelated with the Perceptual Aberration Scale, and had a negative correlation with the Magical Ideation Scale (small effect size). The Social Anhedonia Scale was significantly correlated—a medium effect size—with the Perceptual Aberration and Magical Ideation Scales, consistent with the finding that the Social Anhedonia Scale taps aspects of both positive and negative schizotypy.

The measures of social anxiety were positively correlated and demonstrated large effect sizes, as were the measures of paranoia. The paranoia scales were positively correlated with measures of positive schizotypy, negative schizotypy, and social anxiety. Note that the SPQ-Ideas of Reference subscale had the strongest correlations with measures of paranoia, consistent with the self-referential nature of paranoid beliefs. In general, effect sizes between measures of paranoia and negative schizotypy were small to medium, between paranoia and social anxiety were medium, and between paranoia and positive schizotypy were medium to large.

Table 1

*Descriptive Statistics for Paranoia, Schizotypy, and Social Anxiety Scales*

<u>Paranoia Scales</u>	<u>Mean</u>	<u>SD</u>	<u>Range</u>	<u><math>\alpha</math></u>
MMPI- Persecutory Subscale	2.64	2.29	0 – 16	.70
Paranoia Checklist	32.69	28.49	0 – 196	.88
SPQ- Ideas of Reference	3.46	2.47	0 – 9	.75
SPQ- Suspiciousness	2.25	1.95	0 – 8	.68
<u>Schizotypy Scales</u>	<u>Mean</u>	<u>SD</u>	<u>Range</u>	<u><math>\alpha</math></u>
Revised Social Anhedonia	9.21	9.21	0 – 33	.83
Physical Anhedonia	14.28	7.09	0 – 47	.83
Perceptual Aberration	4.98	4.75	0 – 34	.85
Magical Ideation	8.11	5.23	0 – 29	.83
<u>Social Anxiety Scales</u>				
SPS	60.30	22.38	15 – 140	.92
SPQ- Excessive Social Anxiety	3.62	2.44	0 – 8	.80

Note: SPQ refers to the Schizotypal Personality Scale, MMPI-Persecutory refers to the Minnesota Multiphasic Personality Inventory Version 2-Persecutory Ideas Subscale, and SPS refers to the Social Phobia Scale.

Table 2

*Correlations between Paranoia, Schizotypy, and Social Anxiety Scales*

	Social Phobia Scale	SPQ-Excessive Social Anxiety	Revised Social Anhedonia	Physical Anhedonia	Perceptual Aberration	Magical Ideation	MMPI- Persecutory	Paranoia Checklist	SPQ-Ideas of Reference
SPQ-Excessive Social Anxiety	<b><i>0.59*</i></b>								
Revised Social Anhedonia	0.24*	<b>0.27*</b>							
Physical Anhedonia	0.08	0.11*	<b><i>0.47*</i></b>						
Perceptual Aberr.	<b>0.33*</b>	<b>0.25*</b>	<b>0.32*</b>	-0.03					
Magical Ideation	<b>0.31*</b>	0.20*	0.22*	-0.14*	<b><i>0.68*</i></b>				
MMPI- Persecutory	<b>0.25*</b>	0.22*	<b>0.29*</b>	0.12*	<b>0.41*</b>	<b><i>0.45*</i></b>			
Paranoia Checklist	<b>0.34*</b>	<b>0.32*</b>	<b>0.29*</b>	0.08	<b>0.42*</b>	<b>0.41*</b>	<b><i>0.54*</i></b>		
SPQ-Ideas Ref.	<b>0.30*</b>	<b>0.30*</b>	0.17*	0.00	<b>0.39*</b>	<b><i>0.55*</i></b>	<b><i>0.52*</i></b>	<b><i>0.49*</i></b>	
SPQ- Suspicious	<b>0.32*</b>	<b>0.37*</b>	<b>0.39*</b>	0.20*	<b>0.35*</b>	<b>0.40*</b>	<b><i>0.65*</i></b>	<b><i>0.57*</i></b>	<b><i>0.59*</i></b>

\*Correlations significant at  $p < .001$

Medium effect sizes indicated in bold text, large effect sizes indicated in bold and italicized text

### *Confirmatory Factor Analyses*

To examine the relation of paranoia with social anxiety and schizotypy, six confirmatory factor analyses based upon *a priori* hypotheses were conducted (see Table 3 and Figures 1-6). Both the sample size and number of participants per variable were adequate for conducting confirmatory factor analyses in accordance with the recommendations set out by Anderson and Gerbing (1984) and Bentler and Chou (1987). Following the recommendations of Little et al. (2002) and Coffman and McCallum (2005), the items for each of the schizotypy scales were divided into three parcels and the SPS was divided into two parcels to produce more robust estimates.

Model fit was assessed using the Comparative Fit Index (CFI), the Tucker-Lewis Index, (TLI), and the Root Mean Square Error of Approximation (RMSEA). Table 4 reports these fit statistics. Excellent model fit is indicated by CFI and TLI greater than .95, and RMSEA less than .05 (Bentler & Bonett, 1980; Browne & Cudeck, 1993). Note that all chi-square values were significant—as would be predicted given a sample this large—so these values are not included on the table. Furthermore, the models were not nested, so the change in chi-square could not be compared across all successive models to assess improvement in fit. As an alternative method of comparing competing models, the Akaike Information Criterion (AIC) and Browne-Cudeck Criterion (BCC) values are also included in Table 4. The AIC and BCC are fit indices that assess model fit by constructing a hypothetical data set similar to the actual data set. Unlike other fit indices, the AIC and BCC adjust for model complexity. Models with smaller values of BCC and AIC have better fit than competing models (Kline, 2005).

In all models that specify separate positive and negative schizotypy factors, the Revised Social Anhedonia Scale was allowed to cross-load onto both factors, consistent previous factor analytic studies (Brown et al., 2008; Kwapil, Barrantes-Vidal, & Silvia, 2008; Lewandowski et



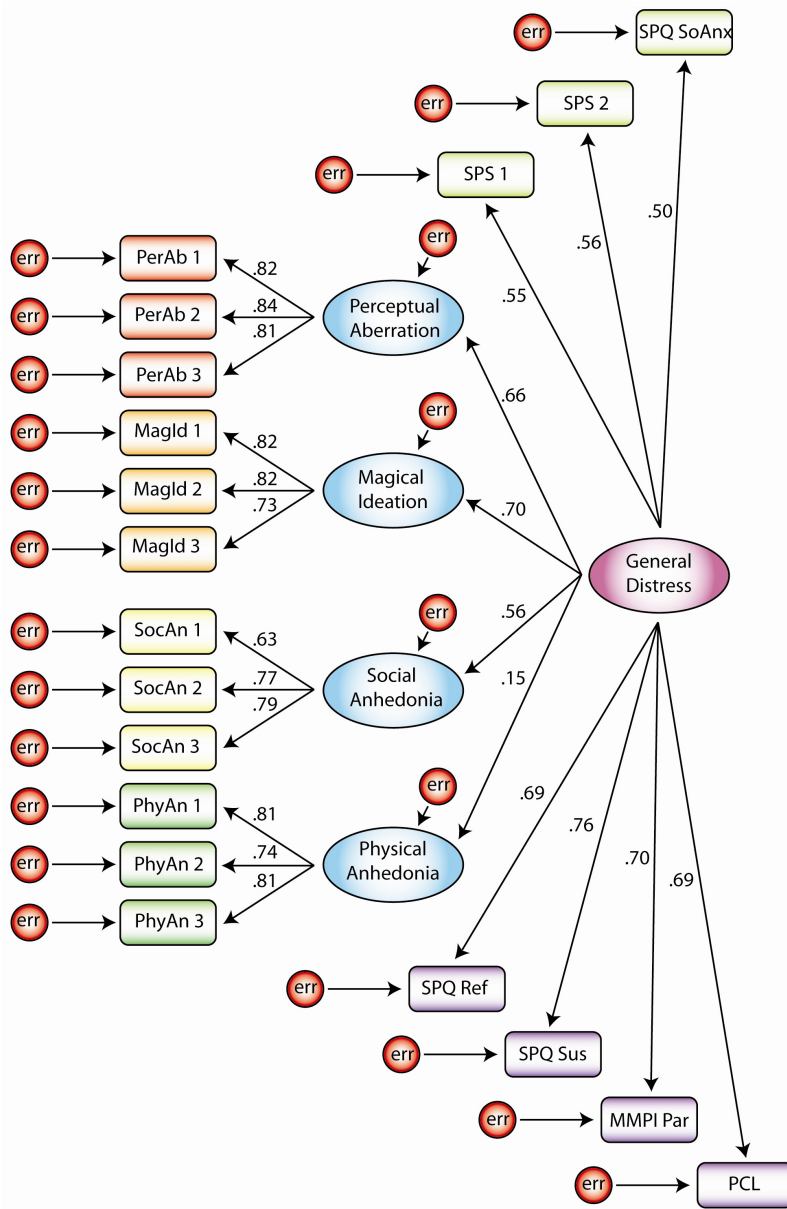
Table 3

*Summary of Models Tested in Confirmatory Factor Analysis*

<u>Model</u>	<u># of Factors</u>	<u>Factor Labels</u>	<u>Scales</u>
Model 1	1	General Distress	Perceptual Aberration , Magical Ideation Physical Anhedonia, Revised Social Anhedonia SPS, SPQ-Excessive Social Anxiety, MMPI-Persec .Paranoia Checklist, SPQ-Ideas Ref., SPQ-Suspiciousness
Model 2	2	Schizotypy	Perceptual Aberration, Magical Ideation Physical Anhedonia, Revised Social Anhedonia
		Social Dysfunction	SPS, SPQ-Excessive Social Anxiety, MMPI-Persec .Paranoia Checklist, SPQ-Ideas Ref., SPQ-Suspiciousness
Model 3	2	Positive Schizotypy	Perceptual Aberration, Magical Ideation SPS, SPQ-Excessive Social Anxiety, MMPI-Persec., Paranoia Checklist, SPQ-Ideas Ref., SPQ-Suspiciousness
Model 4	3	Negative Schizotypy	Physical Anhedonia, Revised Social Anhedonia
		Positive Schizotypy	Perceptual Aberration , Magical Ideation
		Negative Schizotypy	Physical Anhedonia, Revised Social Anhedonia
		Social Dysfunction	SPS, SPQ-Excessive Social Anxiety, MMPI-Persec., Paranoia Checklist, SPQ-Ideas Ref., SPQ-Suspiciousness
Model 5	3	Positive Schizotypy	Perceptual Aberration, Magical Ideation, MMPI-Persec., Paranoia Checklist, SPQ-Ideas Ref., SPQ-Suspiciousness
		Negative Schizotypy	Physical Anhedonia, Revised Social Anhedonia
		Social Anxiety	SPS, SPQ-Excessive Social Anxiety
Model 6	4	Positive Schizotypy	Perceptual Aberration, Magical Ideation
		Negative Schizotypy	Physical Anhedonia, Revised Social Anhedonia
		Social Anxiety	SPS, SPQ-Excessive Social Anxiety
		Paranoia	MMPI-Persec., Paranoia Checklist, SPQ-Ideas Reference, SPQ-Suspiciousness

