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S Y M P O S I U M

MANIA RISK AND ENTREPRENEURSHIP: OVERLAPPING PERSONALITY TRAITS

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The goal of this paper is to briefly review extant findings on bipolar disorder and entrepreneurship, and then to develop a model of personality traits that might link mania risk with entrepreneurial intent and entry. Findings from a large set of cross-sectional and longitudinal studies indicate that people diagnosed with bipolar disorder, as well as those with subsyndromal forms, show personality traits such as high ambition, confidence, and positive affectivity, even during well periods. Intriguingly, a parallel, distinct literature documents that these same personality traits are related to greater likelihood of becoming an entrepreneur and of succeeding as an entrepreneur. We will describe research on whether mania risk is linked to entrepreneurial intent, entry, and income, drawing on findings from two small surveys and one epidemiological study. As those findings regarding the link between mania risk and entrepreneurship are mixed, we present a model in which some specific personality traits tied to mania risk might also be related to entrepreneurial intent and entry. In a small study, we find support for key personality traits that overlap. We discuss implications of these findings and some key issues not considered in this study, and suggest directions for future research.

Bipolar disorder, defined on the basis of manic episodes, is an enigma. On one hand, this disorder is the single psychiatric condition most tied to suicide (Nordentoft, Mortensen, & Pedersen, 2011). More than half of those diagnosed are unemployed (Hirschfeld, Lewis, & Vornik, 2003), and during the year of an episode, the disorder is related to an average of 65 days of work lost per worker (Kessler et al., 2006). On the other hand, research using both clinical and community-based samples suggests that milder forms of this disorder and family history of this disorder are tied to individual accomplishment in scientific and creativity domains (see Johnson, 2005, for review). Given the strong evidence that creativity and accomplishment are intricately tied to both bipolar disorder and entrepreneurship (Jamison, 2005), many authors have suggested that manic tendencies could provide an advantage for entrepreneurs.

Beyond the academic research, a broad range of popular writing and media coverage has suggested that bipolar disorder might be tied to entrepreneurship. Much of the available writing on this topic relies on case studies (Gartner, 2005; Ghaemi, 2011; Whybrow, 2006). As one example, authors have focused on Andrew Carnegie. Certainly, Carnegie showed remarkable entrepreneurial skill. He guided the North's railroad strategy through the Civil War and was put in charge of the War Department's telegraph office, where he worked with President Abraham Lincoln. After the war Carnegie borrowed $500 to start a railroad and civil engineering empire that ultimately led him to build innovative steel mills, sell steel to the railroads, and become the

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wealthiest man in the world. Historical data suggest that Andrew Carnegie had at least some manic symptoms; for example, he required little sleep. Toward the end of his life, Carnegie crusaded to bring democracy and everlasting peace to the world, tried to start a secular religion based on Darwinism, and gave away his fortune. He considered himself to be the high priest of a civil religion, wrote eight books including *Triumphant Democracy*, and wanted to lead civilization's progress at the dawn of the 20th century, building 2,811 libraries in the process. He was known for sending world leaders unsolicited advice, and he became deeply depressed after World War I proved that his ambition and accomplishments were insufficient to realize his utopian dreams (Gartner, 2005).

While the case studies are intriguing, it is important to consider whether bipolar disorder is systematically tied to entrepreneurial intent, entry, or outcome. The goal of this paper is to summarize the extant empirical data about this idea, provide a model and a small test of that model, and discuss potential directions for future research in this area.

