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Mania Risk is Associated with Dominance Behavior in an Interpersonal Negotiation Task

Daniel Fulford[a], Sungchoon Sinclair[a], Oliver P. John[b], & Sheri L. Johnson[a]

[a] *University of Miami, Department of Psychology, Coral Gables, FL USA*

[b] *University of California, Berkeley, Department of Psychology, Berkeley, CA USA*

Abstract

Researchers have noted strong parallels in the symptoms of mania—including grandiosity, hostility, goal-driven behavior, and overly sexualized behavior—and dominance. Drawing on these parallels, it has been hypothesized that bipolar disorder might be related to dysregulations of the dominance system, which includes dominance motivation, power, and dominance behavior. The goal of the current study was to consider whether manic tendencies related to the dominance system as measured in an ecologically valid experimental paradigm. Participants took part in small group interactions in which they negotiated merit pay for candidates seeking promotion. They completed ratings of their own and peers' dominance behaviors during the interaction. All participants also completed the Hypomanic Personality Scale to assess risk for mania, as well as scales to assess for current (hypo)mania and history of depression. Whereas history of depression was related to lower dominance motivation, mania risk was related to dominance behavior during the task, and peers rated this dominance behavior unfavorably. Findings provide a framework for understanding some of the social problems observed in bipolar disorder, with both depression history and mania risk contributing to dysregulations in the dominance system.

Keywords: Bipolar Disorder, Dominance, Power, Dominance Behavioral System, Mania Risk

Correspondence to: Sheri L. Johnson, Department of Psychology, University of California, Berkeley, 3210 Tolman Hall, Berkeley, CA 94720 USA. Email: sljohnson@berkeley.edu

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Introduction

Considerable research has established the importance of social rank systems across animal species that live within groups. These systems are also operative in humans. At the broadest level, more dominant organisms are believed to acquire access to the resources that garner the greatest reproductive success (Buss, 1981; Buss, 2004; Fournier, Moskowitz, & Zuroff, 2002). Social rank systems help regulate individual instincts for gaining dominance and, so doing, stabilize relations within a group by reducing conflicts (Wynne-Edwards, 1963).

Among humans, three aspects of the dominance system are important to distinguish: motivation, behavior, and perceptions of power. Dominance motivation has been conceptualized as the desire to attain dominant rank and leadership roles (Emmons, 1986) and has been related to motivation for extrinsic recognition (i.e., wealth and fame; Carver, Sinclair, & Johnson, 2010). People also differ in power, or the ability to influence others (Allan & Gilbert, 1995; Anderson & Berdahl, 2002; Burt, 1992; Fiske, 1993). Lastly, dominance behavior involves actions to gain power, which can include both aggressive behaviors as well as prosocial behaviors such as coalition building (Zuroff, Fournier, Patall, & Leybman, 2010).

A growing body of research has shown that psychopathology is related to dysregulation of the dominance system (for review, see Johnson, Leedom, & Muhtadie, 2012). For example, one measure of dominance motivation—the Multidimensional Personality Questionnaire Social Potency subscale (Tellegen & Waller, 2008)—correlates positively with conduct disorder (Krueger, Caspi, Moffitt, Silva, & McGee, 1996), psychopathy (Hall, Benning, & Patrick, 2004; Hicks, Markon, Patrick, Krueger, & Newman, 2004), and substance abuse (Krueger et al., 1996). These disorders have also been associated with biological markers of dominance, such as elevated testosterone, particularly during critical development periods for young males (Olweus, Mattsson, Schalling, & Löw, 1988; Tarter et al., 2007; Udry, 1990). Internalizing disorders also appear to have robust links with the dominance system. For example, high levels of submissive behavior are related to depression (Gilbert et al., 2007a; Gilbert et al., 2009; Mehrabian & Bernath, 1991; Troop & Baker, 2008; Wyatt & Gilbert, 1998), anxiety (Gilbert et al., 2009), and particularly social anxiety (Heerey & Kring, 2007; Walters & Hope, 1998). Taken together, self-report, observational and biological evidence links the dominance system with externalizing and internalizing disorders.