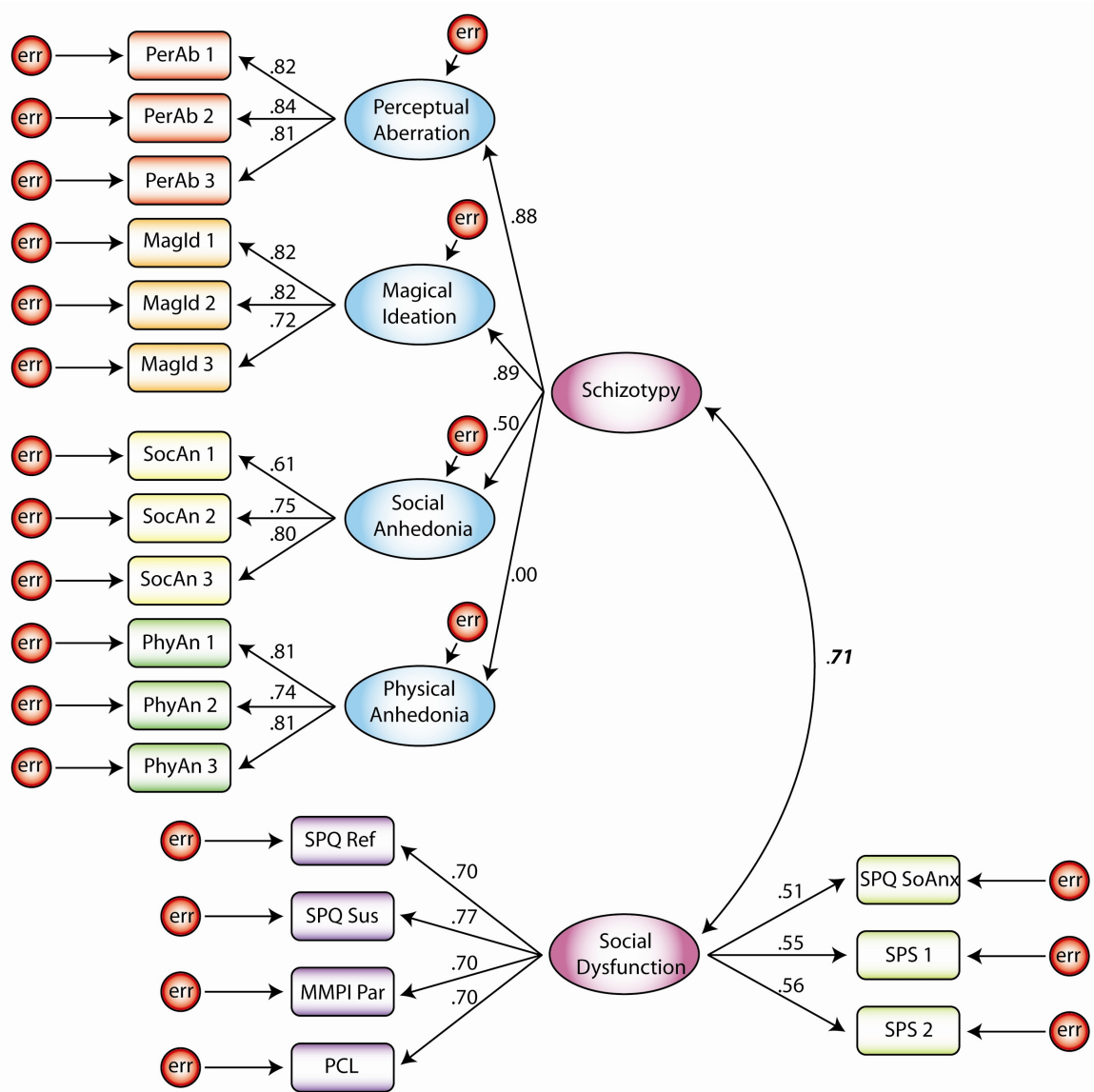
Note: SPQ refers to the Schizotypal Personality Scale, MMPI-Persecutory refers to the Minnesota Multiphasic Personality Inventory Version 2-Persecutory Ideas Subscale, and SPS refers to the Social Phobia Scale.

Figure 1. Model 1: One-Factor Model



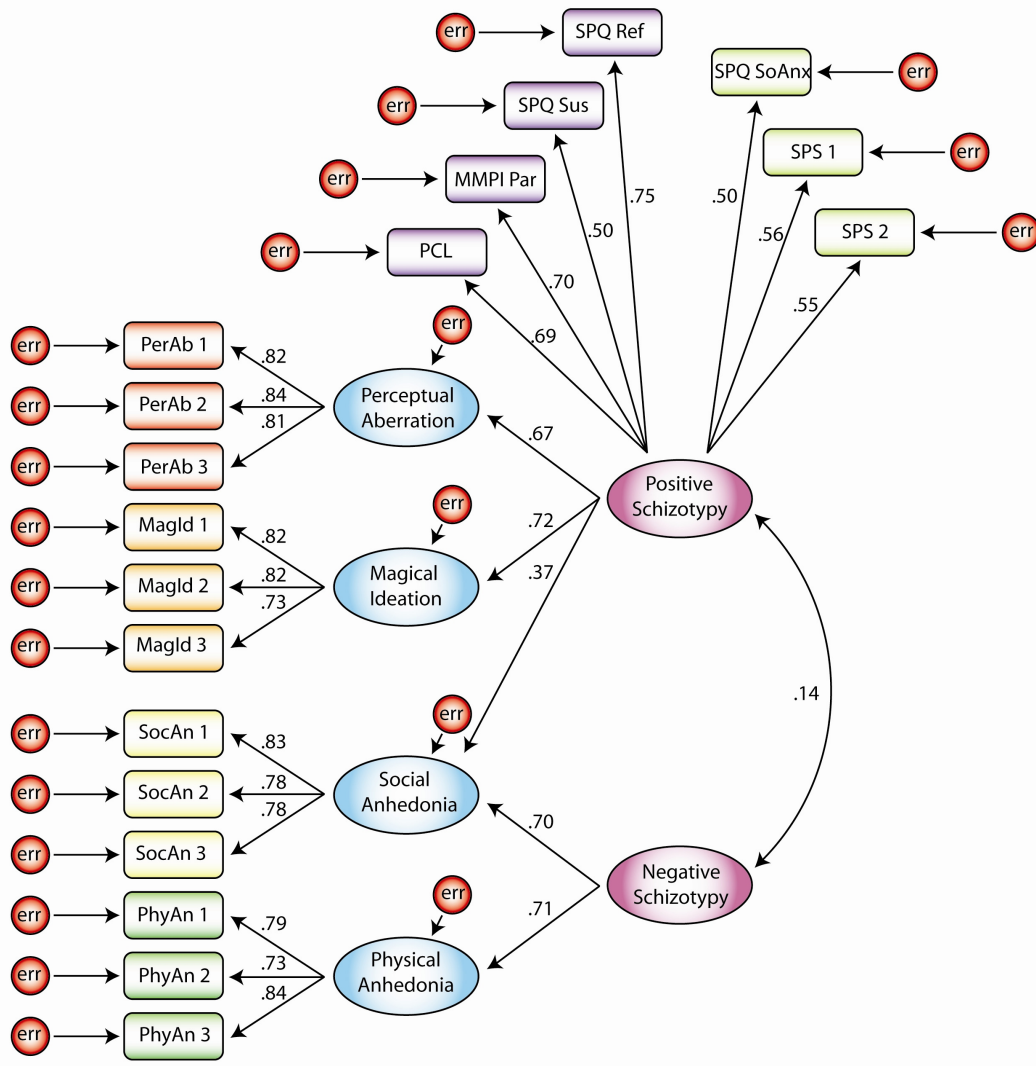
Medium effect sizes indicated in bold text, large effect sizes indicated in bold and italicized text