DEFINITIONS OF BIPOLAR DISORDER AND MANIA RISK

Before considering relevant research, it is important to note that there are many different levels of bipolar diagnoses, collectively referred to as bipolar spectrum conditions, and well-established methods for studying those at risk for bipolar disorder. The diagnostic system of the American Psychiatric Association (APA, 2006) provides criteria for bipolar I disorder, bipolar II disorder, and cyclothymic disorder. Bipolar I disorder is diagnosed on the basis of a single lifetime episode of mania. Mania, in turn, is defined by symptoms of excessively high or irritable mood, accompanied by increased energy, and at least three other symptoms such as extremely high confidence, lack of need for sleep, talkativeness, racing thoughts, and engagement in high-risk pleasurable activities without attention to potential negative consequences. To meet diagnostic criteria for mania, a person must experience these symptoms for at least a week or reach a level of severity that would mandate hospitalization; the symptoms must also create significant functional impairment. Bipolar II disorder is defined by episodes of hypomania as well as depressive episodes. Hypomania is defined by the presence of the same symptoms as mania, but the symptoms need last only four days, and rather than causing functional impairment result in a distinct change in behavior. Cyclothymic disorder is defined by alternations between manic and depressive symptoms that do not meet the full threshold for episodes; mood symptoms must be present at least 50% of the time for two years (or one year in youth). All of these bipolar spectrum conditions are considered to be lifelong diagnoses, as manic symptoms are highly recurrent.

Beyond diagnoses, a large literature has focused on persons at risk for bipolar disorder. Because the heritability of bipolar disorder is estimated to be as high as 85% (McGuffin et al., 2003), family history of bipolar disorder among those unaffected by manic symptoms is one indicator of risk. Another common research approach is to consider those who report lifetime patterns of mild manic symptoms that do not surpass diagnostic thresholds, including elevations of positive mood, energy, and talkativeness. This is most commonly measured with a self-report scale such as the Temperament Evaluation of Memphis, Pisa, Paris, and San Diego Autoquestionnaire (TEMPS-A; Akiskal, Mendlowicz, et al., 2005), the General Behavior Inventory (GBI; Depue & Klein, 1988), or the Hypomanic Personality Scale (HPS; Eckblad & Chapman, 1986), which have been found to have at least some predictive validity for the onset of the disorder. In this paper, we use the term *mania risk* to refer to those who have not been diagnosed with bipolar disorder but who show either high scores on measures of subsyndromal manic tendencies such as the TEMPS-A, GBI, or HPS, or who have a family history of bipolar disorder.

LINKS OF BIPOLAR DISORDER AND MANIA RISK WITH CREATIVITY AND ACCOMPLISHMENT

Across a range of epidemiological studies, bipolar disorder has been found to be more common among those with higher compared to lower socioeconomic status (Johnson, 2005). In considering specific facets of accomplishment related to bipolar disorder, the domain of creativity has the most attention. Individuals diagnosed with bipolar disorder, their first-degree relatives, and those with subsyndromal manic symptoms are significantly overrepresented in creative professions (Johnson, Murray, et al., 2012). This link has been supported across a broad range of measures of creativity. Perhaps the most important analyses are those conducted in a Swedish national cohort dataset ($n = 300{,}000$) in which both those with bipolar disorder and their unaffected family members were found to be overrepresented in

creative occupations (Kyaga et al., 2011). In a larger analysis of the Swedish data incorporating more than one million people, of 11 mental health conditions examined, bipolar disorder was the only diagnosis positively associated with engagement in a broad range of creative professions (Kyaga et al., 2013). These findings are bolstered by findings of another community-based epidemiological study that found that those with bipolar disorder were engaged in occupations that were rated on average as more creative than the occupations of those without bipolar disorder (Tremblay, Grosskopf, & Yang, 2010).

There is some evidence for an inverse U-shaped curve in which milder levels of bipolar tendencies provide an advantage compared to the general population, whereas more severe levels are less tied to heightened creative accomplishment. That is, stronger creativity effects have emerged in studies of those at risk for bipolar disorder, by virtue of subsyndromal manic symptoms or family history, than among those diagnosed with severe forms of the disorder (see Johnson, Murray, et al., 2012 for review; Akiskal & Akiskal, 1994; Richards, Kinney, Lunde, Benet, & Merzel, 1988). Even more so than those diagnosed with bipolar disorder, the unaffected family members of those diagnosed with bipolar disorder were overrepresented among those engaged in creative occupations in the cohort study described above of more than 300,000 individuals (Kyaga et al., 2011). Similarly, family members of those with bipolar disorder, but not those diagnosed with bipolar disorder, appear to be overrepresented among executive professions (Kyaga, Lichtenstein, Boman, & Landén, 2015). The findings on creativity are consistent with broader findings that relatives of those diagnosed with bipolar disorder often achieve high levels of accomplishment compared to the general population (Andreasen & Glick, 1988; Coryell et al., 1989; Johnson, 2005).