Of most import for the current study, the dominance system also appears conceptually relevant for bipolar disorder, defined by the presence of mania. Theoreticians over the past 50 years have noted strong parallels between manic symptoms and dominant behaviors (Gardner, 1982; Price, 1967). That is, manic symptoms include many behaviors that have been observed as correlates of power, including grandiosity, inappropriate expressions of anger, over-talkativeness, excessively goal-driven behavior, and overly sexualized behavior (Johnson & Carver, 2012). It has been argued that persons with bipolar disorder may be prone to overestimating their power, and to maintaining such cognitive distortions despite conflicting evidence (Gardner, 1982).

Studies suggest links between mania and dominance system dysregulation. More specifically, manic tendencies have been related to elevated motivation to pursue power (Johnson & Carver, 2012) and with elevated ratings of one's own status or power (Gilbert, McEwan, Hay, Irons, & Cheung, 2007). The motivation to achieve power has been consistently related to setting life goals involving extrinsic recognition (Emmons, 1986; Johnson & Carver, 2012), and accordingly, people with bipolar disorder (Johnson, Eisner, & Carver, 2009) and those at high risk set extremely high life goals for extrinsic recognition, such as achieving fame and wealth. Hence, bipolar disorder, as well as risk for mania, appears to be related to motivation to achieve power, elevated beliefs about having attained power, and life ambitions relevant to the pursuit of social rank.

Despite this growing evidence, little is known about whether mania risk is related to dominance behavior. In one study, high risk for mania, as evidenced by lifetime experiences of subsyndromal manic symptoms reported on the Hypomanic Personality Scale (HPS; Eckblad & Chapman, 1986), correlated with self-rated tendencies to engage in dominant behaviors, such as intrusively providing advice and taking on leadership roles (Johnson & Carver, 2012). High HPS scores have also been related to less willingness to take advice from others while in a positive mood state (Wade, Wigg, & Mansell, 2012).

To date, two studies have specifically examined how manic tendencies relate to observational ratings of dominance behavior. In one, 60 participants worked in pairs to construct a house out of Legos and reported on their own and their partner's traits after the task (Taylor & Mansell, 2008). Those at high risk for mania (as measured by the HPS) rated themselves as more dominating and were rated by their partners with more high-intensity positive terms (e.g., ambitious, talented, vivacious) than those not at risk. In the other study, participants engaged in an interview task, which was later coded for the proportion of conversation dominated by the participant (Dodd, Mansell, Beck, & Tai, 2013). Those at high risk for mania were rated as more dominating of the conversation during the interview than those low in risk. The goal of the current study was to consider whether mania risk would be related to dominance behavior using a previously established, ecologically valid paradigm that would more readily elicit interpersonal competition.

To do so, participants took part in a small group negotiation task called the Compensation Committee Task, in which people were asked to represent a candidate's case for a bonus (John & Robins, 1994). Participants completed ratings of their own and peers' dominance behaviors during the interaction.

In considering links of mania and the dominance system, it is worth noting one methodological issue. While clinical studies undoubtedly have advantages, the repeated experiences of bipolar disorder can have profound implications for social rank, as people often experience hospitalizations, unemployment, and even bankruptcy and legal issues as a consequence of their illness. These highly stigmatizing experiences would be expected to deeply influence motivations to regain power, beliefs about power, and behaviors designed to restore power losses. As such, it will be difficult to determine whether disruptions to the dominance system observed within clinically diagnosed samples represent vulnerability characteristics or the aftermath of difficult life experiences. In this study, then, we chose to study the dominance system among a population with varying risk for the disorder as assessed using the HPS, rather than a diagnosed sample.

In the current study we hoped to examine the impact of the dominance profile, including observable behavior, on interpersonal functioning among individuals at risk for mania. Our primary hypothesis was that risk for mania would be related to greater engagement in dominance behaviors, such that HPS scores would be correlated with speaking duration and peer ratings of dominance during the group interaction. Our secondary hypothesis was that, consistent with previously observed correlations between the HPS and dominance motivation variables, general dominance motivation, life ambitions relevant to status, and perceived power would be associated with mania risk

within this sample. We planned to test these hypotheses while controlling for potential confounds of mood symptoms to rule out state-dependent effects.

Method

Participants

One hundred undergraduate students (55% female) participated in the current study in exchange for partial credit in an Introduction to Psychology class. The average age of participants was 19.45 years (*SD* = 3.98). The ethnicity of participants was 49.1% Caucasian/White, 30.9% Hispanic/Latino, 9.1% Asian or Pacific Islander, 3.6% Black or African American, and 7.3% other ethnicity. There were a total of 27 small group interactions consisting of 3 to 6 members.