Figure 2. Model 2: Two-Factor Model



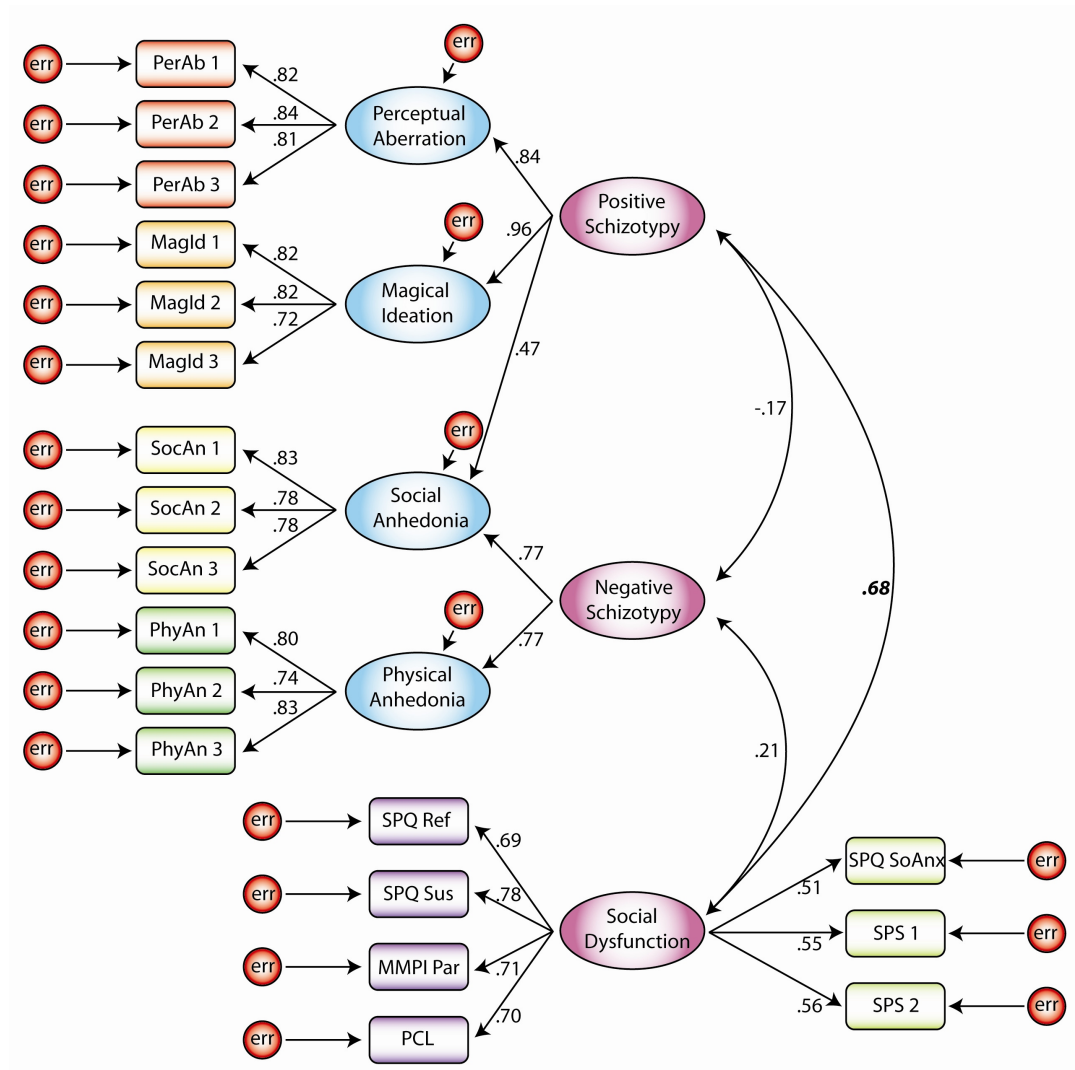
Medium effect sizes indicated in bold text, large effect sizes indicated in bold and italicized text

Figure 3. Model 3: Alternative Two-Factor Model



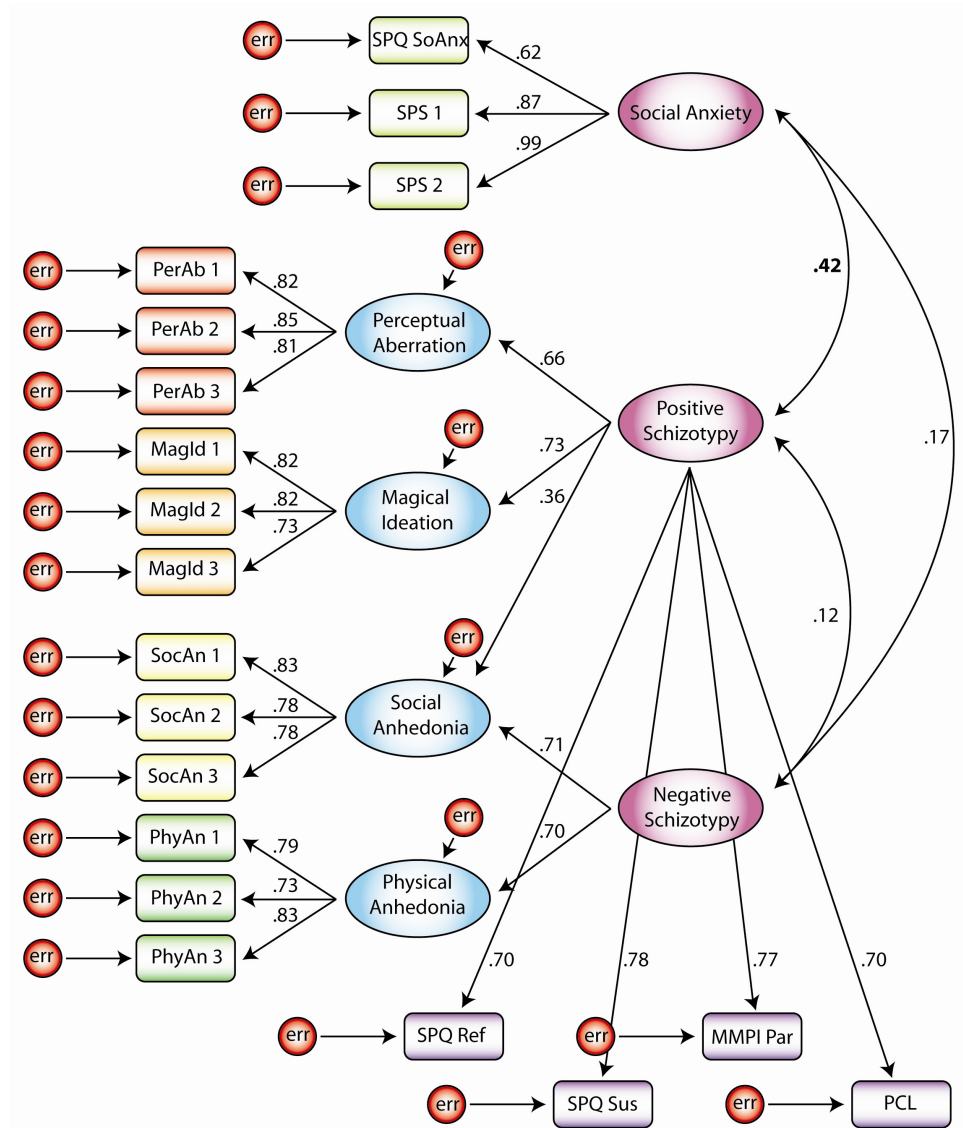
Medium effect sizes indicated in bold text, large effect sizes indicated in bold and italicized text

Figure 4. Model 4: Three-Factor Model



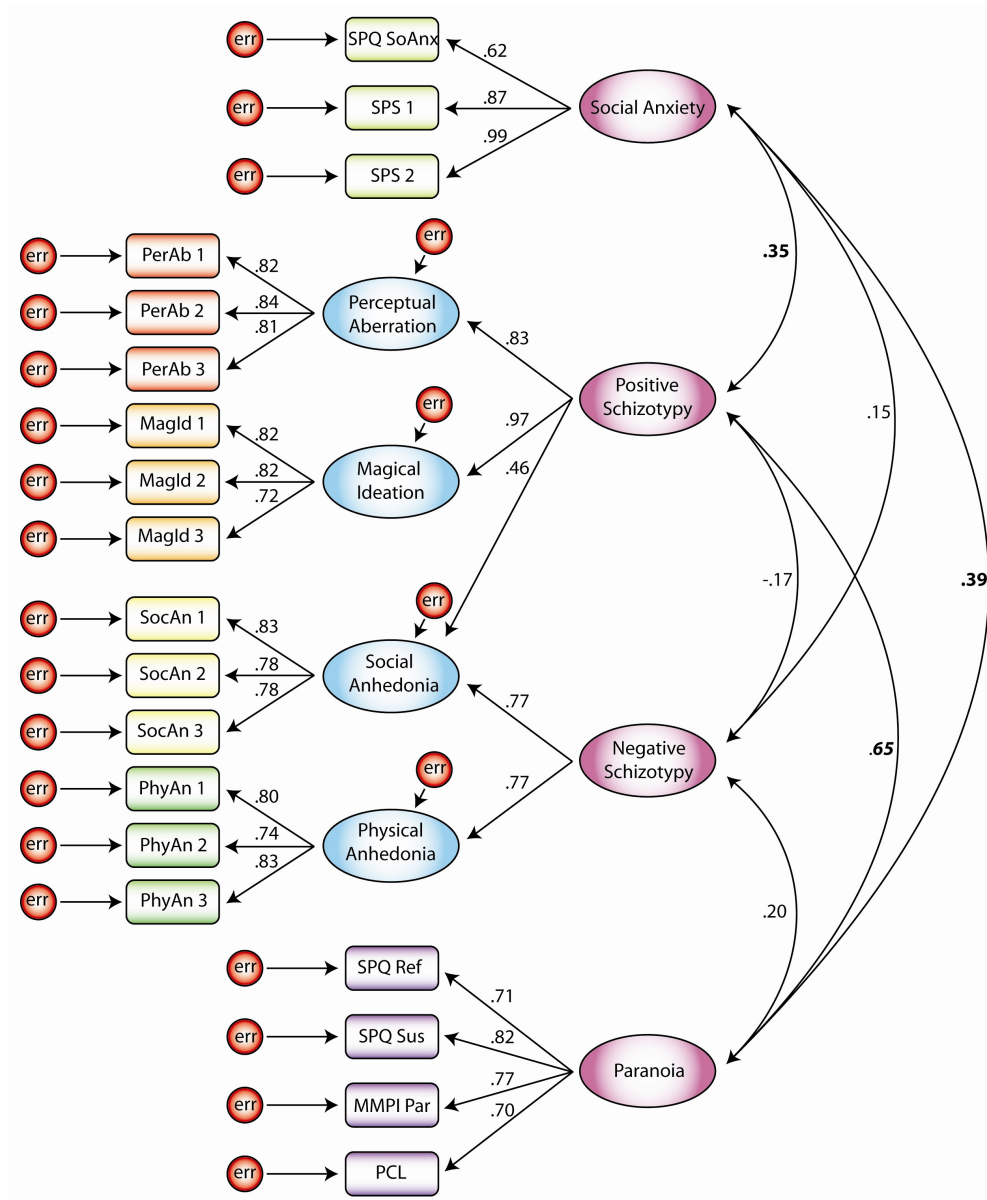
Medium effect sizes indicated in bold text, large effect sizes indicated in bold and italicized text

Figure 5. Model 5: Alternative Three-Factor Model



Medium effect sizes indicated in bold text, large effect sizes indicated in bold and italicized text

Figure 6. Model 6: Four-Factor Model



Medium effect sizes indicated in bold text, large effect sizes indicated in bold and italicized text

Table 4

*Confirmatory Factor Analyses of Paranoia, Schizotypy and Social Anxiety*

<u>Model</u>	<u>CFI</u>	<u>TLI</u>	<u>AIC</u>	<u>BCC</u>	<u>RMSEA</u>
Model 1	0.74	0.67	2802.68	2804.98	0.13
Model 2	0.76	0.70	2603.79	2606.13	0.12
Model 3	0.77	0.71	2497.61	2499.99	0.12
Model 4	0.81	0.75	2160.23	2162.69	0.11
Model 5	0.92	0.90	1049.93	1052.39	0.07
Model 6	<u>0.96</u>	0.94	<u>641.44</u>	<u>694.01</u>	<u>0.05</u>

Excellent fit indicated by CFI & TLI  $\geq$  .95; RMSEA & SRMR  $\leq$  .05;  
 Smaller values of AIC and BCC indicate improved model fit



al., 2006). Note that Kwapil, Barrantes-Vidal, and Silvia extensively discussed the moderate correlation found between social anhedonia and positive schizotypy, concluding that this likely represented a measurement issue, as the construct of social anhedonia should fit only on a negative schizotypy factor.