Why might elevations of accomplishment and creativity be more consistently observed in those at risk for the disorder compared to those diagnosed with the disorder? One possible explanation for this is that there is considerable variability in the outcomes of those with more severe forms of the disorder. Consistent with this idea, in a Swedish national cohort study, very high academic performance as well as very low performance during adolescence predicted the onset of bipolar disorder over the next nine years (MacCabe et al., 2010). Those with bipolar disorder have been shown to be more likely to be rated as extremely high or extremely low in military officer suitability than the general population (Kyaga, Lichtenstein, Boman, & Landén, 2015). Research has also shown that those with bipolar disorder demonstrate more variability in their lifetime levels of creative accomplishment than do those without bipolar disorder (Johnson, Tharp, & Holmes, 2015).

In sum, those who are at risk for bipolar disorder tend to show higher mean levels of accomplishment and creativity. Those who are diagnosed with bipolar disorder tend to show more varied accomplishment, leadership skills, and creativity, with some achieving incredible heights and others struggling. This variability may help explain why some with bipolar disorder are the focus of case reports and other widely noted examples of exceptional success. Researchers have now begun to try to understand both the mean elevations and the variability in outcomes. In the quest to understand these outcomes, personality traits that are often observed for those with bipolar disorder as well as those at risk for mania have been shown to be highly relevant (see Johnson, Edge, et al., 2012 for review).

LINKS OF BIPOLAR DISORDER AND MANIA RISK WITH ENTREPRENEURSHIP: EMPIRICAL FINDINGS

Given the accomplishment and creativity that are observed in those at high risk for mania, it is reasonable to consider whether these tendencies could provide advantages for entrepreneurship. Despite the series of case reports (cf. Gartner, 2005; Ghaemi, 2011; Whybrow, 2006), little empirical work is available on links of entrepreneurship with bipolar disorder.

In one study, researchers compared outpatients who were business founders ($n = 48$), executives in companies they did not start ($n = 35$), and professionals engaged in careers such as law, medicine, architecture, art, or journalism ($n = 150$) on tendencies toward elevated manic symptoms such as high mood and energy. High scores on the mania risk measure were noted in 61% of the business founders, 43% of the employed executives, and only 20% of the other professionals (Akiskal, Savino, & Akiskal, 2005).

In contrast, in a recent paper, we found no significant correlations of elevation of manic symptoms or family history with entrepreneurial intent or status. In addition, mania risk (HPS scores) correlated with modestly higher corporate growth, but was not tied to other indices of entrepreneurial success (Johnson, Freeman, & Staudenmaier, 2015a). Findings, then, are mixed across these two small studies.

Only one study has examined bipolar characteristics and entrepreneurship in a large sample. In a community-based study of entrepreneurship, researchers examined lithium prescriptions for 3,361,472 people who had been employed or enrolled as university students in Denmark between 1995 and 2010 (Biasi, Dahl, & Moser, 2015). It is worth noting that this study excluded those who were not in the workforce or engaged as students, which is likely a significant source of bias given the high rates of unemployment in bipolar disorder. It also relied on lithium prescriptions rather than diagnosis. Although many people diagnosed with bipolar disorder do not seek treatment, among those who do, lithium is the first-line recommended treatment in the APA and other national treatment guidelines (APA, 2006). With these caveats in mind, the findings did provide support for links of lithium use with entrepreneurship. People (n = 12,936) who had been prescribed lithium at least once in their lives were more likely (6.5%) than those in the general population (6%) to become self-employed, and they were more likely to incorporate (8% versus 6%). Despite this, there was also a relatively lower average degree of success within occupational roles for those who had been prescribed lithium: Those who had taken lithium were less likely to become executives, and regardless of their employment situation, they earned an average of 46% less than did the general population. Consistent with the idea that family history of bipolar disorder may relate to success, the siblings of those treated with lithium earned 61% more money than did those affected with the illness, placing their incomes above normative levels. These findings, then, suggest that those who took lithium may be slightly more likely to become entrepreneurs than those in the general population, but also might be less successful economically on average; in contrast, their family members seem to do well in their occupational pursuits compared to the general population.