Procedure

The Institutional Review Board approved all study procedures. Upon participants' arrival to the laboratory, a trained research assistant guided them to a room equipped with a round table with two discreetly positioned digital video cameras. Cameras and recorders were controlled in a separate room for later behavioral and verbal coding. The research assistant randomly assigned participants to their seats at the table. After completion of written informed consent procedures, the research assistant described the study as examining individual decision-making processes within a group interaction. Each participant was asked to wear a tag with a unique shape, which was then used for identification throughout data coding. Participants completed baseline ratings related to the group interaction, engaged in the Compensation Committee Task, completed post-task ratings of the group interaction, and then completed self-report questionnaires.

Measures

Descriptive statistics for all measures, including internal consistency alpha coefficients, are presented in Table 1. Participants completed measures relevant to the dominance system, mania risk, and to potential confounds such as demographic and symptom severity variables.

The Compensation Committee Task (CCT; John & Robins, 1994).

The CCT is a group discussion task simulating a company's compensation committee. In the current study, the status of all participants was equal (i.e., no leader was assigned). Each participant was provided with a written summary of one candidate for a merit bonus, entailing biographical information, employment background, salary, and appraisals of prior job performance. Each participant was instructed to present their own candidate's case at the committee meeting. We instructed participants to focus on achieving three goals during the task: 1) Distribute $25,000 among the fictional candidates in a way that is fair and in the best interest of the company; 2) negotiate a bonus that is as high as possible for your candidate; and 3) complete the task within a specified period of time (3 minutes for each participant, with an additional two minutes for closing the discussion).

Self and Peer Evaluations of Dominance.

After the CCT, participants completed self and peer evaluations of dominance behaviors in relation to the task. In line with interpersonal circumplex theory (Wiggins, 2003), we generated warm (positive) and hostile (negative) dominance adjectives to capture the self-perception of dominance as well as others' perceptions of dominance within the task setting. Positive dominance adjectives consisted of the following: successful, active, accomplished, strong, productive, confident, and achieving. Negative dominance adjectives consisted of the following: pompous, egotistical, smug, snobby, arrogant, dominant, and stuck-up.

Observer-Based Measure of Dominance.

Drawing on Henley's (1977, 1995) theory of vertical representation of dominance, status and power, we included speaking duration as it has achieved strong empirical support as an observed index of social rank (Knapp & Hall, 2005; for a review, see Mast, 2002). Ratings using a stopwatch were made by trained research assistants who reviewed videotapes of the CCT and took place only after research assistants had achieved high inter-rater reliability (above .80). An independent coder rated a subsample of participants. We achieved high interrater reliability (r = .83, n = 15).

Hypomanic Personality Scale (HPS; Eckblad & Chapman, 1986).

The HPS is a self-report questionnaire designed to capture risk for mania. The scale contains 48 true-false items that assess energy, emotions, and social behavior (e.g., "I often get so happy and energetic that I am almost giddy"; "I often feel excited and happy for no apparent reason"; "I am so good at controlling others that it sometimes scares me"). In the validation study (Eckblad & Chapman, 1986), 81% of people who scored more than two standard deviations above the mean met diagnostic criteria for a bipolar spectrum disorder. In a 13-year longitudinal study, 75% of high scorers on the HPS experienced hypomanic or manic episodes within the follow-up period (Kwapil et al. 2000). The HPS has been shown high test-retest reliability (α = .81) over 15 weeks (Eckblad & Chapman, 1986).

Altman Self-Rating Mania Scale (ASRM; Altman, Hedeker, Peterson, & Davis, 1997).

The ASRM is a 5-item scale designed to capture current symptoms of mania (i.e., elated mood, increased self-esteem, less need for sleep, pressured speech, and psychomotor agitation). This self-report scale has been shown to be highly correlated (r = .61) with the Clinician-Administered Rating Scale for Mania (Altman, Hedeker, Peterson, & Davis, 2001) and to have good test-retest reliability (α = .79; Altman et al., 1997).

Inventory to Diagnose Depression-Lifetime (IDD-L; Zimmerman & Coryell, 1987).

