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Generalized Anxiety Disorder Symptoms as a Moderator of Affective Reactions to Perceived Interpersonal Behaviors

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Generalized Anxiety Disorder Symptoms as a Moderator of Affective Reactions

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Abstract

Individuals with generalized anxiety disorder (GAD) symptoms often struggle with heightened

sensitivity and arousal in response to perceived threats. Moreover, interpersonal dysfunction in

GAD has become increasingly a focus of empirical investigation and treatment, given the

possibility that responses to social interactions may contribute to GAD symptom maintenance.

Laboratory studies and cross-sectional trait assessments of interpersonal problems comprise most

of our understanding of interpersonal dysfunction in GAD. However, how GAD symptoms

interact with perceived interpersonal threats to predict affective responses (increased arousal,

lower valence) within daily life remains poorly understood. Therefore, the purpose of the present

study was to examine effects of *in vivo* social perceptions on state affect, and how GAD

symptoms may moderate those relationships. Participants ($N = 161$) completed baseline

measures of trait GAD and depression symptoms (as a covariate). Then participants completed

30 social interaction surveys over the subsequent 10 days. In each survey, participants rated

interaction partners' dominant, cold, and immoral behavior (each conceptualized as interpersonal

threats) as well as their own arousal and valence in response to the behavior. Multilevel

modeling analyses of between- and within-person effects revealed that mean perceptions of cold

and immoral behavior predicted higher arousal and lower valence as hypothesized, whereas

mean perceived dominance unexpectedly predicted only lower valence. All within-person

fluctuations in social perceptions predicted both higher arousal and lower valence. Regarding the

moderating effects, GAD symptoms unexpectedly buffered the effect of average perceived cold

behavior on valence and strengthened the effect of average perceived immoral behavior on

valence. These results provide a deeper understanding of how social perceptions may contribute

to affect in naturalistic interactions, and add to the literature on interpersonal correlates of GAD symptoms.

Keywords: generalized anxiety disorder, morality, interpersonal circumplex, whole trait theory, threat perception

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CHAPTER I

Introduction and Literature Review

Overview

The excessive and uncontrollable worry and hyperarousal symptoms of Generalized Anxiety Disorder (GAD) range from "normal" to pathological and contribute to distress and functional impairment in individuals of all ages. However, the current best interventions for treating GAD symptoms are only effective for about 50% of individuals at post-treatment follow-up (Hanrahan, Field, Jones, & Davey, 2013). As such, research on GAD symptoms has increasingly focused on better understanding underlying processes that may be targeted in treatment, such as biases toward perceived threats, affective reactivity, and specific domains of dysfunction, such as interpersonal relationships. However, scant research exists that examines dynamic state processes that explain trait GAD symptoms in the context of specific interpersonal interactions in daily life. The existing research in this area is limited by its focus on trait-level tendencies to explain trait GAD symptoms. Much less is known about variable, state-level, daily interpersonal processes in individuals with GAD symptoms, which may better explain how GAD symptoms are maintained over time.

Whole Trait Theory (WTT; Fleeson & Jayawickreme, 2015) is a recently-developed theory which posits that understanding a 'whole trait' or individual difference variable – like GAD symptoms – is possible by examining it at both the stable, trait level and the variable, within-person state level. WTT asserts that there is an inseparable link between the broad description of a given trait and its varied expression across situations. For instance, having high levels of a trait such as neuroticism reflects both 1) a description of the person's average level of negative emotionality over time compared to other people and 2) a predictable pattern of within-

person variability in the expressed level of negative emotional states, which may fluctuate around the person's mean level response to characteristics of a given situation. Therefore, in the present investigation, better understanding how the state-level perception of threats and affective reactivity occur in daily interpersonal interactions will inform our understanding of trait GAD symptoms more broadly.

The Interpersonal Circumplex (IPC; Wiggins, 1982), which conceptualizes social behaviors along dimensions of dominance (ranging from dominance to submission) and affiliation (ranging from close, socializing behavior to distancing behavior), provides a basic framework for considering interpersonal perceptions of threats in daily social interactions. These two dimensions appear to capture substantial variance in the domain of interpersonal behavior, permitting researchers to categorize behaviors and predict behaviors within social interactions (see Pincus & Ansell, 2003 for a review). However, recent theory and research suggests that it may be important to also examine a third social-cognitive or interpersonal dimension representing perceived morality, as this clearly contributes unique variability in perceptions of others' behaviors (Goodwin, Piazza, & Rozin, 2014; Haidt, 2003; Haidt, 2006).

In addition to circumplex descriptions of behavior, an individual's affective reaction to another person's interpersonal behavior helps us understand what meaning was ascribed to the other person's behavior. For instance, negative affect and arousal are typically associated with the perception of threats (Carver & White, 1994; Gray, 1982). Although GAD theory and research has assumed that negative social information represent threats (i.e., angry faces; Mogg, Millar, & Bradley, 2000; Verkuil et al., 2009), further research is needed to better understand how specific IPC behaviors may function as daily interpersonal threats to people with different levels of self-reported GAD symptoms. Therefore, the present study aims to examine how

perceptions of others' behavior in terms of dominance, affiliation, and morality dimensions during social interactions may predict negative affect and arousal, as well as whether individuals high in GAD symptoms have stronger within-person associations between perceived social threats and affective response. Before describing the details of the present study, I will review relevant literatures on GAD, Whole Trait Theory, and the Interpersonal Circumplex.

Background

Generalized Anxiety Disorder

Core Symptoms

Generalized Anxiety Disorder (GAD) is characterized by excessive and uncontrollable worry about several life domains (e.g., daily to-dos, finances, interpersonal relationships, health of family members; American Psychiatric Association [APA], 2013). Worry is a cognitive process that involves repetitive thinking about anticipated negative events (Borkovec, Robinson, Pruzinksy, & DePree, 1983). The form of worry has been theorized to be primarily abstract verbal-linguistic cognitions (e.g., "What if my classmate rejects me?"; Borkovec, Alcaine, & Behar, 2004), but may also include mental imagery (e.g., mentally picturing being rejected by a classmate; Bergman & Craske, 2000; Skodzik et al., 2016). To receive a diagnosis of GAD, the dysfunctional worry needs to occur nearly every day over the course of six months and must be accompanied by at least three somatic symptoms that are associated with physiological arousal, including: restlessness or feeling keyed up or on edge, being easily fatigued, difficulty concentrating or mind going blank, irritability, muscle tension, and sleep disturbance (APA, 2013). Thus, broadly speaking, GAD involves problems with negative anticipatory thinking that coincides with overactive physiological arousal.

GAD Symptoms Are Prevalent and Disabling

Regarding GAD symptom prevalence and disability, most of the available data are based on estimates from people with diagnosable GAD. Prevalence estimates suggest that 1.6% to 5.0% of the population suffered from GAD over the past year (Kessler et al., 2005: Kessler, Keller, & Wittchen, 2001; Moffitt et al., 2010; Wittchen, Zhao, Kessler, & Eaton, 1994), and that an estimated 14.2% of people will develop GAD at some point in their life (Moffitt et al., 2010). Around 56% of individuals with GAD reported having severe disabilities (Kessler et al., 2009), 37% relied on public assistance, and 50% lacked full-time employment (Massion et al., 1993). Having GAD has been associated with increased functional impairment over preceding 3 months, increased number of physician visits, and decreased health-related quality of life (Dear et al., 2011). Furthermore, people with GAD tended to endorse lasting interpersonal conflicts (Judd et al., 1998), report low marital satisfaction (Whisman, 2007), were less likely to be married, experienced more life events and greater financial problems, and reported more disability and distress (Goncalves & Byrne, 2012). Gentes and Ruscio (2014) conducted a study that identified disabilities relevant to GAD symptoms, regardless of diagnostic status. They found that compared to individuals with non-distressing levels of worry, people with GAD and even worriers who did not meet full GAD criteria reported more disruptions in schoolwork, social life, family/home life, number of days lost and unproductivity due to worry symptoms. Thus, these individuals experience significant distress and dysfunction, particularly in the interpersonal domain.

Across psychiatric disorders, having comorbid diagnoses is often associated with increased distress and functional impairment (Williams & Egede, 2016), and GAD is frequently comorbid with other psychiatric disorders (e.g., Bruce et al., 2005). For instance, GAD was

found to be comorbid with a mood or personality disorder in 89.8% of individuals over the past

12 months (Grant et al., 2005), with Major Depressive Disorder or dysthymia (i.e., Persistent

Depressive Disorder) in 36% of individuals (Brown, Campbell, Lehman, Grisham, & Mancill,

2001), and with panic disorder and social anxiety disorder in 23% of individuals (Beesdo, Pine,

Lieb, & Wittchen, 2010). Thus, individuals with GAD symptoms are prone to endorsing a range

of other symptoms or comorbid disorders, suggesting further evidence of impairment.

GAD Symptoms as Dimensional

Although GAD is a formal diagnosis, GAD symptoms may be conceptualized as a

dimensional, continuous variable rather than dichotomous factor (i.e., presence of GAD

diagnosis or not). Despite evidence linking diagnosable GAD to impairment, its core cognitive

features and symptoms occur on a broad spectrum. First, worry is a normative cognitive process

(Ruscio, Borkovec, & Ruscio, 2001) engaged by people of all ages (Miloyan, Byrne, & Pachana,

2014; Olatunji, Broman-Fulks, Bergman, Green & Zlomke, 2010; Wilson, 2010). Second, the

more a person worries (even at subclinical levels), the more psychological distress they tend to

experience (Goncalves & Byrne, 2012). Finally, having high levels of worry does not always

mean that the person would meet full criteria for a formal diagnosis of GAD (Ruscio et al.,

2001). For instance, results of two taxometric analyses suggest that worry constitutes a single

dimensional factor, rather than dichotomous factors that would otherwise distinguish "normal"

from pathological worriers (Olatunji et al., 2010; Ruscio et al., 2001). Furthermore, in a sample

of 3,486 worriers aged 18 to 98 years, about 987 (28.3%) of the participants met screening

criteria for Generalized Anxiety Disorder (GAD) in the past 12 months (Miloyan, Byrne, &

Pachana, 2014). However, researching only the individuals who surpassed the threshold for

clinical-levels of GAD symptoms impedes our understanding of the processes behind GAD

symptoms in general. Therefore, it seems prudent to measure GAD symptoms as a continuous variable to understand its linear relationship to other continuous variables and provide findings that are relevant to a wide variety of GAD symptomatology.

Core Processes of GAD: Threat Sensitivity and Affective Reactivity

Given the negative impact of trait-like GAD symptoms in people's lives, it is important to understand core underlying processes that may be targets for psychological interventions. Two cognitive-affective processes that appear to be central to individuals high in GAD symptoms include: 1) a heightened sensitivity to perceiving threats (Goodwin, Yiend, & Hirsch, 2017; Hirsch & Mathews, 2012) and 2) tendencies to react to perceived threats with greater negative affect and arousal (Aldao, Mennin, Linardatos, & Fresco, 2010; Hoffman et al., 2005; Stapinski, Abbott, & Rapee, 2010). Threats may be defined as "any object, person or event (internal or external) that might endanger one's physical health or psychological wellbeing" (Arnaudova et al., 2017, p. 4). These can include environmental threats (e.g., a cliff's edge) or social threats (e.g., picture of an angry face; Dolan & Vuillemier, 2003; Monk et al., 2008; Sutherland, Oldmeadow, & Young, 2016). Furthermore, perceiving something as a threat means that the individual assumes a negative outcome is both probable and costly (Berenbaum, Thompson, & Bredemeier, 2007).

Research has shown that people with GAD symptoms have heightened neurological sensitivities to perceiving threats (Stout, Shackman, Pedersen, Miskovich, & Larson, 2017) and sustained threat processing (Burkhouse, Woody, Owens, & Gibb, 2015), attentional biases toward threat (Goodwin et al., 2017b; Van Bockstaele et al., 2014), and tendencies to interpret neutral or ambiguous stimuli as threatening (Gole et al., 2012; Mathews & MacLeod, 1994; Verkuil et al., 2009). This research suggests a linear relationship between GAD symptoms and

sensitivity to interpersonal threats, such that higher symptoms may be associated with higher sensitivity.

However, research on threat perception in GAD has been conducted almost entirely in laboratory settings in which participants were tested for their implicit and self-reported reactions to negatively-valenced stimuli (e.g., Stapinski et al., 2010; Zainal & Newman, 2017). Only two studies were found that examined the effect of GAD symptoms on naturalistic, daily reports of negative contrasts, which are threatening experiences of sudden shifts into negative moods (Crouch, Lewis, Erickson, & Newman, 2017; Newman et al., 2019). These studies were limited, however, by the fact that they did not examine specific domains of naturalistic interpersonal behavior that may be perceived as threatening in participants' daily lives. Furthermore, it remains unclear whether individuals with high levels of GAD symptoms would perceive specific, naturalistic interpersonal behaviors (e.g., dominance, coldness, morally disgusting) as threatening, and whether they would perceive these behaviors as more threatening than individuals with low levels of trait GAD symptoms.

Regarding the second core process in GAD (i.e., affective reactivity), individuals with GAD symptoms tend to show heightened physiological arousal in response to perceived threats. In humans, perceiving a threat is associated with a rapid increase in physiological arousal and negative affect (Carver & White, 1994; Gray, 1982). This reaction serves to signal the presence of threat to the organism and prepare the body to respond to the threat and maximize chances for survival (Kemeny, 2003; Lange & James, 1922). However, this process appears to be dysfunctional in individuals with increased GAD symptoms, as GAD has been theorized to cause greater reactivity toward threats (Newman et al,. 2013). For instance, worrying is associated with increased physiological arousal, as suggested by increased skin conductance response (Ottaviani

et al., 2014; Stapinski et al., 2010), increased heart rate (Hoffman et al., 2005), and decreased heart rate variability (Aldao, Mennin, & McLaughlin, 2013) in response to perceived or anticipated threats. Furthermore, even when compared to individuals with unipolar depression, individuals with GAD symptoms self-reported higher levels of trait emotion intensity and affective reactivity (Aldao et al., 2010). As such, we would expect GAD symptoms, rather than depression symptoms, to be associated with heightened affective reactivity to perceived threats in daily, naturalistic situations. Prior research has shown that depressed participants tend to report less arousal in response to negative stimuli compared to anxious participants and participants with comorbid anxiety and depression (Rosebrock, Hoxha, Norris, Cacioppo, & Gollan, 2016). Furthermore, while participants diagnosed with an anxiety disorder showed heightened startle response to aversive stimuli compared to healthy controls, participants with comorbid depression and anxiety disorders showed blunted startle response (Yancey, Vaidyanathan, & Patrick, 2014). Therefore, we would expect that, in situations that are likely to be perceived as threatening to people in general, individuals with depression symptoms might show less affective reactivity, whereas individuals with GAD symptoms are likely to exhibit greater affective reactivity.

Interventions for GAD symptoms often target these two processes to help the individual manage threat perceptions as well as track and reduce negative affect (Szkodny, Newman, & Goldfried, 2014; Van Bockstaele et al., 2014); for instance, cognitive interventions attempt to help individuals reduce catastrophic interpretations of events and applied relaxation can help them reduce anxious arousal and tension. However, current evidence-based treatments for GAD yield limited treatment response (Hanrahan, Field, Jones, & Davey, 2013), indicating a clear need for research to better understand how GAD symptoms contribute to dysfunction. Therefore,

better understanding how perception of threat and affective reactivity show up in daily interactions may uncover specific targets for treatment that help to improve outcomes.