An important facet of this study was the examination of extremes in earnings. There was significantly more variability in the wages of those treated with lithium, such that they were more likely than the general population to earn wages above the 90th percentile and the 95th percentile. Perhaps most important, the variability in income among those prescribed lithium suggests the need to consider factors that might predict success or failure for those with manic tendencies.

In sum, research to date suggests that business founders may be likely to have high scores on a measure of mania risk, and that those who are prescribed lithium at least once in their lives might have a greater likelihood of creating a business and earning wages above the 90th percentile (Biasi, Dahl, & Moser, 2015). Despite this, one study failed to find that mania risk was related to higher entrepreneurial intent or engagement (Johnson et al., 2015a). On the whole, there is considerable variability in the findings regarding bipolar disorder and entrepreneurship, both across studies and even within one major study. This variability is the starting ground for the current work.

A MODEL OF MANIA RISK AND ENTREPRENEURSHIP

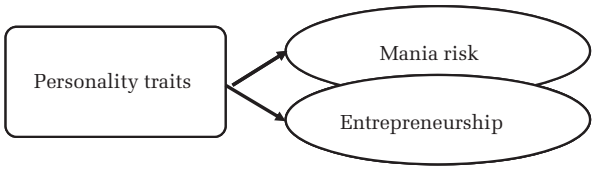
As discussed above, some individuals who are diagnosed with bipolar disorder or are at risk for mania can be quite accomplished, but others have severe difficulties in work and financial domains. Findings of heightened accomplishment appear most consistent for those at risk, due to either subsyndromal symptoms or family history, as compared to those with a diagnosis. This would suggest that symptoms cannot explain the tendency for more successful outcomes. Another important theme is the variability, suggesting that we must consider predictors of outcomes within those who are diagnosed with bipolar disorder and those at risk for mania. In the accomplishment and creativity domain, researchers have shown that personality traits that are correlated with bipolar disorder and mania risk can help explain positive outcomes (Johnson, Edge, et al., 2012; Johnson, Murray, et al., 2015). Our goal is to extend this model to entrepreneurship. We advance a theory that some personality traits related to mania risk, rather than the symptoms themselves, may be an advantage for entrepreneurship. Our model is shown in Figure 1.

As a first test of this model, our goal in the current paper is to consider how a set of personality traits correlated with mania risk might relate to entrepreneurial intent and status. We begin by selecting a set of personality traits to consider from the literature on entrepreneurship and from the literature on mania risk.

Traits Drawn From the Entrepreneurship Literature

A growing body of research has identified personality traits that predict interest in becoming

FIGURE 1
Model of Relationship Between Mania Risk and Entrepreneurship



an entrepreneur and success as an entrepreneur (Brandstätter, 2011; Rauch & Frese, 2007). Considering personality as a whole, one meta-analysis (n = 26,700) found that personality traits accounted for as much as 19% of the variance in business creation and 19.5% of the variance in business success (Rauch & Frese, 2007). When researchers focused on the extremely well-validated Big Five personality traits, a meta-analysis of large sample size (n = 15,423) indicated that these traits accounted for 36% of the variance in entrepreneurial intentions and 31% of the variance in performance as an entrepreneur (Zhao, Seibert, & Lumpkin, 2010). Regarding specific Big Five traits, entrepreneurs have been found to score significantly higher than managers on conscientiousness and lower on neuroticism (Zhao & Seibert, 2006), and extroversion has also been shown to correlate with entrepreneurial success (Leutner, Ahmetoglu, Akhtar, & Chamorro-Premuzic, 2014).

Several of the personality traits related to entrepreneurship show remarkable resonance with qualities discussed in the clinical and empirical literature in bipolar disorder. Beyond extroversion, another such trait is self-efficacy, which correlates positively with entrepreneurial intentions (Nwankwo, Kanu, Marire, Balogun, & Uhiara, 2012). Proactive personality has been tied to both entrepreneurial intentions (Crant, 1996) and charismatic leadership (Crant & Bateman, 2000; Fuller & Marler, 2009). Creativity—specifically, the ability to improvise in constrained conditions—has also been tied to intent to become an entrepreneur (r = 0.45, $p < 0.01$) (Hmieleski & Corbett, 2006). Other studies have found that high goal-setting and ambition, as well as positive affectivity, contribute substantially to entrepreneurial intentions and success (Baron, Tang, & Hmieleski, 2011; Baum & Locke, 2004; Rauch & Frese, 2007).