The IDD-L was used to capture lifetime depression history. In this 22-item self-report measure, participants are asked to recall a time in their life when they felt the most depressed and answer questions regarding symptoms during that time (including if they lasted for at least two weeks). The measure has displayed high internal consistency (α = .92; Zimmerman & Coryell, 1987) and has high agreement with the Diagnostic Interview Schedule for lifetime depression (DIS; Robins, Helzer, Croughan & Ratcliff, 1981).

Willingly Approached Set of Statistically Unlikely Pursuits – Popular fame subscale (WASSUP; Johnson & Carver, 2006).

The WASSUP is a self-report scale designed to capture a tendency to set unrealistically high goals (e.g., "You will have a million dollars or more", "Celebrities will want to be your friends"). Participants are asked to respond to each item on a scale ranging from 1 ("No chance I will set this goal for myself") to 4 ("I definitely will set this goal for myself"). Two subscales, Popular Fame and Financial, were designed to capture the pursuit of extrinsic recognition, and those two subscales have been found to correlate with measures of dominance motivation (Johnson & Carver, 2012). These two scales have been shown to be elevated in people with bipolar disorder (Johnson, Carver, & Gotlib, 2012; Johnson, Eisner, & Carver, 2009) and people at risk for mania (Fulford, Johnson, & Carver, 2008; Gruber & Johnson, 2009; Johnson & Fulford, 2009). In the validation study (Johnson & Carver, 2006), these subscales achieved adequate internal consistency (alpha): Popular Fame (7 items) = .88 and Financial (4 items) = .73. Although we administered both subscales in the current study, the Financial subscale was not well endorsed by females. Thus, we only included the Popular Fame subscale in our analyses.

Personality Research Form – Dominance scale (PRF-D; Jackson, 1974).

The PRF-D is a widely used measure of dominance motivation (Moneta & Wong, 2001), incorporating 16 true-false items regarding a desire for leadership roles, comfort with leadership, and behaviors designed to attain leadership (Jackson, 1974). The scale has previously exhibited excellent reliability (α = .91) (Gramer & Berner, 2005).

Sense of Power Scale (SPS: Anderson, John, & Keltner, 2012).

The SPS is an 8-item self-report scale designed to assess self-perceptions of power (social rank). Sample items include “I can get people to listen to what I say,” and “If I want to, I get to make decisions.” Participants rate each item on a scale ranging from 1 (“Disagree Strongly”) to 7 (“Agree Strongly”). In previous research (Anderson, John, & Keltner, 2012), the scale achieved strong internal consistency (α = .88). The scale has also been found to correlate with related measures of power (Anderson & Galinsky, 2006).

Statistical Analyses

We first examined the normality of the distributions of variables. Speaking duration was Winsorized (i.e., set to 5% above the next highest value) to address two high scoring outliers who were more than two standard deviations above the mean (Hasings, Mosteller, Tukey, & Winsor, 1947). Winsorizing effectively reduced the positive skew for each variable. The adjective ratings of negative dominance were positively skewed and so were transformed by calculating their square root. After transformations, all variables exhibited acceptable skew and kurtosis levels. Descriptive statistics for each measure are shown in Table 1.

Table 1. Descriptive Statistics for Key Study Variables (N = 100)

	Min	Max	*M*	*SD*	α
Mania Risk and Symptom Confounds					
Hypomanic Personality Scale (HPS)	2.00	44.00	20.17	7.99	.91
Altman Self-Rating Mania scale (ASRM)	5.00	21.00	12.35	3.95	.75
Inventory to Diagnose Depression - Lifetime (IDD-L)	.00	9.00	3.22	3.03	.90
Dominance Motivation					
Personality Research Form - Dominance	4.00	15.00	9.90	2.99	.65
WASSUP Popular Fame	7.00	31.00	14.39	6.20	.87
WASSUP Financial	4.00	19.00	10.36	3.94	.73
Power					
Sense of Power Scale (SPS)*	3.38	6.63	5.05	.76	.71
Dominance Behavior					
Negative Dominance					
Peers	1.05	3.05	1.55	.44	.86
Self	1.00	3.14	1.49	.47	.75
Positive Dominance					
Peers	1.57	4.71	2.93	.59	.91
Self	1.14	5.00	3.11	.85	.91
Speaking Duration (seconds)	35	408	155.64	80.29	-

WASSUP = Willingly Approached Set of Statistically Unlikely Pursuits

*n = 89

We then examined the degree to which interaction groups influenced behavioral scores, using multilevel modeling to estimate the intraclass correlation coefficient (*ICC*) associated with interaction group for the behavioral variables (i.e., speaking duration, and dominance adjective ratings). ICCs for these variables were low (r's < .10), so analyses were conducted using linear, non-nested models.