The Need to Study GAD-Relevant Interpersonal Processes Specifically

Interpersonal dysfunction in GAD is an understudied context for threat perception and distress. Ample evidence implicates a that individuals high in GAD symptoms may be sensitive to perceiving threats in the interpersonal domain. For instance, people with GAD often report that interpersonal concerns are one of their most commonly endorsed worries (Breitholtz, Johansson, & Ost, 1995; Goncalves & Byrne, 2012; Roemer, Molina, & Borkovec, 1997). People with clinical levels of worry are susceptible to heightened interpersonal sensitivity (Gasperini, Battaglia, Daferia, & Bellodi, 1990; Hoehn-Saric et al., 1993; Mavissakalian, Hamann, Haidar, & de Groot, 1995; Nisita et al., 1990) and negatively biased perceptions of social information (Mathews & MacLeod, 1985; Mogg, Mathews, & Eysenck, 1992). Furthermore, GAD is associated with a range of self-reported interpersonal problems (Przeworski et al., 2011; Salzer et al., 2008).

For instance, cluster analyses (Przeworski et al., 2011; Salzer et al., 2008) have identified heterogeneous self-reported interpersonal problems among individuals with GAD. Across multiple studies, these participants with GAD varied in terms of what predominant types of interpersonal problems they most strongly endorsed, including being too intrusive, exploitable, nonassertive, or cold. If GAD symptoms are associated with a variety of interpersonal problems, then it is important to further tease apart factors that contribute to these differences, whether trait- or state-level differences. Przeworski and colleagues (2011) found that the different interpersonal clusters of participants did not differ in their level of distress, attachment problems, or comorbid Axis I diagnoses, but differed in whether they had a comorbid personality disorder

diagnosis. In the authors' second study, about 68% of the individuals with GAD had a comorbid personality disorder. Given that personality disorders are associated with patterns of interpersonal dysfunction (Pincus & Hopwood, 2012) that include trait-like biased perceptions of others and strong affective reactions to others' interpersonal behaviors (e.g., Berenson, Downey, Rafaeli, Coifman, & Paquin, 2011), the overlap with GAD warrants additional research to identify patterns of interpersonal dysfunction in individuals with GAD symptoms at not only trait but particularly the state level.

If considering possible daily interpersonal tendencies, another point that remains unclear from the two cluster analysis studies (Przeworski et al., 2011; Salzer et al., 2008) is regarding which interpersonal behaviors individuals with GAD would react to with the most intense negative affect and arousal. Because each of the clusters of interpersonal problems (i.e., intrusive, exploitable, nonassertive, or cold) varied in levels of dominance and affiliation, it needs to be understood whether individuals with GAD symptoms would be particularly prone to experiencing high arousal and negative affect in response to specific kinds of daily interpersonal behaviors.

One sizeable limitation of the extant research on GAD symptoms and interpersonal dysfunction is that the findings primarily consist of general trait-like tendencies found in cross-sectional studies (e.g., one-time self-reports or lab interactions) that are presumed to hold constant across interpersonal interactions. Given assertions that specific ongoing patterns of behaviors in interpersonal interactions may maintain psychopathology (Carson, 1991; Horowitz, 2004; Safran & Segal., 1990), it is surprising that few studies have specifically examined situation-specific, dynamically varying interpersonal processes in individuals with GAD symptoms. Recent research has examined daily interpersonal patterns associated with other

psychiatric disorders (e.g., borderline personality disorder, antisocial personality disorder; Sadikaj, Moskowitz, Russell, Zuroff, & Paris, 2013; Scott et al., 2017, respectively) and maladaptive interpersonal traits (e.g., narcissism; Wright et al., 2017). However, research is warranted to better understand the relationship between *trait* GAD symptoms and daily interpersonal interaction *states*, particularly regarding their affective reactions to perceiving others' interpersonal behaviors.

Whole Trait Theory Provides a Way to Link Traits and Within-Person States

Whole Trait Theory (WTT; Fleeson & Jayawickreme, 2015; Fleeson & Law, 2015) posits an inseparable link between broad, descriptive traits (e.g., neuroticism) and their expression in daily situations and states. WTT offers a synthesis of the classic debate about whether behavior is predominantly a reflection of personality traits or situation-specific factors. On one side of the debate, people differ from each other in the types of dispositional traits that broadly describe their behavioral tendencies (e.g., extraversion, agreeableness). On the other side of the debate, individuals often demonstrate considerable within-person variability in their behavior across situations in daily life due to variations in external stimuli (i.e., others' behaviors) and internal processes (e.g., cognitions, affect). However, WTT combines these two frames by suggesting that a 'whole trait' is a compilation of an individual's daily behavior states across contexts into a frequency distribution curve, which portrays the pattern of an individual's varied, daily behavior as an expression of a single, stable trait of their personality. In this way, WTT helps researchers account for both within-person variability across situations and trait-like stability of the distribution of behaviors. Furthermore, WTT posits that the trait explanatory component causes the state descriptive component of the trait as an output.

For instance, aggregating an individual's extraverted *states* (e.g., cognitions, affects, behaviors) over time can strongly predict their mean level of extraversion in subsequent periods; moreover, the standard deviation, skew, and kurtosis of extraversion states within a single person are similarly stable when aggregated across time, despite large within-person variability from moment to moment (i.e., the mean and *SD* of one's extraverted behaviors in one week is correlated with the mean and *SD* in a subsequent week; Fleeson, 2001). Thus, WTT provides a conceptual and statistical framework for examining trait-like characteristics to predict their associated daily within-person states. Previous theory and research support this assertion by suggesting that certain trait-like characteristics or conditions (e.g., borderline personality disorder) predict stronger within-person links between state-level perceptions and affect (e.g., Berenson et al., 2011). Therefore, WTT applied to the current study may be used to investigate whether GAD symptoms, as a trait-like individual difference variable, amplifies (i.e., moderates) within-person links between the perception of others' behaviors and state affective reactions in daily interpersonal interactions, specifically with behaviors that are conceptualized as interpersonal threats (i.e., high dominance, coldness, or morally disgusting). The reported perceptions and reactions may explain a portion of GAD which, according to WTT, we could assume that GAD is an output of these daily perceptions and reactions. Therefore, collecting multiple state-level variables (daily perceptions & reactions) can be combined to explain between-person differences in GAD as a broader trait.

The Interpersonal Circumplex as a Framework for the Interpersonal Domain

Although previous studies have examined threat perceptions broadly in GAD (e.g., reactions to "negative" faces; Bradley, Mogg, White, Groom, & de Bono, 1999), a conceptual framework is needed to operationalize interpersonal threats in terms of daily behaviors. The

Interpersonal Circumplex (IPC; Wiggins, 1982) offers a framework for classifying interpersonal behaviors that would be expected to vary across daily interactions. It is visualized as a two-dimensional circle containing orthogonal axes that broadly represent the dimensions of dominance and affiliation (Tracey, 1994). The dominance dimension pertains to agency, assertion, differentiating oneself, autonomy, and strivings for power (Pincus & Hopwood, 2012), and comprises behaviors that range from dominance to submissive or yielding behavior. The affiliation dimension represents strivings for unity and intimacy (Pincus & Hopwood, 2012) and ranges from warm/social/close to cold/distancing behavior. Since these two axes are plotted on a circle, the IPC can represent each combination of these behaviors around the circumplex (Gurtman, 2009). For instance, extraverted behavior reflects a blend of high dominance and high affiliation. Furthermore, research suggests that perceptions of others' social behavior may also be mapped onto the dominance and affiliation dimensions, thus supporting the validity of these fundamental social cognitive dimensions (Moskowitz & Zuroff, 2005), and suggesting the possibility that perceiving excessive dominance or low affiliation in others might be threatening. Studies using the interpersonal circumplex show that these two dimensions are relevant to many types of interpersonal behaviors (Moskowitz, 1994). In addition, correlations of the theorized behavior characteristics have been shown to adhere to a circular structure, and support the orthogonality of the dominance and affiliation dimensions (Gurtman, 2009; Gurtman & Pincus, 2000).

Perceived Morality Is a Third Social Cognitive Dimension

Recent theory and research (e.g., Landy, Piazza, & Goodwin, 2016) suggests the possible inclusion of a third social cognitive or interpersonal dimension beyond dominance and affiliation, and therefore a third potential type of interpersonal threat. This assertion was made

because some measures of affiliation seem to confound mere social proximity (approaching others, socializing, or distancing oneself from others) with morally-valenced social behaviors (e.g., kindness and altruism versus coldhearted actions; Landy et al., 2016). As such, adding morality as a third dimension to the circumplex may provide additional, vital descriptions of interpersonal behavior. In fact, perceived morality seems to provide important information about the intent of another's social behavior beyond competence (i.e., dominance) and warmth (i.e., affiliation; Goodwin, 2015). Similarly, behavior that is helpful and cooperative toward others is generally considered morally good (Curry, Mullins, & Whitehouse, 2019), and therefore humans may be inherently attentive to whether others' interpersonal behavior adheres, or conflicts, with such social mores. In contrast, perceiving a person engaging in behavior that is low in morality may present a social risk in that it may be unsafe to try cooperate with a person prone to such behaviors (e.g., lying, cheating, stealing; Miles, Griffiths, Richardson, & Macrae, 2010; Van 't Wout & Sanfey, 2008) and they too may be less likely to reciprocate cooperation (Curry et al., 2019).

One way to detect the presence of morally valenced behavior within interpersonal interactions would be to assess the extent to which behaviors elicit moral elevation versus socio-moral disgust (Goodwin, Piazza, & Rozin, 2014; Haidt, 2003; Haidt, 2006). Moral elevation (Algoe & Haidt, 2009; Beck, 2006) occurs in response to perceiving uncommon acts of moral goodness. The experience of moral elevation has been described as feeling subjectively uplifted, and appears to involve somatic sensations such as being moved to tears or feeling a lump in the throat (Algoe & Haidt, 2009), increased cognitions about the goodness of humanity (Erickson & Abelson, 2012), and increased motivation to become a better person (Algoe & Haidt, 2009; Aquino, McFerran, & Laven, 2011; Van de Vyver & Abrams, 2017). Feeling elevated is a

marker for perceiving others' behavior as morally desirable. In contrast, socio-moral disgust may index the low end of the perceived moral dimension. Socio-moral disgust is related to core disgust (i.e., elicited by thoughts of ingesting physical contaminants) but is thought to occur in response to acts perceived as *morally* impure or contaminating (Olantunji & Sawchuk, 2005; Pizarro, Inbar, & Helion, 2011). In both core- and sociomoral disgust, the reaction is to establish a psychological, and in some cases a physical, boundary to ward off the "contaminant" (Nicholson & Barnes-Holmes, 2012), and in this way socio-moral disgust may function like a reaction to an interpersonal threat.

To date there is minimal research on the proposed moral dimension to support its existence within the interpersonal domain. Most of the investigation of elevation and socio-moral disgust have involved prototypical exemplars that elicit the emotion, such as learning the story of someone who "saved [another person's] from a life of gang activity and violence" (Silvers & Haidt, 2008, p. 292) versus committing fraud or theft (Tybur, Lieberman, & Griskevicius, 2009), respectively. However, no known research has examined perceptions of morally elevating versus morally disgusting interpersonal behaviors in daily life.

The research that has been done strongly supported that perceived trait morality is unique from trait dominance and affiliation. Across a combined total of 13 studies, Landy and colleagues (2016) and Goodwin and colleagues (2014) sought to understand the differential influence of perceived morality compared to sociability (i.e., affiliation) and competence (i.e., dominance) on impressions of other people. Trait adjectives that varied in morality, sociability, and competence were developed (Goodwin et al., 2014, Studies 1 & 2) and subsequently used as descriptions of people and roles in hypothetical vignettes. In addition, in some of the studies, participants rated their preferences for high- versus low-morality traits in combination with only

sociable (i.e., affiliation; Goodwin et al., 2014, Studies 4 -7) or both sociable and competence traits (Goodwin et al., 2014, Studies 2 & 3; Landy et a., 2016, Studies 1-6). The results consistently showed that moral traits were 1) preferred to sociable and competence traits and 2) the most influential of the three groups of traits on forming positive (or negative in the case of immoral traits) impressions of others. However, the studies were limited in that they were cross-sectional and focused on the participants' global appraisals (e.g., like or dislike) of morality in abstract trait descriptions or written vignettes.

To expand upon this research, subsequent studies should investigate how participants perceive daily, naturalistic behaviors that vary in dominance, affiliation, and morality, and whether these dimensions have a differential effect on the perceiver's self-reported affective reactions. Examining the affective reaction would add additional context to the perceived behavior and speak to the possible function of the behavior; for instance, whether a given interpersonal behavior (e.g., dominant, cold, immoral) was perceived as threatening, as suggested by a combination of high arousal and low valence.

Empirical Evidence Implies Moral Components of GAD

Interpersonal research on GAD has thus far only utilized the two dimensions of dominance and affiliation. For instance, high worry and/or GAD symptoms have been linked to either 1) self-reported interpersonal problems comprised of blends of dominance and affiliation (Przeworski et al., 2011; Salzer et al., 2008) or 2) specifically affiliative processes (e.g., being overly nurturant; e.g., Erickson et al., 2016; Shin & Newman, 2019; Zainal & Newman, 2017). However, a few studies suggest reasons to suspect that individuals high in GAD symptoms may be attentive to issues of morality.

For instance, a factor analysis of 20 different types of worries – several of which were a priori defined as worries about one's morality (e.g., "I worry that I have sometimes been dishonest in my work," "I worry that I have made bad choices when faced with moral conflicts," "I worry that people will find out what I really am like") – showed that moral concerns, versus practical or self-image concerns, emerged as the largest factor, thus suggesting that one's morality was a predominant foci of worry (Kroll et al., 2002). In addition, Erickson and colleagues (2016) found that higher trait worry uniquely predicted higher self-reported compassionate motivations to help others, despite the fact that worriers' significant others did not view them similarly. Worriers may thus perceive their worrying as a moral action. Regarding the present study, engaging in frequent moral actions may make a person more sensitive to perceiving threats to their morality. Additional evidence by Hebert and colleagues' (2014) indicates that worriers tend to endorse the metacognitive belief "I worry because I care," implying that they may view worry as a way to deal with perceived moral shortcomings, injustices, or imperfections in the world. Other research has shown increased cognitive empathy (i.e., attention to social information) in individuals with GAD symptoms when induced to worry (Zainal & Newman, 2017), which may indicate a moral component to worry in terms of prosocial cognitions. Finally, in another study, Erickson and Abelson (2012) examined the link between daily moral elevation and anxiety symptoms. They found that days in which participants (a mixed clinical sample including some participants with GAD) reported higher moral elevation, relative to their own means, they also endorsed fewer anxiety and dysphoria symptoms. However, the authors did not examine social perceptions occurring within the context of specific social interactions and did not specifically examine morality apart from the affiliation dimension.

The theory of Morality as Cooperation (Curry, Mullins, & Whitehouse, 2019) posits that behaviors regarding helping group members helping family members, and reciprocating cooperation with others. Perhaps individuals with high trait worry are more sensitive to these types of behaviors or feel more afraid of their not being the subject of others' cooperation. Furthermore, perhaps these findings suggest that individuals with GAD symptoms may hold concerns about their cooperating with others and/or whether others will cooperate with them. Nevertheless, we might expect individuals with high trait GAD symptoms to be particularly sensitive to interpersonal threats that are low in morality.

There is Limited Evidence About How People with GAD Perceive Others' Behaviors

What studies have been done show that people with GAD seem to have a bias toward perceiving others as dominant, cold (i.e. unaffiliative), and cold-dominant (Newman & Erickson, 2010; Erickson & Pincus, 2005). This pattern remained even after controlling for depression and social anxiety symptoms (Newman & Erickson, 2010). Furthermore, during first impressions in a social interaction task with a friendly stranger, the participants with GAD symptoms were relatively more like to perceive experimental confederates as attacking, ignoring, and controlling (Erickson & Pincus, 2005). While these results offer little context to help give meaning to the perceptions, we might assume that because of the propensity of individuals with GAD symptoms to attend to threats, the perceived behavior may have functioned as perceived threats. Therefore, we might expect people with high trait GAD symptoms to report more perceptions of dominant and cold behavior across daily interactions. Moreover, given the tendency of "immoral" behaviors to be perceived as aversive (Chapman & Anderson, 2013; Pizarro et al., 2011), we might also expect individuals with high trait GAD symptoms to report more perceptions of others' behavior as disgusting or immoral.