In addition to generally prosocial traits such as self-efficacy, extroversion, creativity, and ambition, researchers have found that propensity for risk taking and overconfidence are tied to intent to become an entrepreneur and entry into entrepreneurship (Cooper, Woo, & Dunkelberg, 1988; Landier & Thesmar, 2009). For example, research has shown that entrepreneurs are more likely to engage in risk-taking behavior compared to controls (Kreiser & Davis, 2010). These findings have emerged even when controlling for the management level of entrepreneurs (Stewart & Roth, 2001). Similar trends have been found regarding overconfidence, with one study finding entrepreneurs to be significantly more overconfident than managers (Busenitz & Barney, 1997), and another finding that overconfidence may drive business creation (Koellinger, Minniti, & Schade, 2007).

Traits Tied to Mania Risk

Mania risk has been tied to many traits that parallel those discussed in the entrepreneurship literature, although it is worth noting that the measures and the trait labels differ slightly in entrepreneur research and psychopathology research. Those at risk, as well as those diagnosed with bipolar disorder, show high levels of ambition and goal orientation (Eckblad & Chapman, 1986; Harmon-Jones et al., 2008; Johnson, Carver, & Gotlib, 2012), as well as greater motivation to pursue reward, as measured using the Behavioral Activation Scale (reviewed in Johnson, Edge, et al., 2012). Mania risk and diagnoses of bipolar disorder are tied to elevated levels of both pride and hubris (Fulford, Sinclair, John, & Johnson, 2014; Johnson & Carver, 2012; Mansell & Lam, 2006; Tang-Smith, Johnson, & Chen, 2015). Extroversion and sociability have also been found to be elevated in large-scale samples of those with bipolar disorder (Middeldorp et al., 2011), among persons with mild manic tendencies (Furnham, Batey, Anand, & Manfield, 2008; Meyer, 2002; Murray, Goldstone, & Cunningham, 2007), and among first-degree family members of those with bipolar disorder (Higier et al., 2014; Middeldorp et al., 2011). Positive affectivity has been found to be elevated in people diagnosed with bipolar disorder and those at risk for the disorder (Gruber, 2011).

As with entrepreneurship, bipolar disorder and mania risk have been tied to personality traits that are less universally prosocial. For example, risk taking and impulsivity have been found to be elevated among those with bipolar disorder (Edge, Johnson, Ng, & Carver, 2013; Muhtadie, Johnson, Carver, Gotlib, & Ketter, 2014) and those at high risk for the disorder (Giovanelli, Hoerger, Johnson, & Gruber, 2013; Newman & Meyer, 2014) and to predict onset

of the disorder (Alloy et al., 2012; Kwapil et al., 2000). Ruthless ambition and the desire for and self-perception of dominance have also been tied to mania risk (Johnson & Carver, 2012; Tang-Smith et al., 2015).

Summary of Personality Model

As described, entrepreneurship and mania risk have been tied to many parallel personality traits. We do not mean to argue that there is a one-to-one correspondence. Certainly, some bipolar personality traits do not seem to overlap with personality traits found among entrepreneurs. As one example, entrepreneurship has been tied to openness to experience (Zhao, Seibert, & Lumpkin, 2010), but findings are relatively inconsistent regarding whether openness to experience links to bipolar disorder (see Barnett et al., 2011; Murray, Goldstone, & Cunningham, 2007, for positive effects; and Middeldorp et al., 2011, for negative effects). Low neuroticism tends to be observed among those who intend to become or are entrepreneurs (Zhao et al., 2010), but levels are normative among those with bipolar disorder without comorbid anxiety or depression, and high among those with bipolar disorder with comorbid depression or anxiety (Cuellar, Johnson, & Winters, 2005; Muhtadie & Johnson, 2015; Rózsa et al., 2008). Our model, then, is that only some personality traits overlap between entrepreneurship and mania risk; as a consequence, mania risk is not likely to be universally related to interest or engagement in entrepreneurship. Rather, we focus on a set of traits that appear relevant to explaining success among those at high risk for mania or diagnosed with bipolar disorder, and overlapping traits that are empirically validated as relevant to entrepreneurship.