Results

Preliminary Analyses

Consistent with previous research (see Johnson, Leedom, & Muhtadie, 2012), dominance measures were moderately intercorrelated, with dominance motivation, power, and dominance behavior being relatively independent. Both self and peer ratings of dominance behavior were significantly positively correlated with the observed dominance behavior variable: speaking duration (r's = .26 to .52, p's < .01). Peer ratings of negative dominance behavior were associated with peer ratings of positive dominance behavior (r = .41, p < .01). In addition, participants' ratings of their own positive and negative dominance behaviors during the interaction were significantly correlated with peers' ratings of these behaviors (r's = .27 - .47, all p's < .01).

Measures of dominance motivation showed some expected correlations with ambition for extrinsic recognition, as the WASSUP Popular fame scale was significantly positively correlated with the PRF-D (r = .26, p < .01). Behavioral measures also showed some expected correlations. The WASSUP Popular fame sale was correlated with self ratings of *negative* dominance behavior (r = .36, p < .05), while the PRF-D was significantly correlated with self (r = .29, p < .01) and peer (r = .24, p < .05) ratings of *positive* dominance behavior. The measure of self perceptions of power, the SPS, was unrelated to dominance motivation and behavior variables.

There were no mean differences between men and women in dominance behavior variables (i.e., speaking duration or peer and self ratings of dominance). Thus, gender was not included in the multivariate models below.

Before testing primary hypotheses, we conducted analyses to examine whether current symptoms of mania or depression history would confound proposed correlations between the HPS and dominance variables. Dominance variables we hypothesized to be related to the HPS were not associated with mania or depression history. Rather, depression history (IDD-L) was related to diminished dominance motivation (PRF-D; r = -.24, p < .05). Current mania symptoms (ASRM) were related to higher self-ratings of positive dominance during the group interaction (r = .26, p < .05).

Does Mania Risk Correlate with Dominance Behavior, Dominance Motivation, and Power?

Our primary hypothesis was that mania risk (HPS) would be associated with dominance behavior, including speaking duration and peer ratings of dominance during the interaction. HPS scores were significantly correlated with peer ratings of negative, but not positive, dominance during the interaction. The HPS was unrelated to our observed dominance behavior variable, speaking duration during the interaction (see Table 2). In a multivariate hierarchical regression model, peer ratings of negative dominance behavior remained a significant predictor of HPS after controlling for peer ratings of positive dominance behavior and speaking duration (see Table 3).

We also wanted to test whether those high in HPS were perceived by their peers as more negatively dominant than would be expected on the basis of their own perception of their negative dominance behavior. To do so, we conducted a hierarchical regression model with both peer and self ratings of negative dominance as predictors of HPS scores. Findings revealed that peer ratings of negative dominance remained a significant predictor of HPS scores after controlling for one's self-ratings of negative dominance (β = .23, p < .05).

The HPS was significantly correlated with dominance motivation as measured by the WASSUP Popular fame scale, but not dominance motivation as measured by the PRF-D. The HPS was also correlated with self-perceptions of power (SPS).

Table 2: Correlations among HPS and Dominance Measures (N = 100)

	Mania Risk	Symptom Control Variables	
	HPS	**ASRM**	**IDD-L**
Dominance Motivation			
PRF-D	.11	.15	-.24*
WASSUP Popular Fame	.24*	.19	-.10
Power			
SPS	.24*	.20	.14
Dominance Behavior			
Speaking Duration	.15	.14	-.09
Positive Dominance (Peers)	.07	-.02	-.10
Negative Dominance (Peers)	.25*	.03	-.04