Interpersonal Behaviors as Perceived Threats

While the IPC offers a broad framework for understanding interpersonal behaviors, researchers must conceptualize IPC behaviors in ways that give meaning to the behaviors in relation to the trait variable being investigated. Given that GAD is associated with sensitivity to perceiving threats, we can conceptualize specific IPC behaviors in terms of their potential to function as interpersonal threats. Although virtually any behavior can be perceived as threatening based on how it is interpreted, some behaviors have been more consistently linked to interpersonal threat than others. For instance, interpersonal threats include behaviors that may be associated with detrimental social ramifications such as negative evaluation (Knowles, Lucas, Molden, Gardner, & Dean, 2010), verbal punishment (Hebl, King, Glick, Singletary, & Kazama, 2007), rejection (Kross, Egner, Ochsner, Hirsch, & Downey, 2007), abandonment (Eng, Heimberg, Hart, Schneier, & Liebowitz, 2001), being exploited (Glick & Fiske, 1996), or damage to one's reputation from being associated with others' immoral behavior (Sacheva, Iliev, & Medin, 2009; Nicholson & Barnes-Holmes, 2012). These behaviors can be interpreted as threatening to the extent that they block the psychological needs (Knowles et al., 2010) of autonomy, competence, and belonging, all of which would otherwise facilitate psychological adjustment and well-being (Ryan & Deci, 2000).

Given that behavior can be interpreted in virtually any way, it is important to emphasize how specific behaviors may be interpreted with respect to a trait of interest (e.g., GAD symptoms). Since GAD is associated with heightened sensitivity to perceived threats, what follows is a conceptualization of IPC behaviors on the three dimensions as interpersonal threats. Each conceptualization is supported with a purported psychological need that is likely to be threatened.

First, another person's dominant behavior may threaten one's need for competence or autonomy (Ryan & Deci, 2000). Second, cold behavior may threaten one's need for relatedness/belongingness (Ryan & Deci, 2000). In contrast, warm behavior may be perceived as safe and reassuring, submissive behavior may appear compliant and overtly non-threatening (Newman et al., 2013). Third, although morally elevating behavior may be perceived as trustworthy and signal good moral character (Keltner, Kogan, Piff, & Saturn, 2014), perceived immoral social behavior may signal low trustworthiness (Van 't Wout & Sanfey, 2008) and low cooperation (Curry et al., 2019), and threaten one's need for moral self-worth (Sacheva, Iliev, & Medin, 2009) as well as the need to avoid being "contaminated" by another person's impure behavior (Nicholson & Barnes-Holmes, 2012; Tang et al., 2017; Zhong & Liljenquist, 2006). Furthermore, perceiving others' moral behavior may be threatening if it evokes an upward social comparison, sparks fears of being judged as morally inferior, or stirs uncertainty about one's own morality (Monin, 2007).

Affective Responses May Suggest Perceived Threats

The affective response to a perceived behavior is a key component that implies whether a behavior was considered threatening. For instance, fear, anxiety, and shame are three negative emotions that have been shown to arise in response to perceived threats (e.g., Arnaudova et al., 2017; Leech, Barnes-Holmes, Madden, 2016). When broken into their constituent components, fear, anxiety, and shame consist of negative affect (i.e., unpleasantness) and heightened physiological arousal (Carver & White, 1994; Jefferies, Smilek, Eich, & Enns, 2008), whereas other types of negative emotions, such as sadness, would include negative affect and decreased physiological arousal (Jefferies, Smilek, Eich, & Enns, 2008). In contrast, emotion that is positively-valenced (i.e., pleasant) and arousing suggests the experience of positive emotion

(e.g., joy, excitement), which is more likely to evoke approach behaviors (Carver & White, 1994). Therefore, determining whether a stimulus was perceived as threatening depends upon the emotion it evokes. For instance, one person's increase in arousal and negative affect in response to another person's cold behavior suggests the behavior was perceived as threatening, whereas a different person's positive emotion evoked by the same behavior implies it was perceived as rewarding. Although we would expect most people to react with negative affect and arousal to interpersonal behaviors that are perceived as dominant, cold, and immoral, GAD symptoms likely moderate these relationships in that having higher levels of GAD symptoms may prospectively predict higher self-reported affective reactions to perceived interpersonal threats.

The Present Study

Therefore, the present study sought to examine participants' baseline trait levels of self-reported GAD symptoms in relation to their daily perceptions of others' behaviors and affective responses to the behaviors. Broadly, I expect perceptions of dominant, cold (low affiliation), and immoral or disgusting interpersonal behaviors to predict greater negative affect and arousal, thereby functioning as interpersonal threats across all the participants, but that GAD symptoms will moderate these relationships by strengthening them.

Hypotheses

First (*GAD main effects*), I hypothesized that baseline trait GAD symptoms will prospectively predict higher daily perceptions of others' dominant behavior (Hypothesis [H] 1a), cold behavior (H1b), and immoral behavior (H1c) as well as high self-reported arousal (H2a) and lower valence (H2b). Given that GAD is associated with increased sensitivity to threats, and the literature suggests that perceived threats are more likely to occur with dominant, cold, and immoral behaviors (for people in general), I predicted that individuals with higher GAD

symptoms would report more instances of these behaviors as opposed to the presumably less-threatening behaviors (warmth, submission, moral behavior). Furthermore, given that GAD involves physiological arousal symptoms and that worry involves the experience of negative affect (i.e., fear, anxiety), I predicted increased reported GAD symptoms to be related to increased reports of arousal and lower valence.

Second (*social perception main effects*), I hypothesize between-person effects, such that higher mean levels of perceived dominant behavior, cold behavior, and immoral behavior across daily interactions will each predict higher self-reported arousal (H3a, H4a, & H5a, respectively) and lower valence (H3b, H4b, & H5b, respectively). Individuals who are chronically exposed to perceived interpersonal threats may experience higher levels of affective arousal and lower valence compared to participants with less exposure to interpersonal threats. Next, I hypothesize that within-person increases in perceived dominant behavior, cold behavior, and immoral behavior in daily interactions will each predict higher self-reported arousal (H3c, H4c, & H5c, respectively) and lower valence (H3d, H4d, & H5d, respectively). That is, after accounting for each participant's mean level of perceptions of others, when participants perceive increases in dominant, cold, or immoral behavior, they would report higher arousal and lower valence relative to their own mean. This is because dominant, cold, and immoral behavior are more likely to be perceived of as threatening across the participants, as they may threaten the needs for autonomy, belongingness, and avoiding contamination, respectively.

Third (*GAD symptom moderation effects*). I hypothesize that trait GAD symptoms will moderate (strengthen) the relationships between daily mean perceived dominant behavior, cold behavior, and immoral behavior and self-reported arousal (H6a, H7a, & H8a, respectively) and valence (H6b, H7b, & H8b, respectively). In other words, individual high in GAD symptoms

would show stronger chronic affective responses to perceived dominant, cold, and immoral

behavior across the daily interactions. Furthermore, I hypothesize that trait GAD symptoms will

moderate (strengthen) the within-person relationships between perceived dominant behavior,

cold behavior, and immoral behavior and self-reported arousal (H6c, H7c, & H8c, respectively)

and valence (H6d, H7d, & H8d, respectively). Although I predicted that dominant, cold, and

immoral behaviors will be perceived of as threatening to people in general, individuals with

more severe GAD symptoms were likely to find these interpersonal behaviors more threatening.

Figures 1-3 depict the hypothesized theoretical models of direct and moderating effects between

the variables.

Figure 1

Daily perceived dominant behavior predicting arousal and valence, moderated by baseline GAD symptoms.
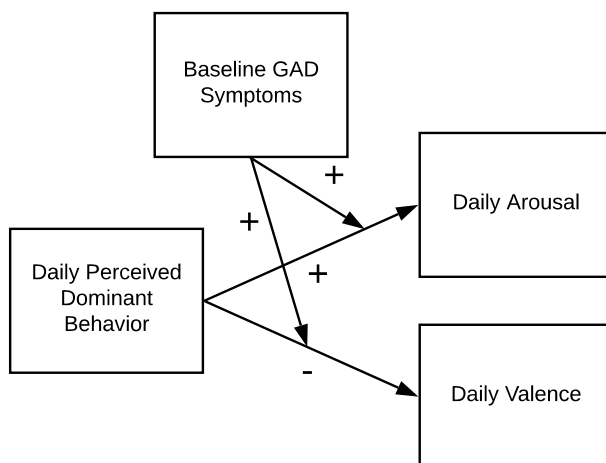
Figure 2

Daily perceived cold behavior predicting arousal and valence, moderated by baseline GAD symptoms.
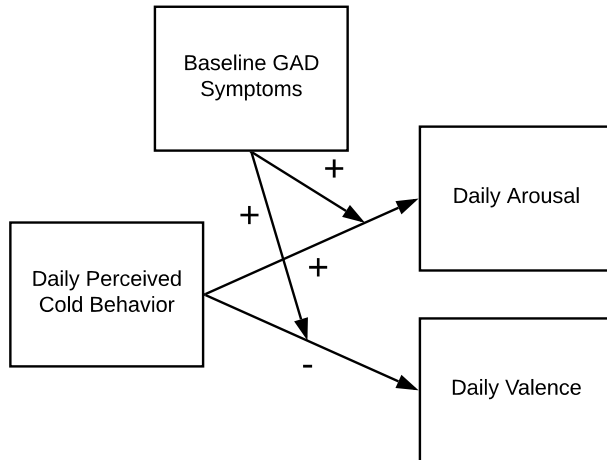
Figure 3

Daily perceived immoral behavior predicting arousal and valence, moderated by baseline GAD symptoms.
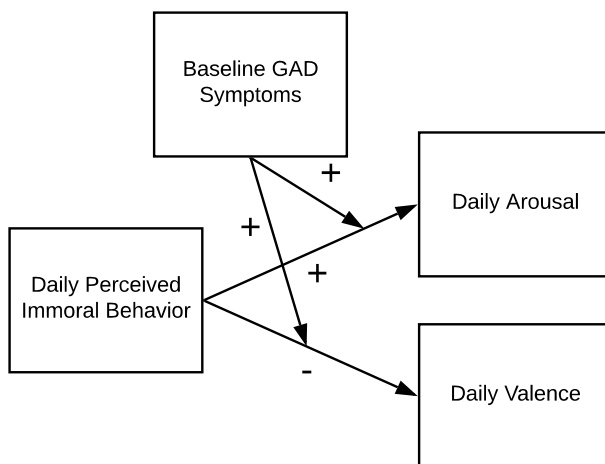
CHAPTER II

Method

Recruitment

To examine test these hypotheses, undergraduates were recruited from psychology courses at a private university in the Pacific Northwest between Fall 2017 and Summer 2018. They were offered course credit in exchange for their participation, whereas individuals who declined to participate were instead given the option to write an essay for course credit. A total of 182 Participants completed baseline measures, however 18 did not complete any daily diary surveys, one participant completed only one survey, and one participant was identified as using a response set. Therefore, 21 participants were deleted from the analyses, resulting in a final sample of 161 participants aged 18 to 25 years (82.6% female, 1.2% gender non-binary). The participants self-identified as White (55.3%), Black (2.5%), Latinx (9.3%), Multiracial (14.3%), Asian (15.5%), Middle Eastern (1.9%), Samoan/Pacific Islander (0.6%), and one participant did not disclose their race or ethnicity (0.6%).

Procedure

Following recruitment, participants were sent an Internet link to a Qualtrics survey that contained the baseline self-report measures regarding their demographics and GAD symptoms. Several other measures were completed at baseline as a part of a larger study about interpersonal behavior, personality, cognition, and emotion. However, only the measures used in the present study are discussed further. After completing the baseline measures, participants were sent 30 experience sampling surveys over the subsequent 10 days (3 surveys per day) via text or email, based on each participant's preference. Odd-numbered waves were sent at 11am, 3pm, and 8pm and even-numbered waves were sent at 10 am, 2 pm, and 5 pm each day.

To minimize participant adoption of response sets, in which they respond to a questionnaire the same way each time, the research team created two versions of the daily survey and randomized the order that participants were sent each version across the 30 surveys. To maximize participant engagement and minimize attrition as participants completed the daily surveys, I emailed participants once or twice during the daily diary protocol with a pre-written and pre-approved standardized message to inform participants 1) of how many surveys had been completed to that point, 2) to finish any uncompleted surveys, and 3) offer encouragement for having completed surveys. For the participants whose surveys had timed out or the links were lost or broken, I sent additional anonymized Qualtrics survey links (randomized survey version 1 or 2) until the participants completed 30 surveys or stopped responding. Participants were awarded their extra credit shortly after completing the 10 days of experience sampling, regardless of the number of daily surveys they completed.

Measures

Baseline Generalized Anxiety Disorder Symptoms - Generalized Anxiety Disorder Questionnaire for DSM-IV (GAD-Q-IV; Newman et al., 2002)

The GAD-Q-IV is a widely-used nine-item self-report measure of dimensional worry symptoms over the preceding six months (Newman et al., 2002). It was developed to serve as a brief screening instrument for the DSM-IV version of GAD. Given that the DSM-5 GAD criteria are nearly identical to those from the DSM-IV, the GAD-Q-IV can still be used to screen for the DSM-5 version of GAD (Pierson, Prenoveau, Craske, Netsi, & Stein, 2017). The GAD-Q-IV includes five yes/no items, two 8-point Likert-type scales (0 = none, 8 = very severe), one checklist of symptoms, and a free-response asking the respondent to list his or her specific topics of excessive and uncontrollable worry. Each of the free-responses earns 1/3 point, thus allowing

a maximum of two points if the respondent includes six distinct topics about which they worry. Additionally, answering "no" to having experienced worry consistently over the preceding six months allows respondents to skip the second half of the assessment. However, the participants' responses to the second half can be retained when using the instrument to assess dimensional GAD symptoms (M. Newman, personal communication, December 11, 2019). All the answers can be computed into a total scale score, with higher scores representing higher presence of self-reported GAD symptoms. Newman and colleagues established a cut score of 5.7 to classify scores that indicate probable GAD diagnosis. However, subsequent research increased the cut score to 7.67 to better balance sensitivity and specificity (Moore, Anderson, Barnes, Haigh, & Fresco, 2014).

The GAD-Q-IV has been used in investigations of interventions for GAD (Jonsson & Kjellgren, 2015), as an outcome measure for GAD treatment (Dahlin et al., 2016), to examine cognitive processes underlying GAD (Goodwin, Eagleson, Mathews, Yiend, & Hirsch, 2017), and in the investigation of factors that maintain worry (Llera & Newman, 2014). Concurrent validity with GAD diagnoses obtained through structured clinical interview, the Anxiety Disorder Interview Schedule for the DSM-IV (ADIS-IV; Brown, Di Nardo, & Barlow, 1994) was Kappa = .67, wherein the GAD-Q-IV accurately classified 88% of the participants and had a false positive rate of 11% (Newman et al., 2002). Concurrent validity between the GAD-Q-IV and the Penn State Worry Questionnaire (Meyer et al., 1990) ranged from $r = .55$ (Newman et al., 2002) to $r = .75$ (Toh et al., 2017).

Discriminant validity was tested in a sample of 391 undergraduate students (Newman et al., 2002). The GAD-Q-IV was found to discriminate between PTSD symptoms ($r = .45$), Social Anxiety Disorder symptoms ($r = .34$), panic disorder symptoms ($r = .30$), depression ($r = .26$)

and fear of relaxation (r = .58). However, no significant differences have been found for GAD-Q-IV scores between individuals with GAD and those with comorbid GAD and Major Depressive Disorder (Kircanski, Thompson, Sorenson, Sherdell, & Gotlib, 2015).