PRELIMINARY DATA

Given the mixed findings on mania risk and entrepreneurship, we tested this more nuanced model of overlapping personality traits between mania risk and entrepreneurship. Drawing from previous research, we identified 16 traits that have been found to relate to mania risk and/or entrepreneurship. The current study provided the first test of the contributions of these personality traits to conjointly predicting both entrepreneurship and mania risk (see appendix for details).

We found that scales that have been well validated in the entrepreneurship literature were robustly correlated with personality traits related to mania risk, accounting for 54% of the variance. As shown in Table 1 (and in more detail in the appendix), of the 16 personality traits we considered, mania risk was uniquely related to higher improvisational proclivity, positive overgeneralization, hubristic pride, extroversion, proactive personality, perceived power, and self-efficacy, and to lower conscientiousness and authentic pride. Also shown in Table 1, four of these traits appeared significantly related to entrepreneurial intention or status: hubristic pride, improvisational proclivity, proactive personality, and extroversion. The first three of those four traits also were endorsed more highly among those with intent to become an entrepreneur as compared to controls; the last three were endorsed more highly among those who identified as

TABLE 1
Summary of Regression Model of Personality Traits Predicting HPS (n = 215), and of MANOVA Model of Personality Traits Differentiating Entrepreneurs (n = 29), Those With Entrepreneurial Intent (n = 101), and Controls (n = 92)

	Regression predicting HPS scores		MANOVA comparing entrepreneurs, those with entrepreneurial intent, and controls	
	ΔR^2	Final β	Entrepreneurs vs. controls contrast	Intent vs. controls contrast
Improvisational Proclivity	.256***	.369***	14.329***	8.721***
POG upward	.086***	.212***	.274	.167
Hubristic pride	.042***	.211***	.193	.304***
Extroversion (NEO)	.045***	.213***	.284*	.104
Conscientiousness (NEO)	.049***	−.256***	−.017	−.059
Proactive personality	.021***	.159*	.532**	.352***
Perceived power	.012*	.117*	.246	.069
Authentic pride	.010*	−.178**	.026	.020
Self-efficacy (NGSE)	.012*	.145*	.223	.122

Note: NEO = NEO Five-Factor Inventory. NGSE = New General Self-Efficacy Scale. POG = Positive Overgeneralization.
* $p < .05$ ** $p < .01$ *** $p < .005$

entrepreneurs as compared to controls. Taken together, findings support the idea that at least four personality traits relevant to mania risk may have meaning for entrepreneurial intent and status.

DISCUSSION

A large clinical and popular literature discusses the idea that mania risk might be tied to entrepreneurial entry and success. These ideas have received considerable attention in the media. Although a larger literature suggests that mania risk is tied to high levels of accomplishment and creativity, little research is available about how mania risk relates to entrepreneurship, and little conceptual work has been conducted on why such a link might exist. We developed a model of personality traits that might be common to mania risk and entrepreneurship. In a preliminary test of the model, we found support for this model, in that four personality traits were related to both mania risk and entrepreneurship.

Before discussing the findings, it is important to note several limitations of the analyses presented here. Of concern, we relied on forward selection regression, so findings regarding the relative strength of effects and unique relationships with mania risk will need to be replicated. The sample was also relatively small, with few older individuals. Finally, the current study focused on mania risk as defined by subsyndromal symptoms only; more work is needed to understand potential benefits and risks associated with personal and family diagnoses of bipolar disorder.