Consistent with analyses conducted by Lewandowski et al. (2006) and Brown et al. (2008), Model 1 (Figure 1) tested whether all scales load primarily on a single factor, representing general distress. As indicated in Table 4, this model provided a poor fit.

Model 2 evaluated the fit of a two-factor model (Figure 2), with one factor, schizotypy, that consisted of combined positive and negative schizotypy scales, and a second factor, social dysfunction, that consisted of combined paranoia and social anxiety. This model also provided poor fit. Model 3 (Figure 3) evaluated whether the best fit was obtained with an alternative two-factor model. In this model, one factor represented positive schizotypy, and included both the paranoia and social anxiety scales, and one factor represented negative schizotypy. This model also provided poor fit.

Model 4 (Figure 4) evaluated whether a three-factor model provided the best fit, consisting of a positive schizotypy factor, a negative schizotypy factor, and a social dysfunction factor which combined social anxiety and paranoia. This model provided poor fit. Model 5 (Figure 5) tested an alternative three-factor model, which included a positive schizotypy which included the paranoia scales, a negative schizotypy factor, and a social anxiety factor. This model had adequate to good fit.

Model 6 examined a four-factor solution consisting of positive schizotypy, negative schizotypy, social anxiety, and paranoia factors (Figure 6). This model provided excellent fit and the lowest values of the AIC and BCC. In this model, there was a small effect size indicated by the correlation between the positive and negative schizotypy factors. There was also a small

relationship between the negative schizotypy and social anxiety factors, and well as the negative schizotypy and paranoia factors. There was a medium effect between the social anxiety and positive schizotypy factors; likewise, there was a medium effect between the social anxiety and paranoia factors. As hypothesized, the relationship between positive schizotypy and paranoia was strong, as indicated by a large effect size.

#### Study 1 Summary

In Study 1, paranoia formed a factor that was separate from social anxiety, positive schizotypy, and negative schizotypy. As predicted, the paranoia factor had a weak association with the negative schizotypy factor, a medium association with the social anxiety factor, and a large association with the positive schizotypy factor. This study was an initial examination of the how paranoia and social anxiety related; however, it is important to further validate these constructs. Thus, the next study examined paranoia and social anxiety in daily life in terms of affect, thoughts, and activities.

## CHAPTER III

### STUDY 2

#### Introduction

##### *Goals and Hypotheses*

The goal of the Study 2 was to examine the expression of social anxiety and paranoia in daily life. Although a number of similarities in affect, thoughts, and social interactions between social anxiety and paranoia are expected, differences are expected to emerge that will help differentiate these constructs in daily life in the domains of affect, thoughts, and social perceptions and behaviors. The study will use ESM to examine the expression of paranoia and social anxiety in daily life (based upon factor scores generated in study 1). Given that the focus of the investigation was on the expression of paranoia and social anxiety, the expression of the schizotypy factors scores was not examined in this study (but has been reported in Kwapil et al., 2009). Hypotheses are as follows:

- 1) In terms of affect, it is predicted that both social anxiety and paranoia will be associated with higher negative and lower positive affect; specifically, with being more sad, more anxious, more self-conscious, more irritable, less happy, and less relaxed. However, paranoia will also be associated with more anger and hostility.
- 2) In terms of thought content, it is predicted that paranoia—but not social anxiety—will be associated with daily experiences of suspiciousness. Specifically, trait paranoia will be associated with daily reports of being suspicious, threatened, mistreated, unsafe, and watched

- 3) Furthermore, paranoia, but not social anxiety, will be associated with greater thought disruptions. Specifically, paranoia will be associated with less clarity in thought and more trouble concentrating.
- 4) In terms of social interactions, paranoia—but not social anxiety—will be associated with more social isolation; specifically, more time spent alone and at home. Both paranoia and social anxiety will be associated with a preference to be alone when with others; however social anxiety will also be associated with the preference to be with others when alone, indicating a conflict in the desire for social interactions.
- 5) Furthermore, it is predicted that social anxiety and paranoia will be associated with reports of feeling criticized and “put down”; however, social anxiety (but not paranoia) will be associated with reports of feeling not cared about and being alone because others do not want to be with them.
- 6) In terms of moderating effects of situational context, the closeness of the social relationship is predicted to have differential effects for those higher in paranoia versus social anxiety. Unlike paranoia, social anxiety will be associated with improvements in mood during reports of being with people to whom they feel close. Specifically, during close social encounters, social anxiety (but not paranoia) will be associated with less self-consciousness, less sadness, less anxiety, more happiness, and less preference to be alone.
- 7) It is further predicted that unsuccessful and/or stressful situations will serve as moderating variables. Specifically, in stressful and unsuccessful situations, paranoia will be associated with more anger, blaming others (others are “no good”), and state paranoia. Social anxiety, on the other hand, will be associated with more sadness, self-blame, self-consciousness, and desire to be alone during stressful or unsuccessful situations.

## Method

### *Participants*

A subset of 240 participants from the initial study participated in this study. Recruitment of participants involved two different mechanisms. Unselected participants who completed the departmental mass screening assessment signed up to take part in the study through a confidential web-based recruitment system. I also recruited (oversampled) participants who had elevated scores (standard scores of 1.5 or above) on the paranoia and social anxiety scales in order to ensure that a sufficient number of individuals who experience these characteristics were included in the study. In this sample, 13.4% of participants scored 1.5 or more standard deviations above the Study 1 mean of the paranoia scales, and 7.1% were two or more standard deviations above the mean. In terms of the social anxiety scales, 8.7% scored 1.5 or more standard deviations above the mean, and 2.5% were two or more standard deviations above the mean. Participants received research credit for taking part in the study, and those who completed 70% of the ESM questionnaires were entered into a drawing for two \$100 gift cards awarded each semester.

### *Materials and Procedures*

Paper-and-pencil questionnaires described in the previous chapter were used in the current study. ESM data were collected on PDAs (Personal Digital Assistants) using ESP software (Intel, 2007). The questionnaire (presented in the Appendix) was developed in consultation with Inez Myin-Germeys following from Myin-Germeys et al. (2000) and Myin-Germeys et al. (2003). The ESM questionnaire inquired about cognitions, affect, activities, and social contact that the participant is experiencing at the time of the signal. Most of the items are rated on a 7-point scale from 1 (not at all) to 7 (very much).

Participants attended a one-hour information session in which experimenters provided Palm Pilot PDAs, obtained informed consent, and described study procedures. Additionally,

participants who did not have usable data from mass screening completed the paper-and-pencil questionnaires described above. After being assigned a PDA and being provided verbal instructions on its use during the initial session, participants were asked to complete a practice questionnaire to ensure familiarity with study procedures. Before participants left the session, they were provided with a written summary of the study instructions and contact information in the event that they experienced problems with the procedures.

After completing the information session, participants carried the PDAs with them for seven days. The PDAs signaled the participants, administered the questionnaires, and time-stamped and recorded the participants' responses. Participants were signaled to complete the ESM questionnaire eight times daily between noon and midnight during their study participation. One signal occurred randomly during each of the eight 90-minute blocks that fell within the twelve-hour window. Participants responded by tapping the appropriate answer on the PDA screen with a stylus. Participants had up to five minutes to initiate their responses following the signal and up to three minutes to complete each subsequent question. After these time intervals (or the completion of a questionnaire), the PDA turned off and did not reactivate until the next signal. This procedure ensured that participants could not skip questionnaire administrations and complete them at a later time. The ESM questionnaires required about two minutes to complete.

Participants were also asked to return to the lab on days two and four of the study to allow investigators to download their current data. These visits decreased the likelihood of data loss resulting from lost or defective PDAs and increased the likelihood of participants regularly completing the protocols. This procedure has been used effectively in our lab. Furthermore, findings from previous studies in our laboratory indicated that participants complete an average of 41 to 44 usable ESM questionnaires.

## Results

ESM data have a hierarchical structure in which ESM ratings (level 1 data) are nested within participants (level 2 data). Multilevel modeling is variant of the more commonly used unilevel regression analyses and provides a more appropriate method than conventional unilevel analyses for analyzing nested data (Affleck, Zautra, Tennen, & Armeli, 1999; Hox, 2002; Luke, 2004; Schwartz & Stone, 1998). Furthermore, multilevel modeling techniques are standard for the analysis of ESM data (see Nezlek, 2001; Reis & Gable, 2000).

The relationships of social anxiety, paranoia, and their interaction were examined by modeling several level 1 variables as intercepts of regression equations. This offered an advantage over traditional correlational analyses in that it included an error term for within-person variance, thereby increasing precision. Level 1 variables that were examined include experiences of affect, thoughts, and social contact. Cross-level interaction analyses (see Kreft & de Leeuw, 1998) examined the extent to which paranoia, social anxiety, and their interaction moderated the relations of level 1 variables. In other words, cross-level interactions tested whether level 1 relations varied as a function of the level 2 variable.

The multilevel data were analyzed with HLM 6 (Raudenbush, Bryk, & Congdon, 2004). For all analyses, social anxiety and paranoia were entered simultaneously into the multilevel equations, followed by their interaction term at the second step. Consistent with the recommendations of Cohen et al. (2003) and Luke (2004), social anxiety, paranoia, and interaction term scores were grand mean centered. ESM predictors were group mean centered. The data departed from normality, so parameter estimates were calculated using robust standard errors (Hox, 2002).