Test-retest reliability between the GAD-Q-IV taken at two weeks apart was kappa = .64, with 92% of individuals retaining their GAD diagnosis over the two weeks (Newman et al., 2002). Reported internal consistency has ranged from .75 (Ruggiero et al., 2017) to .82 (Miranda, Fontes, & Marroquín, 2008). Internal consistency for the present sample was good (α = .81).

Baseline Depression Symptoms – The Center for Epidemiologic Studies Depression Scale (CES-D Scale; Radloff, 1977)

The CES-D is a 20-item self-report measure of depression symptoms over the past week. The depression symptoms fall into a 4-factor structure of depressed affect, positive affect (reverse-scored), somatic symptoms and psychomotor retardation, and interpersonal difficulties, but given correlated factors, all items are combined into a composite score. Respondents rate each item on a four-point Likert scale to indicate the duration they experienced each symptom (0 = Rarely or None of the Time [Less than 1 day]; 1 = Some or a Little of the Time [1-2 days]; 2 = Occasionally or a Moderate Amount of Time [3-4 days]; 3 = Most or All of the Time [5-7 days]). The items are summed for a possible total scale score ranging from zero to 60, and higher scores indicate more severe depression symptoms. Radloff (1977) identified an initial cutoff score of 16 as suggesting clinically significant depression. However, a recent meta-analysis of 28 studies using the CES-D indicated that a cutoff score of 20 provided a better balance of sensitivity and specificity (Vilagut, Forero, Barbaglia, & Alonso, 2016). It has been effectively used in diverse ethnic populations such as American, Canadian (Carleton et al., 2013), Korean (Moon et al.,

2017), and French (Moullec et al., 2010). It has shown good convergent validity with the PHQ-9

(Milette, Hudson, Baron, & Thombs, 2010) and the trait anxiety subscale of the State-Trait

Anxiety Inventory (STAI; Orme, Reis, & Herz, 1986). Furthermore, it has shown discriminant

validity with the Rosenberg Self-Esteem Scale and the state subscale of the STAI (Orme, Reis, &

Herz, 1986). However, women have been found to report higher scores on the CES-D compared

to men (Carleton et al., 2013). Internal consistency has ranged from good ($\alpha = .85$) to excellent

($\alpha = .94$) across undergraduate, rehabilitation, clinical, a Canadian community sample, and

United States nation-wide survey samples (Carleton et al., 2013). Internal consistency for the

present sample was acceptable ($\alpha = .78$).

Daily Perceptions of Others' Behavior in Naturalistic Interactions

Each of the surveys asked participants to retrospectively report on their most recent

interpersonal interaction that lasted at least 5 minutes. Participants reported the other person's

initials, gender, and role (e.g., romantic partner, acquaintance, authority figure) and then briefly

described the person's behavior. However, these variables were not examined in the present

study. Then the surveys prompted participants to rate their perception of the other person's

behavior along the dimensions of dominance, affiliation, and morality (e.g., "How dominant was

the other person's behavior?") with three 5-point Likert-type scales (i.e., *not at all, a little,*

moderately, a lot, extremely), and with multiple anchors for each dimension. Each IPC

dimension was assessed with single items to permit a comparison of quantified ratings of

perceived behavior and to minimize the participant's burden of responding to repeated items

across 30 surveys. Furthermore, each participant was expected to perceive varying levels of

dominant, cold, and immoral behaviors differently across interpersonal interactions and

compared to other participants. Indeed, previous research with single-item ratings in experience

sampling has shown that perceptions of others' behaviors often vary both between- and within-person (e.g., Scott et al., 2017). The Spearman-Brown coefficient for the split-half reliabilities for each dimension were acceptable (dominance = .78, affiliation = .78, and morality = .78).

Daily Affective Response - Affect Grid (Russell, Weiss, & Mendelsohn, 1989)

The affect grid is a two-dimensional plane comprised of two orthogonal dimensions of emotional arousal and valence (Figure 4). Arousal ranges from sleepiness to high arousal and valence ranges from positive, pleasant feelings to negative, unpleasant feelings. This measure allows easy single-item repeated assessment of emotion without unduly burdening participants in repeated measures designs (Russell et al., 1989). In the present study, participants were prompted to, "Please click once on the emotion grid to rate HOW YOU FELT during the interaction." Participants then selected a point on a displayed 96 x 95 grid that best characterized their affect. The grid was overlaid with an image of Russell and colleagues' 9 x 9 affect grid. Around the grid were text with affective anchors including, Excitement, Sleepiness, High Arousal, Unpleasant Feelings, etc., that varied according to the two underlying dimensions. Each participant's selection was coded by Qualtrics as x and y coordinates, where the x-axis indicated the level of affective valence and the y-axis indicated the level of affective arousal. Other studies have been found that used a similarly fine-grained affect grid for repeated measures assessments (Kuppens, Champagne, Tuerlinckx, 2012).

Figure 4

Affect grid from Russell et al., 1989.
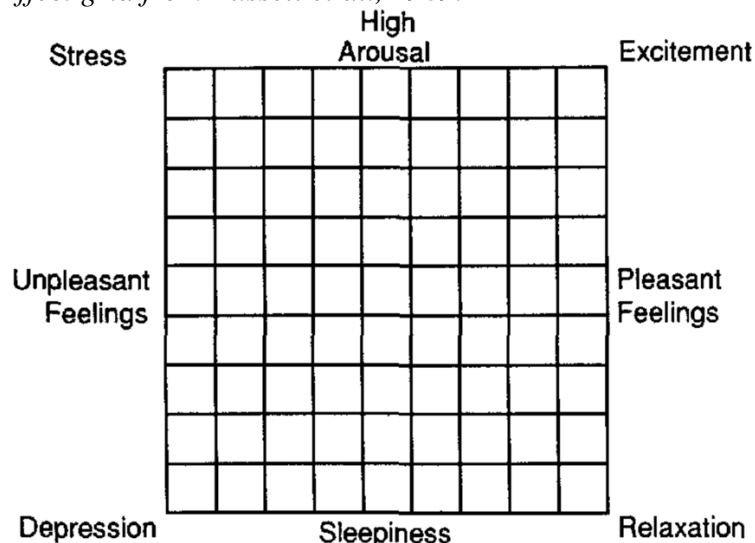
The affect grid's psychometric properties have been shown to be adequate. Evidence of the orthogonal relationship between the valence and arousal dimensions support the affect grid's construct validity and discriminant validity for the valence and arousal dimensions (Killgore, 1998; Russell et al., 1989). Estimates of convergent validity have included moderate to strong correlations between the valence dimension with the Beck Depression Inventory, the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988), and the Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1992). The arousal dimension showed small to moderate correlations with the positive affect PANAS items and the Vigor and Fatigue items of the POMS (Killgore, 1998). The affect grid's low overlap of correlations with the different measures further support its discriminant validity.

Because the affect grid is a single-item measure of affect, traditional estimates of reliability and internal consistency are less applicable compared to measures with multiple items (Tiede, 2019). However, Russell and colleagues (1989) calculated split-half reliability across two studies by having participants rate emotion words or pictures of faces. Although the samples

were small (ns = 20 and 25), the split half reliabilities for the valence dimension were .98 and .99, respectively, and for the arousal dimension was .97 across both studies. In a recent study, Tiede (2019) had 19 participants completed an average of 28 affect grid ratings across a week of experience sampling. The author found within-person split-half reliability of r = .80 (valence) and r = .73 (arousal). For the present study, the Spearman Brown coefficient for the affect grid's split-half reliability was acceptable for the arousal dimension (r = .74) and for the valence dimension (r = .75).

Data Analytic Plan

Power Considerations

A post-hoc power analysis is desired, given that the current study utilized an archival dataset. The present study aimed to detect cross-level interactions, such as the relationship between Level 1 predictors (i.e., perceptions of behavior) that may differ as a function of the Level 2 variable (i.e., GAD symptom severity; Mathieu, Aguinis, Culpepper, & Chen, 2012, p. 951). Calculating power in Multilevel Modeling (MLM) differs from typical procedures in regression analyses. For instance, the power to detect cross-level interactions in MLM has been shown to depend largely on the cross-level interaction (i.e., effect), sample sizes of the Level 1 and Level 2 variables, standard deviation (SD) of the Level 1 regression coefficients (Mathieu et al., 2012), the level of power, as well as the sizes of the variance components and the covariance of the random slope and random intercept (Arend & Schäfer, 2019), and the Intraclass Correlation Coefficient (ICC; McCoach, 2010). Moreover, determining power also depends on the selected Alpha (i.e., risk of Type I error), which for the present study is α = .05. In a repeated-measures design, the sample size is considered for both the Level 2 variable (i.e., number of participants) and Level 1 variable (i.e., surveys completed by each participant over

time). Power is maximized when both the Level 1 and Level 2 samples are sufficiently large,

which has been suggested to be ≥ 18 and ≥ 115, respectively (Mathieu et al., 2012). The Level 1

and Level 2 samples sizes for the present study exceed these recommendations.

Beyond the determination of whether a study has adequate statistical power, it is

becoming increasingly recommended that researchers identify the effect size(s) that a given

study is powered to detect. Recently, Arend and Schäfer (2019) provided estimates (based on

their review of research and a Monte Carlo simulation) for the minimal detectable effect size

(MDES) for MLM designs. Their estimates are based on standardized effects with standardized

predictors and outcome variables, so the effect sizes are comparable across measures and studies.

The authors asserted that power must be determined separately for each desired effect (i.e., L1 &

L2 main effects, cross-level interaction). The authors indicate that, with a power level of .80 and

a Level 2 sample size of 150 and Level 1 sample size of 25, there would be sufficient power to

detect at least a .09 direct effect for the Level 1 variable, regardless of the size of the ICC. Using

the same parameter estimates, assuming power of at least .80, an ICC of .10 would permit

detecting a level 2 direct effect of at least .27 (standardized), an ICC of .30 would be sufficient to

detect an effect of .24, and an ICC of .50 would permit the detection of at least a .23 effect.

Finally, the MDESs for the cross-level interaction with the same input parameters depends on the

size of the random slope variance component (RS). An RS of .01 would permit detecting effects

of at least .51, an RS of .09 would detect a .28 effect, and an RS of .25 would detect a .25 effect.

Thus, assuming small ICCs (~.10) for the L1 variables and small RS's (~.01) in the present

sample, I should have enough statistical power to detect at least a .09 level 1 direct effect, a .27

level 2 direct effect, and a .51 cross-level interaction.

Data Preparation

Each participant's depression symptoms (CES-D) sum score was calculated, after reverse-coding the appropriate items, and GAD-Q-IV responses were summed according to Newman and colleagues' (2002) procedure to obtain a total score. Then all the L1 variables were first centered at zero so that positive values reflected high arousal, positive valence, and perceived dominance, coldness, and immorality; negative values represented low arousal, negative valence, and perceived submission, affiliation, and morality, respectively; and scores of zero reflected neutrality. This facilitated obtaining descriptive statistics for each variable. Then all the L2 study variables were grand-mean centered to control for the central tendencies in responding among all the participants in this sample. Separate person-mean centered variables were created for each L1 variable by subtracting each participant's scores by their own means on each variable. This facilitated the examination of within-person effects by controlling for each participant's mean. Finally, standardized versions of the variables (except the covariate gender), both between- and within-persons, were also calculated to facilitate identification of MDESs.

Preliminary Analyses

First, I conducted data pre-screening. Participants who completed fewer than 3 surveys were deleted. In addition, one participant's data was deleted due to their data showing no variability (only the maximum ratings of 2s) on both the affiliation and morality dimensions across all their surveys, therefore suggesting that the participant used a response set. One participant mistakenly completed the entire daily diary protocol twice, resulting in a total of 62 completed surveys. I examined the results with and without this participant's data and there were no markedly different results. Therefore, to increase variability and power, all of this participant's surveys were retained in the analyses. The final sample consisted of 161

participants who completed a total of 4,533 surveys. The participants completed an average of 28.16 out of 30 surveys, indicating a 93.9% compliance rate. The data were assessed for the degree of missingness. There was no missing data for the baseline measure (GAD-Q-IV), and only 5 cells in the daily diaries showed missing data. Therefore, missing data were not imputed because the effect is negligible with less than 5% missingness (Cheema 2014; Schafer, 1999).

Next, all variables and residuals were inspected for normality (e.g., skew, kurtosis). This was done by plotting histogram plots of all study variables as well as the residuals for all variables. Because there were a large number of surveys completed, traditional tests of normality (e.g., Kolmogorov-Smirnov, Shapiro-Wilk) were not appropriate due to an inflated risk for Type I error (Field, 2013). Instead, I used visual inspection of the histogram plots and descriptive statistics to understand examine degree of skew and kurtosis. In the present study, all the variables fell within -.770 to .361 skew and -.794 to .165 kurtosis, thus indicating normal skew and kurtosis (Field, 2013). In addition, visual inspection of the histograms suggested that all the variables were normally distributed.

Analytical Strategy

I first obtained descriptive statistics for each variable, though it should be noted that the L1 variables include multiple entries for each participant. Consequently, the L1 descriptive statistics reflect the grand mean of all completed surveys. Then I calculated each participant's mean for each L1 variable and conducted a Pearson's bivariate correlation between GAD-Q-IV score, CES-D score, and participant means for all the L1 variables. To analyze the effects of gender, I created two separate dummy coded variables. The first variable was coded to compare the effects of female, coded as 1, to non-female participants (i.e., male, gender non-binary), coded as 0. The second variable compared the two gender non-binary participants, coded as 1, to

the remaining cis-gendered participants, coded as 0. Both dummy coded variables were included simultaneously in each analysis. All but one of the analyses showed non-significant effects based on gender identity (see Table 1 note). Otherwise, there were negligible differences in the effects if gender identity was included or excluded. Therefore, the gender identity variables were dropped from the analyses to maximize statistical power, and the effects of gender identity will not be discussed further.

Data were analyzed using multilevel modeling (MLM) via the SPSS 26 MIXED command. MLMs are appropriate to account for the nesting of repeated measures (e.g., multiple daily interactions; Level 1) within higher-order units (participants; Level 2). In addition, using MLMs for the present analyses is advantageous because they can handle unbalanced data (participants completing different numbers of surveys), model between- and within-person variability, permit random effects and cross-level interactions, and allow researchers to specify the type of covariance between repeated L1 variables. For the present analyses, individual participants were specified as the L2 groups and daily diaries were specified as L1 repeated measures variables. GAD symptoms and depression symptoms were modeled at Level 2 and all the remaining variables were modeled at Level 1. An AR1 (autoregressive) covariance structure was assumed to be most appropriate covariance structure for the data, as it assumes surveys completed close in time are more highly correlated than surveys completed at more distal times. However, alternate covariance structures were also tested for optimal fit. Finally, Maximum Likelihood (ML) estimation was used, which is generally recommended for large datasets to yield more accurate parameter estimates (Field, 2013).

Nine separate MLMs were conducted to test all the hypotheses. These were conducted first with unstandardized predictors and outcome variables and then with standardized predictors

and outcome variables (for comparison with MDESs). First, I conducted five MLMs to examine the fixed effects of GAD symptoms predicting each of the five L1 variables. Gender and depression symptoms were modeled as covariates. Both GAD symptoms and depression symptoms were grand-mean centered and the outcome variables were in their raw format. This procedure permitted the detection of between-person differences of L1 variables at different levels of the L2 variables.

Next, I conducted two MLMs to examine the fixed and random effects of perceived dominance, affiliation, and morality on arousal and valence. These predictors were each designated as Block 1 in a model-building approach. The L1 predictors included both person-means and person-mean centered variables to examine the between- and within-person effects, respectively. These two MLMs allowed me to examine the unique effects of each social perception dimension while simultaneously controlling for the other dimensions and the L2 variables. Furthermore, modeling random effects permitted the examination of significant between-person variability for each of the L1 variables. Because GAD symptoms is a L2 variable with a single data point for each participant, its random effects were not modeled. Again, the L2 variables were included as covariates. For these two analyses, as well as the subsequent analyses, GAD symptoms and depression symptoms were grand-mean centered.