*$p < .05$

Note. n = 89 for SPS

ASRM = Altman Self-Rating Mania Scale; HPS = Hypomanic Personality Scale; IDD-L = Inventory to Diagnose Depression – Lifetime; Negative Dominance (Peers) = Peer ratings of negative dominance behaviors during the interaction; Positive Dominance (Peers) = Peer ratings of positive dominance behaviors during the interaction; PRF-D = Personality Research Form – Dominance scale; Speaking Duration = Time (in seconds) spent speaking during the interaction; SPS = Sense of Power Scale; WASSUP = Willingly Approached Set of Statistically Unlikely Pursuits

Table 3: Hierarchical Multiple Regression of Dominance Behavior Variables as Predictors of Mania Risk (Hypomanic Personality Scale) (N = 100)

	b	***SE***	***t***	***p***	ΔR^2
(Constant)	6.51	6.52	0.99	0.32	-
Speaking Duration	0.00	0.01	0.32	0.75	-
Positive Dominance (Peers)	-0.64	1.48	-0.44	0.66	-
Negative Dominance (Peers)	12.13*	5.84	2.08	0.04	.04*

*$p < .05$

Note. Final model statistics reported.

Negative Dominance (Peers) = Peer ratings of negative dominance behaviors during the interaction; Positive Dominance (Peers) = Peer ratings of positive dominance behaviors during the interaction

Discussion

The primary goal of the current study was to examine the relationship between risk for mania and dominance behavior. Using a well-validated paradigm, current findings indicate that persons at risk for mania were more likely to engage in behavior rated as negatively dominant by their peers. Findings also replicated previous research in demonstrating that mania risk is correlated with heightened dominance motivation, including ambitions for extrinsic recognition (e.g., fame) and perceptions of power. This is one of the first studies to show that the dominance profile of mania risk may trigger interpersonal difficulties.

Hence, people at risk for mania evidence a profile of self-professed pursuit of power and success in obtaining power, but their behavior and self-perceptions contrast with negative peer ratings. In addition, our findings showed that mania risk was associated with peer ratings of negative dominance even after accounting for ratings of one's own perceptions of their negative dominance behavior. This finding suggests that those at risk for mania were perceived by their peers as more negatively dominant than would be expected on the basis of their self-perception of dominance behavior.

The overall profile of dominance behavior variables relevant to mania did not appear to be an artifact of current manic symptoms or previous depression. Nonetheless, depression and manic symptoms both were related to

distinct disruptions in dominance. That is, those with a history of depression reported less motivation to achieve dominance (PRF-D). This finding extends previous research that has shown that depression may be related to perceptions of powerlessness and to submissive behaviors (Gilbert et al., 2007a; Gilbert et al., 2009; Malatynska & Knapp, 2005; Mehrabian & Bernath, 1991; Troop & Baker, 2008; Wyatt & Gilbert, 1998). Although not tested in the current study, one potential extension of this finding for bipolar disorder is that persons with a history of mania and depression exhibit tendencies both towards and away from dominance, which may be driven by mood-dependent self-appraisals (see Mansell, Morrison, Reid, Lowens, & Tai, 2007). For example, Mansell and Lam (2006) found that people with bipolar disorder accepted more advice than depressed and non-clinical controls, but only while in a negative mood state; during a positive mood state, they took less advice. In another study, the interaction of both high positive and high negative cognitive appraisals during an activated mood state discriminated bipolar disorder from unipolar depression and healthy controls (Kelly et al., 2011).

Current manic symptoms, as measured by the ASRM, were related to self-perceptions of engaging in more positive dominance behavior, but others did not share this perception. This finding suggests that one aspect of the overconfidence perceived during hypomanic periods may extend to over-estimations of one's ability to successfully interact in small groups.

There are important limitations of the current study. First, findings are limited by the reliance on an analog measure of manic risk. Although it is surprising that even modest risk for mania can exert detectable influences on social behaviors and motivations, it is unclear how these findings might generalize to individuals with diagnosed bipolar I disorder. Of particular concern, we do not know whether elevations of dominance motivation or self-perceived power would be sustained across repeated experiences of episodes, hospitalizations, and other social impairments that frequently co-occur with the disorder. Research has suggested that people with bipolar disorder continue to endorse having higher social rank (Gilbert et al., 2007b) as well as setting goals of attaining higher social rank across multiple episodes and hospitalizations (Johnson & Carver, 2012), but few other aspects of dominance have been studied in diagnosed samples.