Turning to the profile of findings, hubris was a predictor of wanting to become an entrepreneur but did not relate to whether one had become an entrepreneur. Hubris has been found to be particularly high among those with narcissistic tendencies (Tracy & Robins, 2007). The finding of ties between hubris and entrepreneurial intent is consistent with research that has identified narcissism as the personality trait most predictive of entrepreneurial intent (Mathieu & St.-Jean, 2013). Together, such findings indicate that an inflated sense of one's importance and ability to achieve may direct one toward an entrepreneurial path. It should be noted that some research supports the idea that overconfidence may be higher in younger entrepreneurs (*Forbes*, 2005); it may be that the relatively young age of our sample ($< 1\%$ were older than 30) contributed to a stronger link between hubris and intent. Of note, high hubris linked to intent but not status; hubris may not help one assemble the resources and hard work that go into creating a business.

Extroversion did not predict the desire to become an entrepreneur, but did relate to becoming an entrepreneur. We speculate that extroversion helps entrepreneurs develop social networks that facilitate resource acquisition. Effective engagement with social networks may facilitate raising capital; identifying talent, trends, and opportunities by learning from others; and persuading investors, customers, suppliers, and staff to engage with the company.

Those who wanted to be entrepreneurs and those who were entrepreneurs tended to describe themselves as highly proactive and creative. Ingenuity has been defined as resourcefulness in novel and constrained situations, and the importance of this trait is in line with previous research on entrepreneurs (Hmieleski & Corbett, 2006). That such a personality trait is prevalent among entrepreneurs is not surprising given that the entrepreneurial context is often characterized by uncertain conditions, scarce resources, and time pressure, all of which require a certain amount of flexibility and inventiveness to navigate (Duxbury, 2014). Proactive personality has been defined as the propensity to effect change in one's environment, a trait that has been shown to be related to entrepreneurial intent (Crant, 1996) and charismatic leadership styles (Crant & Bateman, 2000; Fuller & Marler, 2009) and to be one of the most relevant personality traits for entrepreneurial leadership (Prieto, 2010). We speculate that, given the relative autonomy of many entrepreneurial roles, possession of this trait might incline one toward a profession that allows for significant initiative and individual leadership, and that the ability to utilize these qualities in an organizational context might explain how some are able to remain successful as entrepreneurs. Taken together, tendencies to be proactive and creative could enable entrepreneurs to "skate to where the puck is going" as hockey player Gordy Howe famously said and entrepreneurs often repeat, and develop innovative products and solutions to meet the needs of their customers and to streamline their business processes.

The current study provides support for the idea that certain personality traits related to mania risk may be tied to the intent and the propensity to become an entrepreneur. Current findings, though, also help shed light on an important puzzle in the literature, which is the rather mixed set of findings regarding how and when bipolar tendencies relate to entrepreneurship. Only a subset of the personality traits tied to mania risk related uniquely to entrepreneurship in this sample. Although tentative, this approach may help explain the great heterogeneity

in the entrepreneurial outcomes observed in studies of mania risk and entrepreneurship.

Taken together, findings fit with a growing literature on the "silver linings" or positive outcomes associated with bipolar disorder and mania risk (Jamison, Gerner, Hammen, & Padesky, 1980; Lobban, Taylor, Murray, & Jones, 2012). These findings are particularly important in light of the extremely high levels of negative stigma toward those with bipolar disorder. Indeed, this stigma has increased across the past 40 years in the United States (Phelan, Link, Stueve, & Pescosolido, 2000).

The focus on potential positive outcomes may be particularly important in the workplace, as the literature on mental illness in the workplace typically describes only the costs (cf. Adler et al., 2006; Goetzel et al., 2004; Kessler et al., 2006). Research suggests that managers tend to hold stigmatizing attitudes about mental illness (Manning & White, 1995), and these overly pessimistic or stigmatizing attitudes toward people with bipolar tendencies and bipolar disorder could lead to missed opportunities for strategic human capital management, enterprise formation, product innovation, and business development. Venture capitalists, potential partners, and those interested in entrepreneurship more generally should be aware that contrary to much of the writing in business journal articles, mania risk may be tied to traits that provide some strengths in the pursuit of entrepreneurship (Coutu, 2004).