Finally, using a model-building approach, I conducted two more MLMs by adding the six interaction variables to each of the previous models in Block 2. This was done to examine how GAD interacted with the mean social perceptions and person-centered variables in predicting arousal and valence. Significant interactions were followed up with simple slopes analyses (Dawson, 2014). Figures 1-3 show theoretical models of the moderation analyses.

The AIC was noted to identify the best-fitting model with the optimal level of complexity while matching appropriate statistical assumptions. AIC is a transformation of the -2 Log Likelihood that is adjusted for the number of predictors in the model (Field, 2013). Although the AIC has no inherent meaning by itself, a lower AIC indicates better model fit relative to other models with the same dependent variable but different predictors and/or effects. Therefore, I compared the AIC of the saturated model to the AIC of previous models.

In addition, I used the AIC to compare the optimal fit of different covariance structures for the repeated-measures, L1 variables. An autoregressive (AR1) covariance structure emerged as the best fit for the L1 variables, as other covariance structures (e.g., Compound Symmetry, Variance Components, Unstructured, AR1-Heterogeneous) either failed to converge or resulted in a higher AIC. AR1 assumes that surveys completed nearest in time to one another correlate more highly than surveys completed at more distal times.

CHAPTER III

Results

Sample Characteristics, Frequencies, and Bivariate Correlations

The sample characteristics indicated that, on average, the participants reported themselves as experiencing moderate levels of GAD symptoms. The mean for the sample surpasses the initial cut score (5.7; Newman et al., 2002) but not an updated cut score (7.67; Moore, Anderson, Barnes, Haigh, & Fresco, 2014) that indicates probable GAD diagnosis. This suggests the present sample has somewhat elevated GAD symptoms. Additionally, the sample's mean CES-D score is equal to the revised cut score (≥ 20) that suggests mild depression (Vilagut et al., 2016). Across means of the L1 variables, the participants showed a tendency toward perceiving others as slightly dominant, affiliative, and moral. In addition, the participants tended

to report experiencing slightly high valence and slightly low arousal (i.e., slightly calm). The average reporting of high valence is consistent with trends seen in previous repeated-measures studies, whereas participants in other studies tended to report themselves as experiencing a mild degree of affective arousal (e.g., Cain, Meehan, Roche, Clarkin, & De Panfilis, 2019; Smyth, Zawadzki, Juth, Sciamanna, 2017). Table 1 presents the means, standard deviations, and bivariate correlations for each study variable. To better understand trait-level tendencies for each participant across all the surveys, I obtained the range, minimum, and maximum of all participant means for each L1. Next, frequencies of ratings on each dimension were obtained. The frequencies showed that within each dimension, independent of the other two dimensions, participants reported the most instances of neutral dominance, high affiliation, and high moral interpersonal behaviors (Table 2). Participants reported perceiving the least number of instances of low dominance (submission), low affiliative (cold), and immoral behaviors. Therefore, these sample characteristics support the decision to person-center the L1 predictors as well as outcome variables to control for each participant's average ratings on each variable.

Bivariate Pearson's correlations were conducted between participants' means on all L1 variables, GAD-Q-IV score, and CES-D score (Table 1). Intraclass Correlation Coefficients (ICC) were calculated for each variable to identify the amount of within-person variability present for each L1 variable. The ICCs were small and ranged from .12 to .17, which indicated that 12% to 17% of the variance was between-person and 88% to 83% of the variability was within-person, respectively. These patterns of variability are consistent with prior studies that utilized perceptions of others' interpersonal behavior (e.g., Sadikaj et al., 2013). Consequently, the greater within-person variability in the present study justified conducting MLM to examine such variability.

Direct Effects of GAD Symptoms on Arousal, Valence, and Perceptions of Others'

Dominant, Cold, and Immoral Behavior

Hypotheses 1a-c and 2a-b pertained to the between-person fixed effect of GAD symptom level on each of the L1 variables, separately. Five MLMs were conducted with GAD-Q-IV score predicting each L1 variable while controlling for both gender and CES-D score. Continuous predictor variables were grand mean-centered so that parameters reflect effects of deviations above the sample average level of GAD symptoms (and depression). Table 3 shows the fixed effects of gender, depression symptoms, and GAD symptoms, and the random intercept predicting each of the L1 variables.

The results showed that the random intercepts were significant in every model, thus indicating that L1 outcomes varied across participants. The effect of gender was non-significant in every model ($p's > .497$). Contrary to hypotheses, there were no significant predictors of others' dominant behavior ($p's > .521$) nor of valence ($p's > .504$). Contrary to hypotheses, higher levels of GAD symptoms predicted both lower perceptions of others' cold behavior and lower perceptions of immoral behavior. Unexpectedly, GAD symptoms did not predict arousal, valence, or perceptions of others' dominant behavior, whereas higher depression symptoms predicted higher arousal and marginally higher perceptions of cold behavior. Finally, all the effects fell below the MDES at the present study's level of power for detecting L2 direct effects (.27; Arend & Schafer, 2019). Consequently, I must consider the possibility that the significant effects of GAD symptoms predicting perceived cold behavior and perceived immoral behavior may be 'false positives'. In addition, the remaining null effects may have failed to be detected due to a lack of statistical power.

Direct Effects of Perceptions of Dominant, Cold, and Immoral Behavior on Arousal and Valence

Four MLMs were conducted to predict arousal and valence when including all main effects (between- and within-person) and interactions. Each outcome was tested in a stepwise manner with the main effects entered in the first block and GAD interaction effects entered in the second block. The effect of gender was non-significant for all MLMs and therefore is not discussed further, but the effect is still presented in Tables 4 and 5. Furthermore, only the results of block 2 for each MLM are presented in the following sections, unless otherwise noted.

Predicting Arousal

The results (see Table 4) showed not only significant variability in intercepts but also in slopes between predictors and arousal. Contrary to hypothesis 2a, GAD symptoms did not predict arousal. Furthermore, the standardized effect size fell below the MDES for a L2 direct effect. Unexpectedly, depression symptoms predicted higher arousal with a small effect size (~ .10). Contrary to hypothesis 3a, mean perceived dominant behavior did not predict arousal. Furthermore, this effect fell below the MDES for a L1 direct effect. As hypothesized, mean perceived cold behavior predicted higher arousal (H4a) with a medium effect size. Contrary to hypothesis 5a, mean perceived immoral behavior predicted lower arousal in block 1. When the interaction terms were included (block 2), mean perceived immoral behavior only predicted marginally lower arousal. Although the effect size for this latter result was small, the present study had sufficient power to detect this effect.

Regarding within-person effects, contrary to hypothesis 3c, person-centered perceived dominant behavior predicted lower arousal. As hypothesized, person-centered perceived cold behavior and person-centered perceived immoral behavior both predicted higher arousal (H4c

and H5c, respectively). Each of these standardized effect sizes were small, and the latter result fell below the MDES for a L1 direct effect.

Surprisingly, the results showed that none of interaction effects of GAD symptoms with mean social perceptions or person-mean centered perceptions were statistically significant (p's > .115). Therefore, hypotheses 6a, 6c, 7a, 7c, 8a, and 8c were not supported. There was a small effect size for the interaction between GAD symptoms with person-centered perceived immoral behavior. However, all of these results fell below the MDES.

Predicting Valence

Significant variability in intercepts and all slopes confirmed differences between participants' average valence and within-person associations of perceptions and valence. Contrary to hypothesis 2b, GAD symptoms did not predict valence, nor did depression symptoms. Additionally, both effect sizes were small and fell below the MDES for L2 direct effects. As hypothesized, mean perceptions of dominant, cold, and immoral behavior each predicted lower valence (H3b, H4b, and H5b, respectively) with small (mean perceived dominant behavior) to medium effect sizes (mean perceived cold and immoral behaviors). However, the effect size of mean perceived dominant behavior fell below the MDES. In addition, person-centered perceptions of dominant, cold, and immoral behavior each predicted lower valence with small (perceptions of dominant behavior) to medium (perceptions of cold and immoral behaviors) effect sizes, thus supporting hypotheses 3d, 4d, and 5d, respectively. Each of these L1 direct effects met or exceeded the MDES.

Regarding the interaction effects, GAD did not moderate mean dominance in predicting valence. Therefore, hypothesis 7b was not supported. Furthermore, GAD did not moderate any of the person-centered social perception dimensions in predicting valence, thereby failing to

support hypotheses 6d, 7d, and 8d. These CLI effect sizes were also very small (> .03). However,

GAD symptoms showed a significant and small-sized CLI with average ratings of others cold

behavior. Simple slopes follow up analyses showed that, contrary to hypothesis 7d, GAD

symptoms buffered the relationship between perceived cold behavior and valence (Figure 5). For

participants with low levels of GAD symptoms, one's average perceptions of others' cold

behavior predicted lower valence (b = -24.17, SE = 5.44, p < .001, 95%CI [-34.92, -13.43]). In

contrast, individuals with high levels of GAD symptoms showed no relationship between

average ratings of cold behavior and valence (b = -1.29, SE = 5.26, p = .806, 95% CI [-11.69,

9.10]). Furthermore, compared to low GAD symptom participants, individuals with high GAD

symptoms reported lower valence at all levels of perceived affiliative-cold behavior. Figure 5

shows a plot of the simple slopes analysis.

Figure 5

*Plot of simple slopes analysis – GAD symptoms buffering the relationship between mean
perceived cold behavior and valence.*
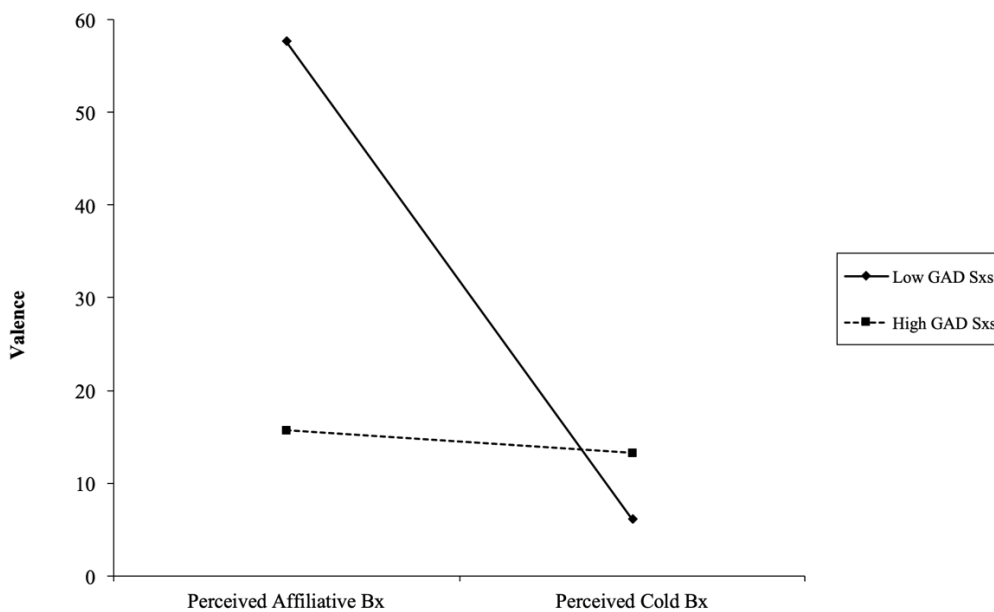
There was also a statistically significant interaction between GAD symptoms and average perceived immoral behavior in predicting valence. This result also had a small standardized effect size. As hypothesized, GAD symptoms strengthened the relationship between perceived immoral behavior and valence (H8d). Simple slopes follow up analysis revealed that at low levels of GAD symptoms the relationship between average perceived immoral behavior and valence was not significant ($b = -4.39$, $SE = 5.36$, $t = -.82$, $p = .41$, 95%CI [-14.97, 6.19]). At high levels of GAD symptoms, perceived immoral behavior predicted lower valence ($b = -23.24$, $SE = 4.79$, $p < .001$, 95% CI [-32.71, -13.77]). Figure 6 shows a plot of the simple slope analysis of the interaction between GAD symptoms and mean perceived immoral behavior predicting valence.

Figure 6

Plot of simple slopes analysis – GAD symptoms strengthening the relationship between mean perceived immoral behavior and valence.
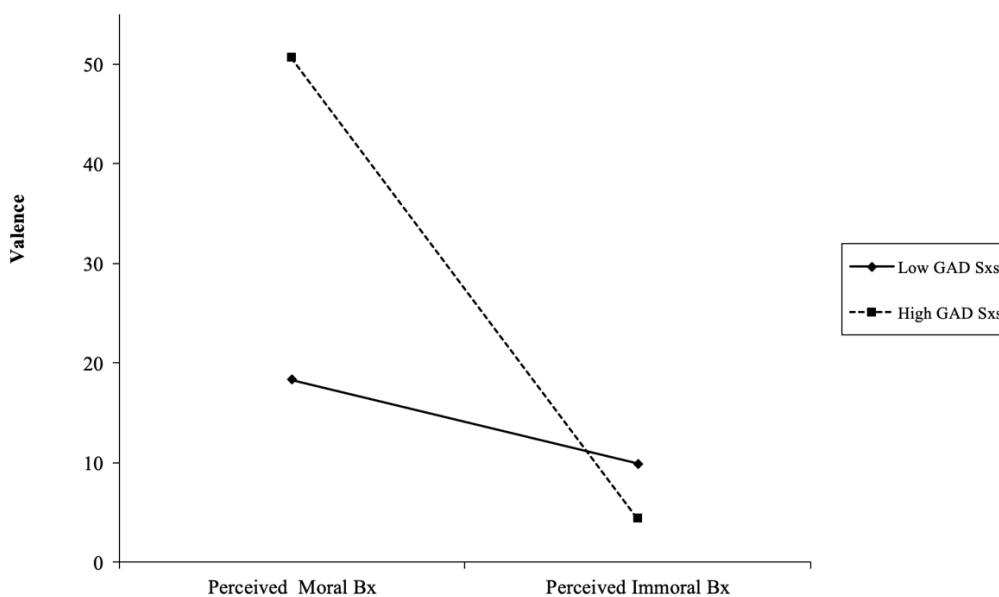
When considered together these results indicate that participants who reported higher average ratings of dominant, cold, and immoral behaviors tended to report lower valence. When participants' ratings of dominant, cold, and immoral behavior deviated above their own means, they reported additional decreases in valence. However, perceptions of others as cold predict lower valence only for low-GAD participants, whereas perceived immorality predicted lower valence most strongly for high-GAD participants. Said differently, GAD buffered the relationship between average ratings of cold behavior and valence, whereas GAD strengthened the relationship between average ratings of immoral behavior and valence.

CHAPTER IV

Discussion

Purpose of the Study

The purpose of the present study was to examine effects of perceptions of others' interpersonal behaviors on self-reported affective reaction over the course of naturalistic self-reported interpersonal interactions, and the extent to which GAD symptoms moderated these effects. Specifically, individuals with higher GAD symptoms were expected to report higher arousal and lower valence when perceiving behaviors conceptualized as interpersonal threats, at both the between-person and within-person levels. Perceptions of others' interpersonal behaviors were divided into the three dimensions of dominance, affiliation, and morality. The interpersonal behaviors were based on the two existing IPC dimensions (dominance and affiliation) and a hypothesized third dimension (morality). Affective reaction was comprised of arousal and valence, the two orthogonal axes of the affect grid. It was theorized that dominant, low affiliative (cold), and immoral interpersonal behaviors might function as interpersonal threats, which would be evidenced by more instances of high arousal and low valence affective responses across the

participants. Furthermore, GAD was hypothesized to predict more instances of each interpersonal threat and the associated responses, as well as to strengthen these relationships.