The first set of analyses examined the relation of social anxiety and paranoia with affect and thoughts in daily life (Table 5). In terms of affect, both social anxiety and paranoia were

Table 5

*Relationship of Social Anxiety and Paranoia with Affect and Thoughts in Daily Life*

<u>ESM Criterion:</u>	Step 1: Paranoia ( <i>df</i> = 235)	Step 1: Social Anxiety ( <i>df</i> = 235)	Step 2: Paranoia x Social Anxiety ( <i>df</i> = 234)
<u>Affect</u>			
Happy	-0.116 ( <i>SE</i> =0.062)*	-0.093 ( <i>SE</i> =0.059)	-0.032 ( <i>SE</i> =0.048)
Angry	0.138 ( <i>SE</i> =0.053)**	0.087 ( <i>SE</i> =0.051)	-0.0510 ( <i>SE</i> =0.031)
Anxious	0.162 ( <i>SE</i> =0.075)*	0.156 ( <i>SE</i> =0.067)*	-0.108 ( <i>SE</i> =0.045)*
Sad	0.123 ( <i>SE</i> =0.058)*	0.132 ( <i>SE</i> =0.055)*	-0.040 ( <i>SE</i> =0.038)
Self-Conscious	0.170 ( <i>SE</i> =0.069)**	0.125 ( <i>SE</i> =0.061)*	-0.024 ( <i>SE</i> =0.043)
Irritable	0.243 ( <i>SE</i> =0.071)***	0.130 ( <i>SE</i> =0.064)*	-0.113 ( <i>SE</i> =0.045)*
<u>Thoughts</u>			
Suspicious	0.196 ( <i>SE</i> =0.062)**	0.064 ( <i>SE</i> =0.048)*	-0.112 ( <i>SE</i> =0.030)***
Threatened	0.116 ( <i>SE</i> =0.059)*	0.052 ( <i>SE</i> =0.043)	-0.052 ( <i>SE</i> =0.034)
Mistreated	0.176 ( <i>SE</i> =0.054)*	0.057 ( <i>SE</i> =0.042)	-0.046 ( <i>SE</i> =0.026)
Safe	-0.159 ( <i>SE</i> =0.067)*	-0.049 ( <i>SE</i> =0.059)	-0.017 ( <i>SE</i> =0.056)
Watched	0.259 ( <i>SE</i> =0.073)***	0.005 ( <i>SE</i> =0.059)	-0.090 ( <i>SE</i> =0.049)
Thoughts Clear	-0.060 ( <i>SE</i> =0.076)	-0.063 ( <i>SE</i> =0.071)	0.035 ( <i>SE</i> =0.057)
Trouble Concentrating	0.121 ( <i>SE</i> =0.070)	0.082 ( <i>SE</i> =0.064)	-0.027 ( <i>SE</i> =0.047)

\**p* ≤ .05    \*\**p* ≤ .01    \*\*\**p* ≤ .001

Note: values are multilevel modeling coefficients (and standard error)

<sup>a</sup>Items is reversed scored (1 = yes [alone], 2 = no [with others])



associated with higher negative affect; specifically, with being more sad, more anxious, more self-conscious, and more irritable. Paranoia was negatively associated with happiness; however, contrary to predictions, there was no significant association between social anxiety and happiness. Paranoia, but not social anxiety, was also associated with reports of anger. Both social anxiety and paranoia were associated with reporting that “others are no good.”

In terms of thought content, paranoia—but not social anxiety—was associated with daily experiences of suspiciousness. Specifically, paranoia was associated with daily reports of being suspicious, threatened, mistreated, unsafe, and watched. Contrary to predictions, paranoia was not associated with less clarity in thought and more trouble concentrating. No association was found between social anxiety and thought disruptions.

The relation of paranoia and social anxiety with social interactions were examined next (Table 6). Neither paranoia nor social anxiety was associated with more time spent alone or at home. Both paranoia and social anxiety were associated with a preference to be alone when with others. Contrary to predictions, social anxiety was not associated with the preference to be with others when alone. Social anxiety and paranoia also had significant associations with negative social perceptions. Both social anxiety and paranoia were associated with reports of feeling criticized and “put down.” In addition, social anxiety—but not paranoia—was associated with reports of feeling not cared about and being alone because others do not want to be with them.

In order to determine whether daily responses differed within the context of social encounters, we examined whether social anxiety and paranoia moderated the relationship between affect and reports of close social interactions (Table 7). Consistent with predictions, participants higher in social anxiety reported less self-consciousness, anxiety, and preference to be alone in close social encounters relative to those lower in social anxiety; however, there were no significant cross-level interactions with social anxiety and reports of feeling less sad, less

Table 6

*Relationship of Social Anxiety and Paranoia with Social Interactions in Daily Life*

<u>ESM Criterion</u>	Step 1: Paranoia ( <i>df</i> = 235)	Step 1: Social Anxiety ( <i>df</i> = 235)	Step 2: Paranoia x Social Anxiety ( <i>df</i> = 234)
<u>Social Interactions</u>			
Alone <sup>a</sup>	-0.006 ( <i>SE</i> =0.012)	-0.016 ( <i>SE</i> =0.011)	-0.009 ( <i>SE</i> =0.009)
At Home	-0.028 ( <i>SE</i> =0.026)	0.000 ( <i>SE</i> =0.024)	-0.022 ( <i>SE</i> =0.019)
Alone: Prefer Others	0.069 ( <i>SE</i> =0.088)	-0.172 ( <i>SE</i> =0.095)	-0.107 ( <i>SE</i> =0.077)
Prefer Alone	0.136 ( <i>SE</i> =0.071)*	0.154 ( <i>SE</i> =0.069)*	-0.129 ( <i>SE</i> =0.052)*
Criticized	0.124 ( <i>SE</i> =0.056)*	0.105 ( <i>SE</i> =0.043)*	-0.063 ( <i>SE</i> =0.031)*
Put Down	0.134 ( <i>SE</i> =0.062)*	0.122 ( <i>SE</i> =0.052)*	-0.062 ( <i>SE</i> =0.039)
Cared About	-0.077 ( <i>SE</i> =0.070)	-0.287 ( <i>SE</i> =0.068)***	-0.065 ( <i>SE</i> =0.057)
Alone: Not Wanted	0.083 ( <i>SE</i> =0.061)	0.110 ( <i>SE</i> =0.052)*	0.0462 ( <i>SE</i> =0.052)

\**p* ≤ .05    \*\**p* ≤ .01    \*\*\**p* ≤ .001

Note: values are multilevel modeling coefficients (and standard error)

<sup>a</sup>Items is reversed scored (1 = yes [alone], 2 = no [with others])

anxious, and more happy during close social interactions. As predicted, these relationships did not change across levels of paranoia.

The next set of analyses examined cross-level interactions during stressful situations and unsuccessful activities (Tables 8 and 9). In contrast to predictions, cross-level interactions between level 1 variables and reports of being in stressful situations were not significant. As predicted, people higher in social anxiety reported greater desire to be alone during less successful activities. Furthermore, both social anxiety and paranoia had negative cross-level interactions of activity success and reports that other are “no good.” Other cross-level interactions of activity success were not significant.

Table 7

*Cross Level Interactions of Social Anxiety and Paranoia with Experience of Closeness in Daily Life*

<u>ESM Criterion</u>	<u>ESM Predictor</u>	Relationship of ESM Predictor & Criterion ( <i>df</i> = 235)	Step 1: Paranoia ( <i>df</i> = 235)	Step 1: Social Anxiety ( <i>df</i> = 235)	Step 2: Paranoia x Social Anxiety ( <i>df</i> = 234)
Sad	Closeness	-0.033 ( <i>SE</i> =0.010)**	-0.012 ( <i>SE</i> =0.011)	0.000 ( <i>SE</i> =0.010)	0.013 ( <i>SE</i> =0.006)*
Anxious	Closeness	-0.083 ( <i>SE</i> =0.014)***	0.030 ( <i>SE</i> =0.017)	-0.045 ( <i>SE</i> =0.016)**	0.003 ( <i>SE</i> =0.013)
Self-Conscious	Closeness	-0.061 ( <i>SE</i> =0.011)***	-0.006 ( <i>SE</i> =0.013)	-0.028 ( <i>SE</i> =0.012)*	0.001 ( <i>SE</i> =0.010)
Irritable	Closeness	-0.099 ( <i>SE</i> =0.014)***	-0.006 ( <i>SE</i> =0.018)	-0.024 ( <i>SE</i> =0.017)	0.010 ( <i>SE</i> =0.011)
Happy	Closeness	0.172 ( <i>SE</i> =0.013)***	-0.013 ( <i>SE</i> =0.016)	0.009 ( <i>SE</i> =0.016)	-0.009 ( <i>SE</i> =0.012)
Prefer Alone	Closeness	-0.373 ( <i>SE</i> =0.019)***	-0.030 ( <i>SE</i> =0.021)	-0.042 ( <i>SE</i> =0.020)*	0.017 ( <i>SE</i> =0.017)

\**p* ≤ .05    \*\**p* ≤ .01    \*\*\**p* ≤ .001

Note: values are multilevel modeling coefficients (and standard error)

Table 8

*Cross Level Interactions of Social Anxiety and Paranoia During Stressful Situations in Daily Life*