In addition, although research indicates that the expressions of dominance motivation may differ among women compared to men (Lippa, 1995; Pratto, Stallworth, Sidanius, & Siers, 1997; Sidanius, Pratto, & Bobo, 1994; Whitley, 1999), we did not aim to detect gender effects in the current study. Although gender did not appreciably affect the current findings, the possibility of such effects will need to be examined in future (larger) samples.

The current study is also limited in scope and fails to provide information about the role of current depression. It seems likely that dysregulation in facets of dominance (e.g., overinvestment in the pursuit of social rank) observed among those prone to mania could increase risk of depression. Indeed, placing importance on social recognition has been found to relate to depression in nonclinical samples (Kasser & Ryan, 1996; Ryan, Chirkov, Little, & Sheldon, 1999). In addition, previous animal and human evidence suggests that social defeat and humiliation are linked with depressive symptoms, including loss of appetite, sleep, diminished exploration, and diminished (sucrose) reward sensitivity (see Arregi, Azpiroz, Fano, & Garmendia, 2006 for a comprehensive review). Gilbert et al. (2007b) have shown that perceptions of social rank within bipolar disorder are diminished in the context of depressive symptoms. A particular need, then, is to understand the bi-directional links between depression and dominance behavior within bipolar disorder.

Despite limitations of the current study, findings do suggest the merits of considering links between dysregulation of dominance behavior and mania. One important future goal will be to consider biological bases of these links. Both bipolar disorder and dominance behavior have been related to dopaminergic activity. Several studies suggest that bipolar disorder is related to sensitization of dopamine receptors (Anand et al., 2011; Berk et al., 2007; Cousins, Butts, & Young, 2009), and that manic symptoms can be triggered by drugs that increase dopamine levels (Gerner, Post, & Bunney, 1976; Swann, Dougherty, Pazzaglia, Pham, & Moeller, 2004). Theories of bipolar disorder have placed particular emphasis on dopamine levels within the nucleus accumbens (Anand et al., 2011). Social defeat and dominance have also been related to dopamine levels within the nucleus accumbens. Among rodents, social defeat decreases dopamine activity (Haney, Noda, Kream, & Miczek, 1990). Conversely, both exposure to a dominant male (Tidey & Miczek, 1996) and winning a fight (Kudryavtseva, 2000) increase dopamine activity in the nucleus accumbens. Intriguingly, testosterone can amplify activity of the nucleus accumbens (Hermans et al.,

2010). Hence, an important goal for future research is to conjointly consider biological and behavioral indices of dominance in relation to mania risk.

Some of the difficulties associated with the pursuit of power and extrinsic recognition should be noted. For example, among individuals with bipolar I disorder, setting highly ambitious life goals relevant to social rank has also been found to predict a more severe course of manic symptoms (Johnson, Carver, & Gotlib, 2012). This form of heightened dominance motivation has also been shown to predict the onset of bipolar disorder among an at-risk sample (Alloy et al., 2012). Thus, assisting individuals with bipolar disorder in identifying when they are setting overly ambitious goals may help improve outcomes. Indeed, a small open pilot trial addressing goal regulation among individuals with bipolar I disorder showed decreases in both overly ambitious goal-setting and manic symptoms (Johnson & Fulford, 2009).

Another goal will be to extend our understanding of how dysregulation of dominance behavior might help explain some of the social difficulties that are observed in bipolar disorder. Indeed, people with bipolar disorder often report that quality of life and social functioning are more important outcomes than symptom relief (IsHak, et al., 2012), and all too commonly, people with this disorder report feeling isolated and experiencing fractures in core relationships (Blairy et al., 2004; Elgie & Morselli, 2007; Romans & McPherson, 1992). Building on the findings of the current study, it would be important to consider whether unchecked desires for power, along with difficulties adaptively expressing these desires, could help explain some social conflicts. In considering the profile here, it is important to note that dominance motivation and perceptions of power have been related to adverse outcomes such as marital conflict and decline in peer relationships (Anderson, Srivastava, Beer, Spataro, & Chatman, 2006; Paulhus, 1998), but when expressed adaptively, have also been related to prosocial outcomes (Hawley, 1999), including success in leadership roles (Zuroff et al. 2010). The finding that mania risk may be associated with dominance behaviors perceived negatively by others speaks to the potential importance of intervening in these behaviors early on to shape more positive, prosocial outcomes.

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