Major Findings

Generalized Anxiety Disorder Symptoms Predicting Social Perceptions

Contrary to hypotheses, GAD symptoms did not predict perceptions of dominance. This finding is inconsistent with the literature, as previous studies have found that individuals with GAD tend to perceive others' behavior as dominant, cold, and cold-dominant (Newman & Erickson, 2010; Erickson & Pincus, 2005). For example, within contrived laboratory social interactions with a confederate, participants with GAD symptoms perceived the confederate as more blaming, controlling, attacking, and ignoring, and less loving, trusting, and connecting (Erickson & Pincus, 2005). However, findings regarding the "pathoplasticity" or heterogeneity of interpersonal problems among people with GAD (Girard et al., 2017; Gomez Penedo, Constantino, Coyne, Westra, & Antony, 2017; Przeworski et al., 2011; Salzer et al., 2008) suggest that interpersonal heterogeneity may obscure any single relationship between GAD symptoms and perceived dominance. Assuming this is true, then perhaps an effect may have emerged in the present study if the participants with high GAD symptoms were grouped according to their predominant interpersonal problems (i.e., intrusive type, exploitable type, cold type, and nonassertive type; Przeworski et al., 2011).

Alternatively, perhaps differences in the study context contributed to the present results. Previous research has assessed interpersonal problems by examining in-vivo laboratory self-reports while interacting with confederates (Erickson & Newman, 2007) or with self-report questionnaires of trait interpersonal problems at one (Girard et al., 2017; Przeworski et al., 2011), two (Salzer et al., 2008), or three time points (Gomez Penedo et al., 2017). However, the

present study measured perceptions of interpersonal behaviors across 30 naturalistic social

interactions, which might "wash out" effects of particular stressors given the broad range of

possible situations assessed. It is also possible that participants in the present study reported on

more interactions with friends and acquaintances, rather than strangers (this information was

captured but not analyzed in the present study), which may have affected the results. In addition,

as discussed further below, the individuals with GAD symptoms reported greater perceptions of

affiliative and moral behavior. If they experienced their interacting partners as affiliative and

moral, perhaps this was associated with less apparent dominance among the participants'

interacting partners. Although additional research is needed to replicate a null finding with

respect to perceived dominance among individuals with GAD symptoms, it is possible that

individuals with GAD symptoms may be sensitive to perceived dominance, but only with certain

people.

Contrary to hypotheses, GAD symptoms predicted higher, rather than lower, perceived

affiliative behavior. In addition, the effect size fell below the MDES for a L2 direct effect (.27;

Arend & Schafer, 2019), meaning that the current study was not amply powered to accurately

detect this effect and thus this finding should be interpreted with caution, as it may be a false

positive. Despite power concerns, the finding is inconsistent with the literature. As mentioned

above, some studies found individuals with GAD symptoms to perceive others in a manner that

is interpersonally threatening (i.e., cold and controlling; Erickson & Pincus, 2005; Newman &

Erickson, 2010), which is what I hypothesized would occur for individuals with GAD symptoms

across naturalistic interpersonal interactions. However, past research has largely relied on self-

reported generalized perceptions of threats and on one-time lab studies. Given our divergent

findings in repeated social interactions, perhaps individuals with higher GAD symptoms in the

present study tended to surround themselves with others with whom they can be affiliative because it is more reassuring (i.e., avoiding individuals they perceive as unaffiliative). Indeed, prior research has shown that individuals with GAD reported engaging in higher levels of reassurance seeking as a safety behavior to control their worrying, uncertainty, or anxiety (Beesdo-Baum et al., 2012; Cougle et al., 2011), even pulling for reassurance from confederates within a laboratory task (Erickson & Newman, 2007). Therefore, the higher levels of perceived affiliative behaviors among individuals with high GAD symptoms may reflect this interpersonal coping strategy. An alternate interpretation is that perhaps worriers use appraisals of affiliation as a means of anxiety avoidance. If perceiving others' cold behavior (which may threaten lack of belongingness) or neutral behavior (which may trigger intolerance of uncertainty; Holaway, Heimberg, & Coles, 2006; Lee et al., 2010) is threatening, it may be that individuals with GAD symptoms appraise cold and neutral behavior as affiliative to avoid experiencing anxiety and uncertainty.

Contrary to hypotheses, GAD positively predicted higher, rather than lower, perceptions of moral behavior. This effect also fell below Arend and Schafer's (2019) MDES for a L2 direct effect (.27), thus warranting caution when interpreting this result. Still, the result is partially inconsistent with the literature. It did not align with the notion that GAD would be associated with higher instances of perceiving threats to moral contamination. However, this result does fit with the notion that individuals with GAD are prone to excessive reassurance seeking (Beesdo-Baum et al., 2012; Cougle et al., 2011). If this is so, then the person with GAD symptoms may perceive the reassuring person's behavior as cooperative, which is an act that previous research has shown that humans generally consider moral (Curry, Mullins, & Whitehouse, 2019). Alternatively, similar to the aforementioned interpretation of higher appraisals of affiliative

behavior, perhaps the higher appraisals of moral behavior also functioned as anxiety avoidance; worriers tended to appraise immoral and neutral behavior as moral to avoid perceiving a threat or sparking uncertainty, respectively.

With respect to the conceptualization of perceived interpersonal threats, both significant main effects – GAD predicting high affiliative behavior and high moral behavior – were in the opposite direction from what was hypothesized. However, in some regards, these results may be consistent with previous research. For instance, individuals with GAD often tend to report interpersonal problems with being too affiliative (Erickson et al., 2016; Shin & Newman, 2019; Zainal & Newman, 2017). In addition, Erickson and colleagues (2018) found that individuals with GAD tended to rate themselves as higher in compassionate motivations and Hebert and colleagues (2014) identified that worriers tend to hold the belief that worrying is a moral action. The present results in combination with previous studies might suggest a propensity of worriers to hold a bias toward appraising interpersonal stimuli as affiliative and moral, whether in themselves or others. For instance, Shin and Newman (2019) found that individuals with GAD over-reported themselves as behaving in affiliative ways, whereas informants reported the GAD individuals were less affiliative. The prior findings about worriers appraising their own behaviors as affiliative and moral may extend also to how they appraise others' behaviors. Clearly, additional research is needed to better understand these discrepancies in naturalistic interpersonal interactions.

Generalized Anxiety Disorder Symptoms Predicting Affective Arousal and Valence

Contrary to hypotheses, GAD symptoms did not predict arousal. This is inconsistent with the literature. The diagnostic criteria of GAD includes somatic symptoms associated with physiological arousal (APA, 2013). Furthermore, several studies have shown heightened arousal

in individuals with GAD symptoms (Ottaviani et al., 2014; Stapinski et al., 2010; Hoffman et al., 2005; Aldao, Mennin, & McLaughlin, 2013; Aldao et al., 2010). However, given that worry in GAD has been theorized in some cases to help individuals avoid arousal (Borkovec, Alcaine, & Behar, 2004) or perhaps more precisely to help them avoid *additional* increases in arousal (i.e., a negative contrast; Newman & Llera, 2011), perhaps the present results are evidence of successful attempts by individuals with GAD symptoms to maintain consistent negative affective states in order to avoid further expected increase in negative mood (e.g., negative emotional contrasts). This is consistent with prior research showing that more intense worrying throughout daily life predicted higher sustained arousal over the next hour (Newman et al, 2019). Said differently, if the participants in the present study were already in a chronically aroused state that did not vary in response to others' interpersonal behaviors, then the present null finding may indicate they successfully suppressed increases in arousal during interactions. However, I would still have expected to find worriers reporting higher arousal across interactions. Despite these effects of GAD symptoms, depression symptoms predicted higher arousal with a large enough effect size to exceed post-hoc MDES (see Arend & Schafer, 2019). This significant covariate effect indicates that, if worriers had been experiencing increased arousal, they would likely have reported it. However, additional research is needed to disentangle the effects of daily worry on subsequent interpersonal interactions.

While not the focus of the present study, the covariate depression predicted higher arousal, even after controlling for the effects of GAD and social perceptions. This effect was surprising given that depression has been associated with decreased arousal to negative stimuli (Rosebrock et al., 2016) and perceived threats (Yancey et al., 2014). Perhaps when controlling for the shared variance of negative affect in GAD symptoms and depression symptoms, the

remaining effect of depression symptoms likely reflected primarily low positive affect (Gençöz, 2002).

Contrary to hypotheses, GAD symptoms did not predict lower valence across social interactions. This is inconsistent with the literature and inconsistent with the previous results. For instance, GAD has been associated with elevated negative affect, even after successful attempts at coping and reduction in negative affect (Fitzgerald et al., 2017), however this pattern did not show up in the present results. If the individuals with GAD symptoms are perceiving more affiliative and moral behavior then we might also expect them to feel higher valence.

Perceived Dominant Behavior Predicting Affect

Contrary to hypotheses, mean perceptions of dominant behavior did not predict arousal. However, as hypothesized, participants who reported higher mean (chronic) perceptions of dominant behavior reported lower valence. This result is partially consistent with the literature. However, it must be noted that the literature also appears to be mixed regarding the relationship between dominance and arousal and valence. The non-significant correlation between perceived dominance and arousal and valence is consistent with prior research (Cain et al., 2019; Killgore, 1998), but the null effect of dominance on arousal stands in contrast to past findings that show interacting with a dominant person tends to increase autonomic nervous system activity (Cordonier, Breton, Trouche, & Van der Henst, 2017). Other research has shown that, people who identify with submissive interaction partners tend to report lower valence when perceiving dominance (Demaree, Robinson, Everhart, & Youngstrom, 2005). In one study, when individuals self-identified as possessing dominant traits, then they reported lower valence when engaged in submissive behaviors; however, participants who identified as possessing submissive traits did not show any significant patterns of valence (Moskowitz & Coté, 1995).

Another study by Stevanovic, Henttonen, Kahri, and Koski (2019) found differential effects of dominance on same-sex interacting partners. Importantly, they found that dominance showed an effect on reported arousal only during the beginning of the social encounter. This highlights an important limitation of the present study. Participants reported retrospectively on social interactions, the recall of which were likely to be influenced by peak and end effects (Kahneman, Fredrickson, Schreiber, & Redelmeier, 1993; Stone, Broderick, Kaell, DelesPaul, & Porter, 2000), meaning that I would expect participants to base their recollections on the peak affect experienced and how they felt at the end of the interactions. However, if perceived dominance exerts influence largely at the commencement of an interaction, then participants would be less likely to remember these details, thus contributing to the null effect of perceived dominance on reported arousal. Alternatively, the effect of dominance on valence was found primarily with the female participants (Stevanovic et al., 2019); valence increased when the interacting partner exhibited greater dominance in an interaction, whereas valence decreased when the participant felt they needed to exert more dominance during the interaction. Given that the present sample consisted predominantly of female participants, the effect of perceived dominance on valence may parallel that found by Stevanovic and colleagues.

Contrary to hypotheses, within-person increases in perceived dominance predicted lower, rather than higher, arousal. However, as hypothesized, within-person increases in perceived dominance predicted lower valence. These findings are inconsistent with the results of other recent studies. For instance, dominant behavior has been shown to increase physiological arousal during interactions (Cordonier et al., 2017). In another study, Cain and colleagues (2019) found that participants were more likely to behave in a friendly (communal & dominant) manner when they perceived others' behavior as communal and dominant.

Alternatively, perhaps low arousal and low valence implies that the participants experienced a different emotion, rather than fear or anxiety, in response to perceived dominant behavior. For instance, Hepach, Kliemann, Grüneisen, Heekeren, and Dziobek (2011) classified 62 emotions in relation to their scores on arousal and valence as well as their frequency in everyday conversations. They found five emotions that were comprised of both low arousal and low valence: boredom, compassion, embarrassment, melancholia, and humility. Interestingly, each of these emotions were found to have similar frequencies experienced throughout daily life, except for humility, which had lower daily frequency than the other emotions. Accordingly, the affective response observed in the present study may reflect the experience of one of these emotions in response to perceiving dominant behavior. However, future research is needed to better understand a lower arousal and lower valence response to perceived dominant behavior.

I had conceptualized perceived dominance as an interpersonal threat, which was theorized to result in within-person increases in arousal and decreases in valence. However, the present results suggest that participants may have been more sensitive to perceived submissive behavior, about which they may have felt excited (high arousal and high valence). Or perhaps, the participants may have felt embarrassed (decreased arousal and decreased valence; Hepach et al., 2011) when perceiving dominant behavior.

It is also noteworthy that the mean or "aggregate" effects differed slightly from the within-person fluctuations in response to perceived dominant behavior. The lower valence in response to perceived dominance was consistent at both the between- and within-person levels. However, the mean (between-person) effects of perceived dominance did not result in any change in arousal, whereas the state (within-person) effects resulted in lower arousal, which was in the opposite direction from what was expected. Perhaps the mean effect reflected displeasure

when interacting frequently with dominant interaction partners, and perhaps the within-person effect reflected the experience of embarrassment in response to being confronted with dominant behavior.

Perceived Cold Behavior Predicting Affect

As hypothesized, higher average perceptions of cold behavior predicted higher arousal and lower valence. Similarly, as hypothesized, higher within-person increases in perceived cold behavior predicted both higher arousal and lower valence. These results support the theory that cold behaviors function as interpersonal threats, both generally and within specific interactions.

The between-person effects suggest that experiencing colder social interactions on average may be associated with lack of belongingness and social connectedness. While experiencing social connection has been linked with mental wellness (Seppala, Rossomondo, & Doty, 2013), the lack thereof is a risk factor for mental illness symptoms (Saeri, Cruwys, Barlow, Stronge, & Sibley, 2018) including anxiety, depression, substance use, and maladaptive attitudes toward food (Richardson, Elliott, & Roberts, 2017). The reciprocal has also been shown, that mental health symptoms predicted subsequent lack of social connectedness (Saeri et al., 2018).

The within-person effects suggest that when in interactions, perceiving colder behaviors results in an increase in arousal and decreased valence. Therefore, it may be experienced as an acute interpersonal threat to belongingness when the other individual behaves in a cold way. Alternatively, the effect of affiliative behavior resulting in lower arousal and higher valence may indicate that participants felt reassured (comforted) by others behaving warmly. Indeed, research and theory points to the seriousness of social connectedness such that individuals with low social connectedness have a higher incidence of depression, generalized anxiety, suicidal ideation, cigarette smoking (Beutel et al., 2017), and a 50% higher risk for mortality (Häfner et al., 2012).

Therefore, perceiving behaviors that threaten belongingness or social connectedness may quite literally pose a threat to one's well-being and life.

Despite these interpretations that supported the theorized conceptualization of interpersonal threat, it is also possible that interactions evoked alternate states, such as guilt, shame, or anger when reporting their affect. If this is so, then it implies variations in the meaning ascribed to perceived behaviors that might contribute to different affective state (Mu & Berenbaum, 2019). This limitation is due to the affect grid only measuring higher-order affective classifications rather than discrete emotions. Therefore, a replication of the present study might utilize measures of several discrete emotions to examine whether perceiving cold interpersonal behavior does indeed contribute to the affective experience of threat (i.e., fear, anxiety) as opposed to other negatively-valenced social emotions such as guilt or shame.

Perceived Immoral Behavior Predicting Affect

Contrary to hypotheses, mean perceptions of immoral behavior marginally predicted lower arousal. This effect may reflect participants having become habituated to perceiving others' immoral behavior. Alternatively, a similar effect has been shown in participants exhibiting decreased arousal when perceiving another person's pain, if that person was judged as immoral (Cui, Ma, & Luo, 2016). The effect was theorized to differentiate instances in which it is least threatening to experience empathy for others' plight, when the person is perceived as moral. If the person is judged to be immoral, they may not be trustworthy and thus empathizing with their pain may be risky.