<u>ESM</u> <u>Criterion</u>	<u>ESM</u> <u>Predictor</u>	Relationship of ESM Predictor & Criterion ( <i>df</i> = 235)	Step 1: Paranoia ( <i>df</i> = 235)	Step 1: Social Anxiety ( <i>df</i> = 235)	Step 2: Paranoia x Social Anxiety ( <i>df</i> = 234)
Angry	Stressful	0.266 ( <i>SE</i> =0.018)***	-0.002 ( <i>SE</i> =0.019)	0.021 ( <i>SE</i> =0.019)	0.011 ( <i>SE</i> =0.018)
Sad	Stressful	0.282 ( <i>SE</i> =0.018)***	-0.011 ( <i>SE</i> =0.019)	0.161 ( <i>SE</i> =0.067)	0.058 ( <i>SE</i> =0.049)
I Am No Good	Stressful	0.197 ( <i>SE</i> =0.016)***	-0.003 ( <i>SE</i> =0.019)	0.033 ( <i>SE</i> =0.016)	0.037 ( <i>SE</i> =0.014)
Self-Conscious	Stressful	0.162 ( <i>SE</i> =0.016)***	0.012 ( <i>SE</i> =0.015)	0.012 ( <i>SE</i> =0.018)	0.017 ( <i>SE</i> =0.011)
Prefer Alone	Stressful	0.315 ( <i>SE</i> =0.027)***	-0.020 ( <i>SE</i> =0.033)	0.020 ( <i>SE</i> =0.031)	0.022 ( <i>SE</i> =0.036)
Suspicious	Stressful	0.151 ( <i>SE</i> =0.016)***	0.026 ( <i>SE</i> =0.019)	-0.007 ( <i>SE</i> =0.015)	0.017 ( <i>SE</i> =0.014)
Threatened	Stressful	0.101 ( <i>SE</i> =0.015)***	0.024 ( <i>SE</i> =0.015)	0.005 ( <i>SE</i> =0.015)	0.003 ( <i>SE</i> =0.009)

\**p* ≤ .05    \*\**p* ≤ .01    \*\*\**p* ≤ .001

Note: values are multilevel modeling coefficients (and standard error)

Table 9

*Cross Level Interactions of Social Anxiety and Paranoia During Unsuccessful Activities in Daily Life*

<u>ESM</u> <u>Criterion</u>	<u>ESM</u> <u>Predictor</u>	Relationship of ESM Predictor & Criterion ( <i>df</i> = 235)	Step 1: Paranoia ( <i>df</i> = 235)	Step 1: Social Anxiety ( <i>df</i> = 235)	Step 2: Paranoia x Social Anxiety ( <i>df</i> = 234)
Angry	Successful	-0.175( <i>SE</i> =0.014)***	-0.022 ( <i>SE</i> =0.015)	-0.009 ( <i>SE</i> =0.014)	-0.024 ( <i>SE</i> =0.013)
Others No Good	Successful	-0.121 ( <i>SE</i> =0.112)***	-0.035 ( <i>SE</i> =0.011)**	-0.027 ( <i>SE</i> =0.0012)*	0.005 ( <i>SE</i> =0.009)
Sad	Successful	-0.178 ( <i>SE</i> =0.014)***	-0.028 ( <i>SE</i> =0.015)	0.002 ( <i>SE</i> =0.014)	0.010 ( <i>SE</i> =0.010)
I Am No Good	Successful	-0.140 ( <i>SE</i> =0.013)***	-0.022 ( <i>SE</i> =0.014)	-0.015 ( <i>SE</i> =0.015)	0.019 ( <i>SE</i> =0.010)
Self-Conscious	Successful	-0.094 ( <i>SE</i> =0.013)***	-0.003 ( <i>SE</i> =0.013)	-0.012 ( <i>SE</i> =0.015)	0.009 ( <i>SE</i> =0.009)
Prefer Alone	Successful	-0.244 ( <i>SE</i> =0.021)***	0.016 ( <i>SE</i> =0.000)	0.061 ( <i>SE</i> =0.023)*	-0.005 ( <i>SE</i> =0.017)
Suspicious	Successful	-0.086 ( <i>SE</i> =0.012)***	-0.004 ( <i>SE</i> =0.015)	-0.006 ( <i>SE</i> =0.012)	0.002 ( <i>SE</i> =0.008)
Threatened	Successful	-0.082 ( <i>SE</i> =0.011)***	-0.006 ( <i>SE</i> =0.014)	-0.002 ( <i>SE</i> =0.013)	0.011 ( <i>SE</i> =0.008)

\**p* ≤ .05    \*\**p* ≤ .01    \*\*\**p* ≤ .001

Note: values are multilevel modeling coefficients (and standard error)

## CHAPTER IV

### DISCUSSION

#### *A Spectrum of Paranoia*

The present studies examined the nature of paranoia; in particular, its relation to social anxiety, its relation to positive and negative symptom dimensions of schizotypy, and its expression in daily life. Researchers examining paranoia and suspiciousness have often failed to consider it dimensionally in non-clinical samples, and have only preliminary data regarding its relation to social anxiety, to which it is phenomenologically related. Furthermore, no other studies have examined both paranoia and social anxiety in daily life to determine their influence on real-world functioning across levels of clinical and non-clinical expression.

The present findings are consistent with the model that paranoia is best understood as a spectrum of impairment ranging from mild suspiciousness paranoid delusions, with DSM-IV diagnoses characterized by paranoia representing the most extreme end of the continuum. These findings are in line with studies that have demonstrated meaningful, subclinical manifestations of paranoia, and have shown that an adequate range of paranoid experiences can be found in non-clinical samples (e.g., Johns et al., 2004). Nearly 15% of the present sample reported statistically meaningful deviations from mean paranoia scores, and 32% endorsed milder experiences of suspiciousness at least once a week. This supported a continuum of paranoia in which more extreme paranoia builds upon milder social concerns and suspiciousness. Thus, these findings support the use of non-clinical samples as a point-of-entry to identify people with suspicious thinking across the range of severity, with particular utility for examining milder forms of suspiciousness that could signal decompensation into clinical dysfunction.

### *Paranoia and Schizotypy: Overview*

An important goal of the present studies was to examine how paranoia relates to the schizophrenia spectrum. Given that the majority of clinical paranoia occurs within the context of spectrum disorders, it was important to extend this work to a non-clinical sample to understand the relation of paranoia and schizotypy across the full range of expression. These studies were novel in that they utilized multiple well-established paranoia measures in order to capture the range of expression. Many other confirmatory factor analyses of schizotypy rely exclusively on the Schizotypal Personality Questionnaire (SPQ), a measure which primarily taps aspects of positive schizotypy characteristic of Schizotypal Personality Disorder. Thus, several previous studies have explained the relation of schizotypy and paranoia at a specific point on the schizotypy continuum—that represented by the symptoms of Schizotypal Personality Disorder—rather than across the entire continuum. Furthermore, studies relying on the SPQ are less well-suited to resolve questions about the relation between paranoia and negative schizotypy.

Study 1 comprehensively examined the relation of paranoia and schizotypy in confirmatory factor analyses that compared the fit of six models using several schizotypy, social anxiety, and paranoia measures. The majority of previous clinical and non-clinical studies supported the notion that three factors characterize the schizophrenia spectrum: positive, negative, and disorganized symptom dimensions (Andreasen, Arndt, Miller, & Flaum, 1995; Liddle, 1987; Raine, Reynolds, Lencz, & Scerbo, 1994; Vollema & Hoijtink, 2000). Confirmatory factor analyses using the Chapman Schizotypy scales reliably detect two of these dimensions, positive and negative schizotypy. Thus, it was predicted in Study 1 that positive and negative schizotypy would be best described as separate factors, and that models failing to consider them separately would have poor model fit. This was confirmed in the results, as the final 4-factor model (Model 6; Figure 6) providing the best fit to the data consisted of separate



positive and negative schizotypy factors. Furthermore, the models with the poorest model fit (Models 1 and 2) were those that failed to separate positive from negative schizotypy, consistent with previous research (e.g., Brown et al., 2008; Kwapil, Barrantes-Vidal, & Silvia, 2008).

#### *Paranoia and Positive Schizotypy*

In the majority of previous factor analytic studies, paranoia was considered to be part of the positive schizotypy symptom dimension, in conjunction with unusual beliefs and perceptions (e.g., Andreasen et al., 1995; Vollema & Hoijsink, 2000). However, some recent studies using factor analyses in normal populations have found evidence for separate paranoia and positive schizotypy factors (e.g., Stefanis et al., 2004; Suhr and Spitznagel, 2001). The present research examined these plausible explanations by comparing the fit of two models: one that included paranoia as a part of positive schizotypy, and one that described separate positive schizotypy and paranoia factors. Consistent with predictions, the present research found that Model 6—which included positive, negative, social anxiety, and paranoia factors—best described the data, given that it had superior fit indices and lower information criterion values as compared to the alternative 3-factor model in which paranoia was a nested subfactor within positive schizotypy (Model 5). Furthermore, there was a strong correlation between the paranoia and positive schizotypy factors in Model 6.

Consistent with Stefanis et al. (2004), the present findings suggested that paranoia is conceptually distinct from the perceptual/ideational aspects of positive schizotypy. Stefanis et al. discussed this issue extensively, noting that a number of studies “have supported the multidimensionality of positive symptomatology and proposed that paranoia might constitute a distinct dimension within the schizophrenia spectrum separate from a dimension encompassing first rank Schneiderian symptoms (‘loss of ego boundary’ dimension) (e.g., Peralta and Cuesta 1998, 1999; Cardno et al. 2001)” (p. 345). The authors further noted that this finding may be

minimized in some studies of the schizophrenia spectrum, as many common measures of positive symptoms, such as the Scale for the Assessment of Positive Symptoms (SAPS; Andreasen 1984) and the Chapman schizotypy scales, do not include items specifically tapping paranoia.

An extensive body of research asserts a strong association between cognitive/perceptual aspects of positive schizotypy and paranoia (e.g., Raine et al., 1994; Venables & Rector, 2000). The present findings support these assertions; however, they also refine our understanding of paranoia as distinct from the cognitive/perceptual aspects of positive schizotypy. The content of paranoia differs from cognitive/perceptual distortions more generally because the former deals with a person's perception that they are vulnerable and exposed within the social world. Stefanis et al. (2004) offered a similar explanation for their results, noting that:

Maher (1988) has proposed that delusions arise as reasonable explanations of abnormal perceptual experiences; Zigler and Glick (1988), on the other hand, have proposed that delusions of grandiosity and paranoia seem much more to reflect a psychological motivation, serving a protective role against threats to the individual's sense of self. The relative independence between abnormal perceptual experiences and paranoid beliefs in our sample appears to favor less Maher's hypothesis (p. 345).

In other words, the unique perception of the self as threatened, and resulting attempts to compensate for this perception, can account for the divergence of paranoid and self-referential thinking from the cognitive/perceptual distortions characterizing positive schizotypy. This distinction merits further study, and points to the importance of including paranoia measures in future examinations of the structure of schizotypy.