As hypothesized, mean perceptions of immoral behavior predicted lower valence. Perhaps these effects reflect, on average, that perceiving more immoral behavior contributed to the experience of embarrassment, compassion, boredom, humility, or melancholia (Hepach et al.,

2011). The converse of these effects is also noteworthy, such that participants may have felt joy, admiration, gratitude, or moral elevation (characterized by positive affect; Algoe & Haidt, 2009) such that being around others who engaged in moral behaviors may have contributed to the participants feeling generally uplifted.

As hypothesized, within-person increases in perceived immoral behavior predicted both higher arousal and lower valence. Taken together, these within-person effects suggest that perceiving low moral behavior is more interpersonally threatening during social interactions since they predicted higher arousal and lower valence. This fits with the conceptualization of immoral behavior functioning as threats of moral contamination. Alternatively, interacting with someone engaging in moral behavior may be reassuring which decreases arousal and increases valence.

Interestingly, the between- and within-person effects of perceived immoral behavior on arousal differed such that average perceived immoral behavior predicted marginally lower arousal whereas state perceived immoral behavior predicted increased arousal. In contrast, immoral behavior at both the between- and within-person levels predicted lower valence. Perhaps these differences may reflect that at the trait level immoral behavior may have contributed to the experience of embarrassment (low arousal and low valence; Hepach et al., 2011), whereas at the state level perceiving immoral behavior contributed to the experience of interpersonal threat. Despite these interpretations, it is again noted that the affect grid measures a higher-order categorization of emotion and does not lend itself to parsing apart specific emotions – such as fear, guilt, or shame – that participants may have experienced that resulted in similar ratings on the affect grid but arise from alternate interpretations of the same kind of behavior and result in different action tendencies once evoked.

Random Intercepts and Slopes Predicting Arousal and Valence

As hypothesized, the random effects of person-mean centered perceived dominant, cold, and immoral behavior showed significant variance across participants in predicting arousal and valence. Said differently, each participant had their own mean level of arousal and valence as well as their own pattern of fluctuations in response to perceived dominant, cold, and immoral behaviors. These findings are consistent with the literature. Each person is expected to have their own average level of affect (Schwartz & Stone, 1998; Tiede, 2019) and perceptions of behavior (e.g., Wright et al., 2017).

Generalized Anxiety Disorder Symptoms Moderating the Relationship Between Perceived Interpersonal Behaviors and Arousal

Contrary to hypotheses, GAD did not moderate any of the relationships between average perceptions of dominant, cold, or immoral behaviors predicting arousal. In addition, GAD did not moderate any of the within-person fluctuations in person-centered perceived dominant, cold, or immoral behavior predicting arousal. These results are consistent with the prior result reported earlier – the main effect of GAD symptoms did not predict arousal – but are inconsistent with the literature on GAD. The diagnostic criteria for GAD includes symptoms involving physiological arousal (e.g., feeling on edge, difficulty concentrating, muscle tension; APA, 2013). Moreover, research on GAD has frequently shown that it includes heightened physiological arousal (Ottaviani et al., 2014; Stapinski et al., 2010; Hoffman et al., 2005; Aldao, Mennin, & McLaughlin, 2013; Aldao et al., 2010). However, other studies have shown that GAD symptoms predicted lower arousal symptoms suggesting that worry functions to suppress increases in arousal (Brown, Chorpita, & Barlow, 1998). Therefore, it is surprising that the present study

found no moderating effect of GAD on the relationship between social perceptions and affective arousal.

However, there are alternate interpretations that may explain the present results. First, perhaps the arousal experienced by individuals who worry occurs largely outside of interpersonal interactions. Indeed, the DSM-5 states that individuals with GAD tend to worry more about ongoing relationships rather than negative evaluation within social interactions, thus differentiating it from social anxiety disorder (APA, 2013). Second, perhaps these results lend support to the theory that situation-specific factors are better predictors of behavior (in this case arousal) than are traits (e.g., Mischel & Shoda, 1995). For instance, perhaps GAD did not influence appraisals of others' behaviors and the resultant affect, or perhaps the three interpersonal domains assessed (dominance, affiliation, and morality) are not particularly salient to individuals with GAD symptoms with respect to their reported level of arousal. However, this is unlikely because the IPC dimensions dominance and affiliation have been shown to be trans-diagnostic, and previous research has shown that worriers report behaviors that vary in dominance and affiliation (Erickson & Newman, 2007; Erickson et al., 2016).

Third, we did not measure arousal related specifically to GAD symptoms. Instead we chose to utilize the affect grid because it is a single item measure of affect that reduces participant burden across multiple surveys. This permitted the assessment of affective arousal more generally, which was assumed to be applicable to all the participants regardless of psychiatric diagnoses. However, perhaps a measure that is targeted specifically to physiological arousal related to GAD should be used in future research. Perhaps such a measure would be more sensitive to fluctuations in arousal that is specifically related to GAD in naturalistic interactions.

For instance, Sadikaj and colleagues (2013) asked participants to rate the degree to which they responded with 12 a-priori specified behaviors during social interactions. Scott and colleagues (2017) asked participants whether they had perceived specific behaviors (i.e., rejection, criticism) and responded with specific urges or behaviors (i.e., aggressive or threatening behavior). As such, these authors' measures of affect and behaviors were more directly relevant to their target population, whereas the present study permitted participants to rate their perceptions using three Likert scales and freely indicate their affective arousal and valence on the affect grid.

Fourth, perhaps the present results provide evidence that GAD is not associated with affective arousal in interpersonal interaction, whereas another trait variable would. For instance, considering that the covariate depression showed a significant direct effect on arousal, perhaps depression is a trait variable that would moderate these relationships between social perceptions and arousal. Future research should investigate this. If findings support that, then it would add to the literature on the differential state-level effects of different types of symptoms (i.e., depressive versus anxiety).

Generalized Anxiety Disorder Symptoms Moderating the Relationship Between Perceived Interpersonal Behaviors and Valence

Contrary to hypotheses, GAD did not moderate the relationship between average perceptions of dominant behavior predicting valence. This result is inconsistent with the literature. Prior studies have shown that individuals with GAD tend to perceive others' behavior as cold and dominant (Erickson & Newman, 2007). As discussed previously, perhaps interpersonal pathoplasticity among individuals with GAD symptoms (e.g., Przeworski et al., 2011) obscured the detection of an effect of GAD symptoms with perceived dominant behavior.

Contrary to hypotheses, GAD symptoms buffered the relationship between average levels of cold behaviors and valence. While the moderating effect of GAD was significant, it was in the opposite direction from what was predicted. Participants with high GAD symptoms reported an equally low valence regardless of their average perceptions of cold (or affiliative) behaviors. In addition, participants with high GAD symptoms reported overall lower valence than did participants with low GAD symptoms. Alternatively, for participants who reported low levels of GAD symptoms, valence was negatively related to average perceptions of cold behavior, such that participants with low average perceptions of cold behavior reported higher valence than participants with high average perceptions of cold behavior. Although this effect was not hypothesized, it suggests that higher GAD symptoms were related to lower valence and no differences in valence between average affiliative versus distancing behavior. Said differently, GAD symptoms appeared to dampen the overall effect of perceiving more affiliative behaviors on valence such that these individuals do not experience increases in positive affect from associating more frequently with affiliative people. This result is consistent with research on social disconnection in that mere socializing does not necessarily meet the need for belongingness and connection, but rather that close relationships in which one can confide are more pertinent (see Seppala et al., 2013 for a review). While no studies were found that examined the relationship between social disconnection and GAD, Cruwys and colleagues (2014) found that belonging to a valued social group decreased depression symptoms over time, and to a lesser extent decreased anxiety symptoms. Perhaps the present findings suggest that individuals with GAD symptoms may too experience greater difficulties feeling connected with others, particularly if the GAD symptoms contribute to low valence regardless of how affiliative others behaved. Alternatively, this finding also supports the contrast avoidance model of GAD

(Newman & Llera, 2011). Participants with high GAD symptoms may have worried to maintain low valence as to avoid being surprised by a sudden, unexpected shift in their emotional state.

As hypothesized, GAD symptoms strengthened the relationship between average perceptions of immoral behavior and valence. Participants with high levels of GAD symptoms differed in their level of valence based on their average perceptions of immoral behavior; individuals who perceived more immoral behavior reported lower valence than individuals who perceived more moral behavior. However, participants who endorsed low levels of GAD symptoms reported low valence, regardless of how moral they perceived others' behavior on average. The individuals with lower GAD symptoms did not differ in levels of reported valence between high and low mean perceptions of immoral behavior. However, GAD symptoms contributed to being more susceptible to feeling worse when perceiving immoral behavior. Such a sensitivity to the morality of others' behavior resembles scrupulosity or may reflect the consequences of having been raised in a family in which sensitivity to moral behaviors was highly reinforced, even to the point of leading to anxiety from "overactive sensitivities" to moral concerns (Miller & Hedges, 2008, p. 1048). Indeed, comorbidity between scrupulosity OCD and GAD have been found to be just under 20% (Rasmussen, Siev, Abramovitch, & Wilhelm, 2016). Sample characteristics may have also contributed to this finding, as the participants were undergraduates from a private, religious university. Therefore, the likelihood of the worried participants having been reared with "overactive sensitivities" to moral behaviors is increased compared to a secular university or community sample.

It is noteworthy that the moderating effects of GAD with mean cold behavior differed from the moderating effect with mean immoral behavior in predicting valence. GAD symptoms appeared to blunt the positive effects of perceiving affiliative behavior whereas it strengthened

the effect of perceiving moral behavior. The non-worried participants who engaged primarily in

interactions with people whose behavior they perceived as warm reported feeling best (on

average) compared to all other non-worried participants. In contrast, worried participants who

interacted mostly with moral people reported feeling better than all the other worried

participants. These results could reflect differences in psychological needs between worried and

non-worried individuals. As worry severity increases, people may have more difficulty

experiencing relatedness and belongingness with others. In addition, high worry may include

concerns about feeling unsafe with others unless surrounded by people whom the worrier

determines to be trustworthy and a positive influence (i.e., are perceived to exhibit high moral

behavior). Another possible synthesis of these discrepant findings may be explained as a function

of intolerance of uncertainty interacting with perceived trustworthiness. Research has shown that

worriers are particularly sensitive to uncertainty and thus worry is an attempt to generate more

control (Holaway et al, 2006; Lee et al., 2010). Social interactions are replete with uncertainties

(e.g., not knowing whether a person's motives are benign or malicious), regardless of the level of

affiliativeness (or coldness) of the other person's behavior. Consequently, the individual with

GAD symptoms must navigate these uncertainties, which may result in experiencing low valence

in response to both others' affiliative and cold behaviors if the worrier is concerned the other

person's intent has negative implications for the worrier. Alternatively, appraising another

person as trustworthy (i.e., interpreting their intent as benign), based on their moral behaviors,

may increase certainty within an interaction thus increasing a sense of safety and therefore

positive affect in individuals with GAD symptoms. Then perhaps individuals with high GAD

symptoms who interacted more frequently with trustworthy people felt better than those

individuals who interacted with others low in trustworthiness. Granted, neither perceived

uncertainty nor trustworthiness were measured in the present study, therefore additional research is needed to test these interpretations.

These differing effects further justify examining moral components of GAD apart from merely the affiliative (i.e., social) components of GAD. Furthermore, the present results provide additional support that affiliation and morality are two distinct dimensions with unique functions within interpersonal interactions and may interact differently with different trait variables, like worry. Future research should further explore the relationship between morality and GAD, especially regarding moral behavior as a perpetuating factor as well as a protective factor.

Lastly, contrary to hypotheses GAD symptoms did not moderate the relationships between state fluctuations in perceived dominant, cold, or immoral behavior in predicting valence. Given the present pattern of results, GAD symptoms behaved only like an individual difference variable explaining trait differences in perceptions of others' behaviors and valence. However, GAD did not appear to influence state-level patterns of affective responses to perceived interpersonal behaviors. Perhaps the state-level changes in perceptions were not specific enough to GAD symptoms, whereas a variable like perceptions of negative contrasts (see Llera & Newman, 2010) may be more likely to be endorsed by individuals with GAD symptoms.

Implications

Clinical Implications

The present results have implications for existing interpersonal models of GAD. Although previous research has shown broadly that GAD symptoms are associated with perceptions of others as cold and dominant in a brief interaction with strangers (Erickson & Newman, 2007), the present results added nuanced and contrasting evidence by investigating

naturalistic social interactions. Firstly, the present study found no effect of GAD symptoms

predicting perceptions of dominant behavior. Second, compared to participants who endorsed

low levels of GAD symptoms, those with high levels of GAD symptoms appeared to show *more*

sensitivity to the (im)morality of others' behavior and *less* sensitivity to others' affiliative (or

distancing) behavior. As mentioned previously, the interaction with affiliation is aligned with the

contrast avoidance model (CAM) of GAD (Newman & Llera, 2011). Furthermore, the present

results might imply that perhaps negative contrasts are not experienced as equally threatening.

For instance, within the CAM framework, the risk of rejection or lack of belongingness (i.e., low

affiliation) from others appeared to be more threatening than the (im)morality of others'

behavior. Consequently, if low affiliation is considered threatening, then worrying to maintain

low valence may help the individual protect themselves from such anticipated negative

consequences, regardless if the other person's behavior is affiliative or distancing.

Clinical researchers have increasingly been integrating into GAD treatment a focus on

interpersonal behaviors (e.g., Erickson, Newman, & McGuire, 2014). Therefore, the present

results hold clinical implications for individuals with GAD symptoms as well as regarding

appraisals of interpersonal threats. Compared to those participants who perceived more overall

immoral behavior, the individuals with high GAD symptoms who perceived more instances of

moral behavior reported experiencing higher valence in social interactions. Therefore, a possible

therapeutic intervention may be to help clients with GAD symptoms practice noticing the

morality of others' behaviors. Such an intervention may consist of a mindfulness practice, such

as to mindfully notice others' benevolent intentions underlying their behaviors. Alternatively, the

intervention may be a cognitive behavioral therapy (Beck, 2011) intervention to think of

alternate adaptive thoughts when their maladaptive thoughts arise in social interactions.

For clients regardless of GAD status, when therapists are exploring a client's experience of threatening interpersonal interactions, the therapist may assess whether the perceived interpersonal behavior was predominantly submissive, cold, or immoral. Therapists may help them navigating interpersonal groups to maximize the affiliative and moral individuals they surround themselves with and decrease time spent with individuals who engage in cold and immoral behaviors. Based on the present results, the expected effects would be an increase in affective valence. Similarly, therapists may examine whether their clients behave interpersonally in ways that perpetuate cold and immoral behaviors from others during social interactions. This may contribute to the maintenance of negative affect. Additionally, perhaps social shame may be a treatment target, particularly when interacting with individuals who are perceived as more dominant that oneself. Acceptance-based strategies (e.g., Hayes, Strosahl, & Wilson, 2012) may improve perceived control and tolerance of shame within interactions with a dominant social partner.

If high-GAD individuals avoid anxiety by appraising cold, immoral, and neutral behavior instead as affiliative and moral, then therapists may help their clients by increasing acceptance of the anxiety and uncertainty that may arise from objectively appraising others' behavior as cold, immoral, or neutral. Such a pattern may necessitate identifying the underlying beliefs that keep anxiety and uncertainty so aversive. An intervention may be to help individuals with GAD symptoms improve the objectivity of their appraisals of others' interpersonal behaviors.

Therapists must simultaneously be wary of the client resorting to anxiety avoidance strategies, namely reassurance-seeking. This may be common among worriers when they disclose their worries to others, they may fail to address their core fear thus continuing to spark worry and additional reassurance-seeking. As such, an important avenue may be for therapists to

teach GAD clients how to seek social support from others that does not perpetuate experiential avoidance and maintain their worry over time.

Limitations and Future Research

There are several limitations of the present research that deserve mentioning. The present sample consisted entirely of college undergraduates, many whom were Caucasian and female. In addition, the sample was recruited from a private, religious university. These features may limit the generalizability of the present results. In addition, this may have resulted recruiting participants with a heightened sensitivity to appraisals of moral behavior. In contrast, individuals from a secular university or from the community may not show such a sensitivity to perceiving the morality of interpersonal behavior. However, prior research and theory (e.g., Goodwin et al., 2014; Pizarro et al., 2011) conceptualized the moral dimension in way that implies most people, regardless of religious affiliation, would be sensitive to the morality of interpersonal behavior. Regardless, replication of the study is warranted with other samples from different social contexts to identify differential sensitivity to the perceived morality of interpersonal behavior.

Participants completed Likert scales rating the quality of other peoples' behaviors rather than choosing concrete categories of behaviors. This was done to flexibly assess the IPC dimensions without a-priori assuming which specific behaviors participants would constitute as belonging in each category. Furthermore, the Likert scales permitted greater variance given their use as continuous – rather than categorical – predictor variables. Another limitation is that the social perceptions ratings were coarsely-grained compared to the affect grid dimensions. This may have reduced variability and suppressed effects. However, given that effects and interactions emerged among the L1 predictors, this measurement issue may not be to blame.

Notwithstanding, future research should measure social perceptions and affect ratings using the same scaling.

There were several limitations regarding the daily diary procedure that are worth noting. First, surveys asked participants to self-report on a recent interpersonal interaction, but my research team did not assess the amount of time that had elapsed between the interaction and completion of a given survey. Furthermore, there was no time-out procedure to limit survey completion times. Even though surveys were sent to participants on a consistent schedule, participants did not complete surveys according to that schedule. For instance, in some cases participants completed multiple days' worth of surveys in a single day. This was due in part because of our choice to send links to the surveys via email (or text if participants requested), which may have taken participants longer to receive than would a text message. This was a financial constraint because my team had access to Qualtrics, and we did not appropriate funding to subscribe to a mobile Ecological Momentary Assessment app or pay to have an app developed for the purposes of this study. Consequently, the data may be subjected to an unknown degree of recall bias (Singh & Björling, 2019). Furthermore, this variability in survey completion times prevented me from testing hypotheses regarding lagged time effects, as the amount of time elapsed between each survey varied considerably, both between and within participants.

One limitation to the statistical interpretation of the results is that I did not specify a relationship between arousal and valence in analyses (i.e., covariance). Instead, the two components of the affect grid were tested separately, which limits our understanding of the relationship between the two. Perhaps an alternative analytic method (e.g., structural equation modeling) may permit the simultaneous effect of social perceptions on both arousal and valence.

In addition, the hypothesized models assumed that perceptions of behavior preceded affective responses, when in fact the causal relationship may have flowed in the reverse direction. Considerable research has indeed shown that an individual's affective state influences their appraisals of a situation (e.g., Lynn, Zhang, & Barrett, 2012). As such, all the effects of daily diary variables may be interpreted in the opposite direction, in that arousal and valence predicted perceptions of dominant, cold, and immoral behavior across interactions. Therefore, future experimental research is needed to support the hypothesized effects that perceptions of behavior resulted in changes in arousal and valence.

Another limitation to the results was that some of the effect sizes fell below the suggested MDESs (see Arend & Schafer, 2019). Thus, it is possible that the present study did not have sufficient power to detect all of the hypothesized effects, resulting in possible Type II error. Furthermore, some of the present study's significant effects also fell below the MDES, thus risking Type I error. Specifically, the direct effects of GAD predicting perceived cold behavior and perceived immoral behavior were too small at the study's level of power, and thus should be interpreted with caution. Additionally, interaction effects such as GAD symptoms moderating within-person perceived cold behavior predicting arousal was not significant, and it also fell below the MDES, suggesting that the present study was underpowered to accurately detect this effect. However, most of the remaining effects exceeded the MDES, indicating that the study was sufficiently powered to test most of the hypotheses.

Strengths of the present study include a moderately large sample size ($N = 161$) and participants completed a large average number of surveys (28.16), which facilitated substantial power for detecting hypothesized effects. I used well-validated, widely-used instruments for assessing GAD symptoms and state affect. Regarding the affect grid, having participants select

their state affect on x and y coordinates – rather than selecting one of 81 boxes in a 9 x 9 grid –

permitted greater variability in the data. In addition, GAD symptom level was treated as a

continuous variable, whereas other studies with similar aims – the effects of psychopathology on

state-level interpersonal interactions – have treated a trait variable of interest as a dichotomous

variable, comparing effects between participants with and without a diagnosis (Sadikaj,

Moskowitz, Russell, Zuroff, & Paris, 2013; Scott et al., 2017; Wright et al., 2017). However, the

procedure used in the present study increased variability, therefore improving power and

maximized the generalizability of results to the entire spectrum of worriers rather than only to

individuals with or without GAD.

Conclusion

The present study expands upon the literature regarding interpersonal behaviors, state

affect, and worry. This is the first known study to conceptualize interpersonal threats according

to three interpersonal dimensions, the two existing dimensions of the interpersonal circumplex

(dominance and affiliation) and a theorized third dimension (morality). Moreover, the results

partially supported the conceptualization of IPC behaviors as interpersonal threats, namely that

cold and immoral behaviors were shown to correspond with ratings of increased arousal and

decreased valence. However, the results showed that perceiving dominant behavior predicted

lower arousal and valence, which suggests that participants may have experienced a different

emotional response, such as shame, boredom, or humility. Furthermore, this study provided

support for the independence of the affiliation and morality dimensions.

This study is one of the few to examine GAD symptoms within daily, naturalistic

interactions. As such, the present results extend the understanding of how GAD symptoms

interact with social perceptions to predict self-reported affect, and also controlled for depression

as a way to ensure that any effects were not simply to do any form of negative emotionality. However, the findings supported the predominance of situational factors in predicting state affect, as GAD symptoms showed no effect on state affect when state social perceptions were in the model. GAD symptoms did influence between-person effects of social perceptions on affective valence, but only for the affiliation and morality dimensions. GAD symptoms buffered the effect of average perceived cold behaviors on valence and strengthened the effect of average perceived immoral behaviors on valence. Overall, this study offers a novel approach to researching interpersonal behaviors associated with GAD, through conceptualizing IPC behaviors according to interpersonal threats. Furthermore, it enhances our understanding of how GAD symptoms might interact with average social perceptions to maintain symptoms over time, permitting clinicians to better target interventions toward improving worriers' quality of social support.

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APPENDIX

Table 1

Grand means, ranges, and correlations of person means between each study variable (N = 161 participants).

	Grand Mean(SD)	ICC	Scale Range	1	2	3	4	5	6	7
1 Arousal[b]	-11.12 (39.59)	.12	-96 to 96	-						
2 Valence[b]	29.53 (48.13)	.13	-95 to 96[a]	.03	-					
3 Oth Dom[d]	.28 (.90)	.13	-2 to 2	-.05	-.09	-				
4 Oth Cold[c]	-.84 (1.06)	.14	-2 to 2	.27**	-.43**	-.15	-			
5 Oth Immor[c]	-.60 (.99)	.17	-2 to 2	.06	-.43**	-.09	.63**	-		
6 GAD-Q-IV[e]	6.16 (3.02)	-	0 to 12	.08	-.07	.02	-.11	-.16*	-	
7 CES-D[f]	20.30 (5.35)	-	10 to 40	.25**	-.07	-.04	.02	-.04	.59**	-
8 Gender[g]	-	-	-	.04	.03	.01	-.08	-.03	.14[h]	.08

†p< .10; *p < .05; **p < .01; [a]This range was from a 191x192 pixel rectangle in Qualtrics. [b]4533 surveys; [c]4532 surveys; [d]4530 surveys; [e]161 participants; [f]159 participants completed the CES-D; [g]Not Female = 0 Females = 1; [h]Excluding the data of the two gender non-binary participants resulted in this correlation meeting statistical significance ($r = .17$, $p < .05$); ICC = Intraclass Correlation Coefficient.

Table 2

Frequencies of perceived interpersonal behaviors within each dimension across all surveys, out of 4,533 total surveys.

Level (Scale Rating)	Dimension		
	Dominance	Affiliation	Morality
High (1 or 2)	1,641	3,109	2,391
Neutral (0)	2,231	858	1,658
Low (-1 or 2)	658	565	483

Note: Three surveys were missing ratings for dominance, two surveys were missing ratings for affiliation, and one survey was missing for morality.

Table 3

Unstandardized and standardized regression weights, standard errors, and confidence intervals for fixed effects & random intercept of GAD symptoms predicting each L1 variable, controlling for gender and depression symptoms – grand-mean-centered predictors.

Predictor / Covariate	Outcome														
	Others' Dominant Bx			Others' Cold Bx			Others' Immoral Bx			Arousal			Valence		
	b (*SE*)	*β*	95% CI	*b* (*SE*)	*β*	95% CI	*b* (*SE*)	*β*	95% CI	*b* (*SE*)	*β*	95% CI	*b* (*SE*)	*β*	95% CI
Fixed effects															
Intercept	.29 (03)***	-	.23, .34	-.82 (.03)***	-	-.89, -.76	-.60 (.03)***	-	-.76, -.43	-11.15 (1.18)***	-	-13,48 -8.82	29.00 (1.55)***	-	25.94, 32.06
Dep Sxs	-.004 (.01)	-.03	-.02, .01	.01 (.01)†	.07	-.002, .03	.01 (.01)	.05	-.01, .03	.89 (.27)**	.12	.34, 1.43	-.25 (.36)	-.03	-.96, .47
GAD Sxs	.005 (.01)	.02	-.02, .03	-.04 (.01)*	-.10	-.06, -.01	-.03 (01)*	-.10	-.06, -.01	-.42 (.50)	-.03	-1.41, .57	.15 (.66)	.01	-1.14, 1.45
Random effects															
	σ² (*SE*)			σ² (*SE*)			σ² (*SE*)			σ² (*SE*)			σ² (*SE*)		
Random Intercept	.11 (.01)***	-	.08, .14	.15 (.02)***	-	.11, .20	.15 (.02)***	-	.12, .20	167.22 (24.79)***	-	125.05, 223.61	298.27 (42.56)***		225.50, 394.52

† p < .10; *p < .05; **p < .01; ***p < .001.

Table 4

MLM fixed unstandardized and standardized regression weights, standard error, t-values, p-values,
and confidence intervals in blocks 1 and 2 predicting arousal with GAD moderating.

Predictor / Covariate	Block									
	1					2				
	b (SE)	β	t	p	95%CI [LL, UL]	b (SE)	β	t	p	95%CI [LL, UL]
Fixed Effects										
Intercept	-3.85 (2.49)	-.01[a]	-1.57	.124	-8.76, 1.07	-3.29 (2.47)	-.02[a]	-1.33	.185	-8.17, 1.69
Dep Sxs	**.76 (.26)**	.10	-.36	.004	.24, 1.28	**.68 (.26)**	.09	2.62	.010	.17, 1.20
GAD Sxs	-.17 (.49)	-.01	2.90	.719	-1.13, .78	-1.46 (.89)	.00	-1.64	.103	-3.21, .30
MP-D	.26 (3.10)	.00	.08	.934	-5.87, 6.39	.05 (3.15)	.00	.02	.986	-6.17, 6.28
MP-C	**14.01 (3.33)**	.37	4.21	< .001	7.43, 20.58	**14.28 (3.27)**	.38	4.37	< .001	7.83, 20.74
MP-I	**-6.99 (3.30)**	-.17	-2.12	.036	-13.50, -.47	-5.72 (3.28)	-.14	-1.74	.083	-12.21, .76
PC-D	**-6.66 (.94)**	-.13	-7.06	< .001	-8.53, -4.80	**-6.67 (.95)**	-.13	-7.05	< .001	-8.54, -4.80
PC-C	**5.20 (.90)**	.12	5.76	< .001	3.42, 6.98	**5.21 (.90)**	.12	5.78	< .001	3.43, 7.00
PC-I	**2.82 (1.06)**	.06	2.66	.009	.73, 4.92	**2.84 (1.06)**	.06	2.69	.008	.75, 4.93
MP-D * GAD	-			-		-.30 (1.04)	-.02	-.29	.776	-2.34, 1.75
MP-C * GAD	-			-		-.68 (1.12)	-.05	-.61	.545	-2.96, 1.53
MP-I * GAD	-			-		-1.64 (1.00)	-.12	-1.63	.104	-3.62, .34
PC-D * GAD	-			-		-.05 (.31)	-.01	-.15	.881	-.67, .57
PC-C * GAD	-			-		.09 (.30)	-.00	.29	.774	-.51, .69
PC-I * GAD	-			-		-.37 (.36)	-.02	-1.03	.303	-1.08, .34
AIC	44932.86					44938.40				

Note: Statistically significant results are presented in **bold**. PC = person-centered; Dep = depression; GAD = Generalized Anxiety Disorder; Sxs = symptoms. MP = mean perceived; PC = person-centered; D = dominant behavior; C = cold behavior; I = immoral behavior; AIC = Akaike's Information Criterion; [a]non-significant.

Table 5

MLM fixed unstandardized and standardized regression weights, standard error, t-values, p-values, and confidence intervals in blocks 1 and 2 predicting valence with GAD moderating.

Predictor / Covariate	Block									
	1					2				
	b (SE)	*β*	*t*	*p*	95%CI [LL, UL]	*b* (SE)	*β*	*t*	*p*	95%CI [LL, UL]
Fixed Effects										
Intercept	**12.54 (2.90)**	-.01[a]	4.32	< .001	6.80, 18.28	**12.53 (2.84)**	-.01[a]	4.42	< .001	6.93, 18.13
Dep Sxs	.03 (.31)	.00	.10	.921	-.58, .64	.06 (.30)	.01	.19	.849	-.54,.65
GAD Sxs	-.79 (.57)	-.05	-1.40	.165	-1.91, .33	.33 (1.02)	-.06	.32	.748	-1.69, 2.34
MP-D	**-8.02 (3.62)**	-.15	-2.22	.028	-15.16, -.88	**-7.91 (3.61)**	-.15	-2.19	.030	-15.04, -.78
MP-C	**-12.53 (3.88)**	-.27	-3.23	.001	-20.19, -4.88	**-12.73 (3.75)**	-.27	-3.40	.001	-20.13, -5.33
MP-I	**-14.10 (3.85)**	-.29	-3.67	< .001	-21.70, -6.51	**-13.81 (3.77)**	-.29	-3.67	< .001	-21.25, -6.38
PC-D	**-5.49 (.84)**	-.09	-6.53	< .001	-7.16, -3.83	**-5.48 (.84)**	-.09	-6.48	< .001	-7.15, -3.80
PC-C	**-14.01 (.89)**	-.27	-15.82	< .001	-15.76, -12.26	**-13.99 (.88)**	-.27	-15.82	< .001	-15.73, -12.24
PC-I	**-19.42 (.94)**	-.35	-20.56	< .001	-21.29, -17.56	**-19.43 (.94)**	-.35	-20.78	< .001	-21.27, -17.58
MP-D * GAD	-	-	-	-	-	.23 (1.19)	.01	.19	.849	-2.12, 2.57
MP-C * GAD	-	-	-	-	-	**3.84 (1.28)**	.25	3.00	.003	1.31, 6.38
MP-I * GAD	-	-	-	-	-	**-3.17 (1.15)**	-.19	-2.76	.006	-5.43, -.90
PC-D * GAD	-	-	-	-	-	-.19 (.28)	-.01	-.67	.503	-.74, .37
PC-C * GAD	-	-	-	-	-	.30 (.30)	.01	1.00	.320	-.29, .88
PC-I * GAD	-	-	-	-	-	-.47 (.32)	-.03	-1.49	.139	-1.10, .16
AIC	44423.578					44421.864				

Note: Statistically significant results are presented in **bold**. PC = person-centered; Dep = depression; GAD = Generalized Anxiety Disorder; Sxs = symptoms. MP = mean perceived; PC = person-centered; D = dominant behavior; C = cold behavior; I = immoral behavior; AIC = Akaike's Information Criterion. [a]non-signitificant.