#### *Self-Reference as Part of Paranoia*

Given that the present research supported an understanding of paranoia as distinct from the cognitive/perceptual aspects of positive schizotypy, how can we understand self-reference within this framework? Self-referential ideas and delusions reflect disordered thinking, which argues for their placement within the cognitive/perceptual aspects of positive schizotypy.

However, self-referential thinking is perhaps better understood as part of the vulnerable self-perception that distinguishes paranoid thinking from positive schizotypy. It is noteworthy that in Model 6 from Study 1, the self-reference subscale from the SPQ has a high loading on the Paranoia factor, consistent with the loadings of other paranoia scales onto that factor. Furthermore, other confirmatory and exploratory factor analytic studies support the inclusion of self-reference with a paranoia factor (Fossati et al., 2001; Peters et al., 1999; Stefanis et al., 2004; Suhr and Spitznagel, 2001). Thus, self-reference is best conceptualized as an aspect of paranoid and suspicious thinking.

#### *Paranoia and Negative Schizotypy*

The nature of the relationship between paranoia and negative schizotypy remains unclear in the literature. In the present research, Model 6 from Study 1 found a small relationship between the negative schizotypy and paranoia factors. This is consistent with the findings from some studies (Stefanis et al., 2004), and in contrast with others. For example, Kwapil, Barrantes-Vidal, and Silvia (2008) conducted a confirmatory factor analysis of schizotypy symptoms in a sample of 6,137 undergraduates, and found that both the positive and negative schizotypy factors were associated with increased reports of paranoid personality disorder symptoms on personality interviews. Given the high negative affect and emotional reactivity characterizing paranoia, and the low positive affect and affective flattening characterizing negative schizotypy, a weak relationship between the two seems conceptually consistent. Potential overlap between negative schizotypy and paranoia is likely in the behavioral domain, rather than in the cognitive and affective domains. For example, common measures of both constructs include items about social avoidance. Future studies of paranoia and negative schizotypy should compare ratings on items of behavioral domains to those of cognitive and affective domains.

#### *Relation of Paranoia to Social Anxiety: Factor Structure*

The present findings indicate that paranoia and social anxiety are separate, albeit related, constructs. Study 1 allowed for the comparison of several models in which social anxiety and paranoia were combined (Models 1-3), including a model specifying a positive schizotypy factor, a negative schizotypy factor, and a “social dysfunction” factor which combined paranoia and social anxiety. This model (see Figure 3), along with the other models combining paranoia and social anxiety, had poor fit. As expected, social anxiety had a moderate relation to positive schizotypy and a small relation to negative schizotypy in the best fitting models. This result was consistent with previous findings (Brown et al., 2008), and similar to the relation of the paranoia and schizotypy factors in this study. In other words, both paranoia and social anxiety were more strongly related to positive than to negative schizotypy, and were only moderately related to one another.

The overlap between features of paranoia and social anxiety, such as social discomfort and heightened self-awareness, account for the moderate relationship between paranoia and social anxiety and are consistent with the literature (e.g., Huppert & Smith, 2005). Furthermore, the differences between paranoia and social anxiety explain the poor fit of models combining the two constructs in Study 1 (notably in Model 4). Paranoia is characterized by a lack of trust in the motives of others and hostility; social anxiety is characterized by a lack of trust in one’s own ability to meet social demands and self-blame. Study 2 was designed to provide a more fine-grained analysis of the relation between these constructs; in particular, how social anxiety and paranoia were expressed in daily life.

#### *Affect in Social Anxiety and Paranoia*

Study 2 found that both paranoia and social anxiety were associated with negative affect in daily life, consistent with previous laboratory and questionnaire studies (Baldwin & Main, 2001; Combs, Penn, Chadwick, et al., 2007). In the present study, both paranoia and social

anxiety were associated with more sadness, anxiety, and irritability in daily life. Study 2 found partial support for the hypothesis that people higher in paranoia would report greater hostility and blame compared to those higher in social anxiety. People higher in paranoia are thought to expect harm and social failure because of the malevolence of others, as indicated by previous findings that paranoia is associated with negative schematic views of other people (Fowler et al., 2006). As predicted, paranoia—but not social anxiety—was associated with greater daily reports of anger. However, both social anxiety and paranoia were associated with reports that “others are no good,” a measure of blame thought to be characteristic of paranoia alone. It may be that experiences of social rejection common in social anxiety predispose one towards negative views of others, as well as of the self. This mechanism could help to explain the developmental trajectory of paranoia as an outcome of social anxiety in some schizotypic or other at-risk individuals. The literature provides preliminary support for such a trajectory (e.g., Freeman & Garety, 2003; Freeman, Garety, Bebbington, Smith et al., 2005), but these studies are few and cross-sectional in design. In summary, the present findings demonstrated that both social anxiety and paranoia were associated with increased negative affect. These findings also highlighted the need for additional research—particularly longitudinal studies—on social anxiety, paranoia, and schematic views towards other people.

#### *Views of the Self in Paranoia and Social Anxiety*

The present research found that both social anxiety and paranoia were associated with heightened self-consciousness and low self-esteem. The literature supports a relationship between exaggerated self-awareness and social anxiety and paranoia, and has found that self-consciousness can predict paranoia in laboratory studies (Heinrichs, Hoffman, & Hofmann, 2001; Fenigstein & Vanable, 1992). Additionally, previous studies have indicated that low self-esteem

was associated with social anxiety (Baldwin & Main, 2001), and low and fluctuating self-esteem was associated with paranoia (Thewissen, Bentall, Lecomte, van Os, & Myin-Germeys, 2008). Accordingly, Study 2 found that paranoia and social anxiety were associated with reports of more self-consciousness and low self-esteem (“I am no good”) in daily life.

An empirical question remains as to why perceptions of personal ineptness and heightened self-awareness resulted in paranoid attributions in some people and social anxiety in others. In both cases, self-consciousness is thought to impair cognitive processing, which could predispose a person to paranoid thinking if other risk factors are present such as positive schizotypy and negative schematic views of others. Some research has pointed to the fluctuations in self-esteem present in those with paranoia as a key to understanding the development of ideas and delusions of persecution (e.g., Thewissen, Bentall, Lecomte, van Os, & Myin-Germeys, 2008). Specifically, the authors suggested that blaming others, rather than one’s self, is a natural outcome of the atypically high self-esteem sometimes seen in paranoia. Blaming others serves a self-protective mechanism when self-esteem fluctuations lead to a poor self-image in those with paranoia.

Bentall and Kinderman (1998) have proposed a model that explains why people higher in paranoia—but not those higher in social anxiety—blame others when experiencing low self-esteem. The key to their model is that people higher in paranoia often exhibit deficits in theory of mind, a social cognitive domain determining one’s ability to understand what other people are thinking and intending. Bentall and Kinderman hypothesized that, for people higher in paranoia, social rejection triggers a negative self-concept by creating discrepancies between peoples’ perceptions of their actual and ideal selves, which people try to resolve by blaming external situations or people, rather than themselves. Given that people with paranoia often exhibit theory of mind deficits, meaning that they fail to accurately understand the intentions of others, the bias

would be not only external to the subject but also of a personal, rather than situational, nature. This would manifest as a consistent pattern of blaming others for all negative events, a suspiciousness that could certainly lead to paranoia. Thus, the heightened self-consciousness and low self-esteem reported in Study 2 may differentially affect people—leading to outcomes of higher social anxiety or paranoia—depending on risk factors such as higher schizotypy, impaired social cognition, and negative schematic views of others.

#### *Thought Disruption in Paranoia and Social Anxiety*

Given that increased symptoms of positive schizotypy—namely, thought disruptions and unusual perceptions—are thought to play a role in paranoia, Study 2 examined the role of disrupted thinking in daily life. As predicted, social anxiety was not associated with greater thought disruptions. Contrary to predictions, paranoia was also not associated with lack of thought clarity or trouble concentrating. However, as previously discussed, there was a strong correlation in Study 1 between the positive schizotypy and paranoia factors. These contradictory findings could be due to people with positive schizotypy having poor insight into thought disruptions in daily life. An alternative is that the type of thought disruptions assessed in Study 2 (lack of clarity, trouble concentrating) do not map closely enough onto the types of disruptions likely for those high in positive schizotypy. For example, paranoid people paradoxically are very focused and vigilant in their thinking, scanning their environment for potential threats from others. Thus, future studies of paranoia in daily life should examine specific perceptual and thought disturbances that are likely to be disrupted in positive schizotypy and paranoia.

Although people high in paranoia did not report more trouble concentrating or lack of thought clarity in Study 2, they did report more daily experiences of suspicious thoughts, whereas those higher in social anxiety did not. Consistent with predictions, people higher in trait-level paranoia reported more feelings of being suspicious, threatened, mistreated, unsafe, and watched.

These findings go beyond construct validation of paranoia; they also provide support for a spectrum of paranoid experiences by demonstrating real-world deficits in the daily lives of people in a non-clinically-derived sample.

#### *Social Perceptions and Behaviors in Paranoia and Social Anxiety*

In terms of social behavior, the present research found that social anxiety was not associated with greater social isolation, consistent with findings from Brown et al. (2008). Unexpectedly, paranoia was not associated with either more time spent alone, less social closeness, or more time at home. Thus, although people higher in paranoia reported a number of distressing thoughts and negative emotions related to their social environments, they did not report behavioral withdrawal from others. Clinical studies of paranoia have often found an association with social isolation and withdrawal (Forsell & Henderson, 1998; Thewissen et al., 2008), suggesting that the present result may be a feature of the non-clinical sample. It may be that marked paranoid symptoms clearly impair social behavior and lead to withdrawal from social contact. However, people with milder manifestations may still be able to engage in the world. The lack of association between paranoia and social isolation suggests that psychosocial treatments aimed at preventing social withdrawal in people with paranoid symptoms could be a beneficial, given that social contact may serve a protective role as a “reality check” for those prone to paranoia and other types of psychosis.

Although social anxiety and paranoia were not associated with increased social isolation in Study 2, they were associated with a reported preference to be alone when with others. A desire for social avoidance was present, if not the behavioral sequelae. Given the intense negative affect likely experienced when a person with social anxiety confronts perceived social rejection and humiliation, and when a person with paranoia confronts perceived bad intentions and threats from others, this finding was conceptually consistent. Contrary to predictions, social anxiety was



not associated with the preference to be with others when alone, a contradiction in preference that would have suggested the “approach-avoidance conflict” often exhibited by people with social anxiety.

In the present study, paranoia and social anxiety were also associated with social evaluative concerns. People higher in both paranoia and social anxiety reported feeling criticized and “put down” in daily life. Freeman (2007) posited a hierarchical model in which both paranoia and social anxiety build upon a common foundation of interpersonal sensitivity, consistent with these results. As further predicted, social anxiety—but not paranoia—was associated with daily reports of feeling not cared about and being alone because others do not want to be with them. Perceived social rejection is a key feature of social anxiety, but not paranoia; thus, these results supported the current understanding in the literature that people higher in social anxiety view social failures as due to their own shortcomings, such as being inept, unappealing, unlovable, or socially unskilled. Overall, these findings suggested that people higher in social anxiety and paranoia experience discomfort in social interactions and have negative perceptions about social situations.

#### *Social Closeness in Social Anxiety and Paranoia*

Previous empirical studies suggested that socially anxious individuals may have small networks of close friends with whom they have adaptive social interactions (e.g. Davila & Beck, 2002) and thus the context of the social interactions may determine the person’s subjective reports of affect. Given these findings, Study 2 included cross-level interactions that examined whether social anxiety and paranoia moderated the relationship between social closeness and daily reports of affect and cognitions. Consistent with predictions, participants higher in social anxiety reported less self-consciousness, anxiety, and preference to be alone in close social encounters relative to those lower in social anxiety; however, there were no significant cross-level

interactions with social anxiety and reports of feeling less sad, less irritable, and more happy during close social interactions. Levels of paranoia did not moderate the relationship between social contact and other level 1 variables, as predicted. Thus, in general, findings suggested that whom a socially anxious person is with may play an important role in how distressed they become during social interactions. In contrast, paranoia was associated with consistent reports of negative affect, negative social perceptions, and suspiciousness in daily life, regardless of whether they reported feeling close to the person with whom they were interacting. These results supported previous findings that experiences of paranoia extend to all social encounters, and are not limited to contacts with strangers or acquaintances (e.g., Martin & Penn, 2001). Thus, social closeness appears to ameliorate some stress and negative affect that socially anxious people experience during interactions with others, but does not diminish the suspiciousness and perceptions of threat that paranoid people experience.

#### *Paranoia, Social Anxiety, and Situational Context*

Study 2 also examined the moderating role of paranoia and social anxiety in situations reported to be stressful and unsuccessful in daily life. Contrary to expectations, cross-level interactions examining these situations were not significant, indicating that negative thoughts and affect did not differ in situations of greater stress and less success across levels of social anxiety and paranoia. Note that stressful and unsuccessful situations did provoke negative thoughts and affect for participants in general; however, these did not vary according to a person's level of paranoia or social anxiety. An exception to these negative results is that people higher in social anxiety reported the preference to be alone during situations they felt were unsuccessful, presumably to avoid the criticism and rejection that they expected from others. The lack of cross-level interactions related to stressful and unsuccessful activities are inconsistent with reports of increased stress sensitivity in paranoia (Myin-Germeys, Delespaul, & van Os, 2005). On the other

hand, given the persistent mistrust of the world and of other people expected in paranoia, it is perhaps not surprising that symptoms of paranoia persist across contexts. In general, both stressful and unsuccessful situations generated similar reports of affect and cognitions, regardless of a participants' level of social anxiety or paranoia.

### *Summary and Future Directions*

The present studies examined the relationship between paranoia, social anxiety, and the schizotypy dimensions in a non-clinical sample, providing support for a dimension of paranoid experiences ranging from mild suspiciousness to persecutory delusions, with real-world consequences for affect and functioning. Study 1 evaluated the relationship of paranoia, social anxiety, and the schizotypy dimensions by testing a series of six *a priori* models using confirmatory factor analysis. This study found that a 4-factor model consisting of positive schizotypy, negative schizotypy, paranoia, and social anxiety factors best described the data. It expanded upon previous work by including multiple measures of schizotypy, paranoia, and social anxiety, and by examining the expression of these traits across levels of clinical severity. Study 1 clarified the relationship between paranoia and positive schizotypy, suggesting that experiences of paranoia diverged from the unusual perceptions and cognitions typifying positive schizotypy. Study 1 also found a modest correlation between paranoia and negative schizotypy. This pointed to similarities in the behavioral domain, such as reports of social disinterest, rather than in the cognitive and affective domains. Furthermore, findings indicated that social anxiety and paranoia are separate, but related, constructs.

Study 2 analyzed the relationship of social anxiety and paranoia in daily life, the first experience sampling study of these two constructs of which the author is aware. In this study, both paranoia and social anxiety were associated with negative affect in daily life, as well as self-consciousness and low self-esteem. Although social anxiety and paranoia shared a foundation of

negative social perceptions, including beliefs of being criticized and “put down,” only people higher in trait paranoia reported more daily experiences of feeling suspicious, unsafe, watched, and threatened. People higher in paranoia and social anxiety reported the preference for social isolation, but were not alone more often than were other participants. Consistent with previous literature about the nature of social anxiety, people higher in social anxiety—but not paranoia—reported more feelings of rejection in daily life.

A key implication of these findings is that future studies of paranoia and schizotypy should consider the motives behind social experiences such as withdrawal, disinterest, discomfort, and isolation. A lack of clarity about the nature of these social behaviors in the literature has contributed to a poor consensus about the nature of constructs like schizotypy, which was one motivation for the present research. For example, previous factor analytic studies of the schizophrenia spectrum have identified a third factor labeled variously as “disorganization” in some studies and a “disorder or relating” in others; in some factor analytic studies paranoia and social anxiety comprise part of a positive schizotypy factor, and in others they are considered a part of negative schizotypy. To illustrate how failing to consider motives for social dysfunction contributes to conceptual confusion, consider this example: A hypothetical measure of schizotypy includes the item, “I am alone more often than other people.” An endorsement could be due to the participant’s preference for solitude due to a lack of positive reinforcement from social contact (negative schizotypy), a fear of being judged or criticized if they ventured out into the world (social anxiety), an avoidance of contact due their embarrassment about the perceptual anomalies they experienced (positive schizotypy), or a belief that others will harm them (paranoia). Failing to account for these different interpretations of social behavior can hinder the progress of research in many clinical disorders, including schizophrenia spectrum disorders.

A strength of this study is an inclusion of several measures of these constructs, as well as multiple methods of measurement. The results from the current study, as well as those from others (e.g., Thewissen et al., 2008) indicated that the experience sampling method is a promising method for further investigations of paranoia and social dysfunction. Future studies of schizotypy could benefit from including measures of paranoia, as well as multiple measures of schizotypy to capture the full range of symptom expression.

Some limitations of the present studies should be noted. First of all, given that the samples consisted of college students, the pattern of findings should be investigated in patients with schizophrenia spectrum disorders. In addition, the experience sampling questionnaire used in Study 2 did not comprehensively examine social functioning, thoughts, and affect; rather, it was designed to highlight points of convergence and divergence between social anxiety and paranoia. Thus, future ESM studies of paranoia in daily life should comprehensively examine the different domains of daily life functioning. Furthermore, Study 1 could have been improved by including additional measures of social anxiety and paranoia independent from schizotypy measures.

The present research served as an initial investigation of paranoia and its relation to schizotypy and social anxiety, and suggested a number of avenues for future research. For example, further study is needed to determine the developmental progression of paranoia. Freeman (2007) has suggested that the presence of perceptual and cognitive disturbances characterizing positive schizotypy could explain a mechanism by which social anxiety progresses to paranoia. Longitudinal studies, particularly those examining social deficits and schizotypy, can address this question, as can more fine-grained analyses of paranoid and schizotypal experiences in daily life. Given that stressful life events and experiences of rejection and social harm are

likely to play a role in the development of social anxiety and paranoia, a clearer understanding of social history will add clarity to future studies of paranoia and social anxiety.

The present findings suggest that the assessment of paranoia should aid in the early identification of individuals at risk for schizophrenia and spectrum disorders. Additional refinements in measures of schizotypy, paranoia, and social anxiety across the spectrum of impairment will assist in improved identification of those at risk. Furthermore, understanding paranoia can lead to better treatment targets for interventions aimed at preventing these disorders.

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## APPENDIX A

### **EXPERIENCE SAMPLING QUESTIONNAIRE**

Note: Protocol is presented on a personal digital assistant (PDA). Each question appears on a separate screen on the PDA. Participants only see the nonbolded information and scoring options. Unless otherwise noted, all items are scored from 1 (not at all) to 7 (very much)

#### **[Thinking]**

- 1) My thoughts are clear right now
- 2) I have trouble concentrating right now
- 3) My thoughts are suspicious right now

#### **[Mood & Thoughts]**

- 4) I feel happy right now
- 5) I feel uncertain right now
- 6) I feel criticized right now
- 7) I feel anxious right now
- 8) I feel like I am no good right now
- 9) I feel relaxed right now
- 10) I feel angry right now
- 11) I feel self-conscious right now
- 12) I feel cared about right now
- 13) I feel threatened right now
- 14) I feel sad right now
- 15) My feelings are intense right now
- 16) I feel mistreated right now
- 17) I feel like I am being watched right now
- 18) I feel irritable right now
- 19) I feel safe right now
- 20) I feel put down right now
- 21) I feel like other people are no good right now
- 22) I feel tired right now
- 23) I feel hungry right now
- 24) I don't feel physically well right now

#### **[Activities]**

- 25) I like what I am doing right now
- 26) I am successful in my current activity
- 27) Right now I am at home      Yes    No

#### **[Social Functioning]**

- 28) Are you alone at this time?      Yes    No

#### **[If not alone (No to #28):]**

- 29) I am with:      1- Significant other; 2- Family; 3- Friend; 4- Classmate; 5- Coworker; 6- Acquaintance; 7- Stranger; (Check all that apply)
- 30) I feel close to this person (these people)
- 31) Right now I would prefer to be alone

#### **[If alone, yes to #28:]**

- 32) I am alone right now because people do not want to be with me
- 33) Right now I would prefer to be with other people

#### **[All participants answer:]**

- 34) Since the last beep, the most important thing that happened to me was pleasant

- 35) Since the last beep, the most important thing that happened to me involved being with other people
- 36) (Fall 08 and Spring 09) My current situation is stressful