Given that the model appears to have important implications, there are several steps that will be important to take in advancing this model. It will be important to consider not only the association of personality traits with entrepreneurship and mania risk, but also the degree to which a trait is present. Traits such as self-assurance, confidence, and pride may be extremely helpful at low levels but destructive at high levels (Miller, 2015). Hubristic pride may help entrepreneurs muster the self-confidence they need to start a company where the odds of success are low but at high levels antagonize customers, suppliers, staff, and investors. It will also be important to consider behavioral measures of traits that may be common to mania risk, and how those may provide advantages to entrepreneurship. Most important, three studies have found that those with bipolar disorder or at risk for bipolar disorder show high willingness to persevere on difficult tasks (Harmon-Jones et al., 2002, 2008; Hayden et al., 2008), and we recommend that future research include behavioral measures designed to tap this tendency.

Given that some of the correlates of mania risk may be related to a desire and ability to become an entrepreneur, it is important to consider the benefits and risks of bipolar traits when individuals do become entrepreneurs. We have focused largely on traits relevant to entry and success, but some facets of bipolar disorder may be difficult in an entrepreneurial environment (Baron, Tang, & Hmieleski, 2011) and thus associated with exit and failure.

Perhaps no domain is more important to understand for success and failure than the presence of symptoms. Many with bipolar disorder go for years without observable symptoms, but the normative pattern is fluctuation between manic and depressive symptoms over time. Qualitative research suggests that many people with bipolar disorder feel as though their hypomanic symptoms can benefit their creative process (Taylor, Fletcher, & Lobban, 2015), but there is also the potential for more severe symptoms to be destructive. Quantitative research also has shown that symptoms such as high energy and mildly positive mood may be beneficial to creative processes, but more serious symptoms—such as aggression, disorganized thought, and recklessness—that emerge as mania spirals upward are more likely to have troubling consequences (Shapiro & Weisberg, 1999). A growing body of research suggests that overconfidence, impulsivity, and neurocognitive concerns may become more dominant during symptomatic periods (Kurtz & Gerraty, 2009; Muhtadie, Johnson, Carver, Gotlib, & Ketter, 2014). One recent case study describes in detail the types of issues and concerns that might unfold if a person in a management position were to escalate into full-blown manic symptoms—with concerns about legal, public relations, customer, and financial operations that should be considered and managed in advance (Coutu, 2004).

Many potentially negative facets of the disorder could be addressed through screening, early identification, treatment, or coaching. Putting in place this type of resource, though, first requires an openness to considering the idea that some at high risk for mania will be drawn toward creating businesses, and beyond an interest, some are likely to establish those businesses. With that recognition, a large number of constructive steps can be taken. As described elsewhere, given the high rates of mental illness in general, and the possibility that some types of mental illness may be more, rather than less, common in entrepreneurial contexts, all corporations should have guidelines for managing symptomatic behavior in the workplace. As part of this, care should be taken

to make sure that managers have a strong understanding of mental illness (Jamison, 2004).

Several features of bipolar disorder are worth understanding well in advance of any crisis. First, manic symptoms can be triggered by life events that involve success, which could occur during critical growth stages of a company (Johnson et al., 2000, 2008). For example, one of the authors (Freeman) evaluated the founder of an innovative "smart manufacturing" company with a track record of creativity, productivity, and success and no prior psychiatric history. As his business plan was positively received and an initial funding round was closed, he escalated into a full-blown manic episode for which he was hospitalized. Another author (Johnson) has followed individuals with bipolar disorder who became manic after a real estate venture went well, after winning an election, and after achieving a new and important academic credential.

Second, symptoms of mania can be triggered by sleep loss. Experimental research using sleep deprivation has shown that after a full night of sleep deprivation, more than 10% of those who were experiencing depressive episodes of bipolar disorder became hypomanic or manic (Colombo, Benedetti, Barbini, Campori, & Smeraldi, 1999). Jet lag, inconsistent schedules, and work binges may create more difficulty for a person with bipolar disorder.

Third, symptoms of mania can unfold within a matter of days, if not hours; partners and close colleagues should be able to respond quickly to emergent symptoms. Doing so is facilitated by strong policies and guidelines available in advance. When we work with persons with bipolar disorder, we often help them develop a key support person in different social contexts (e.g., one close family member, one close work colleague) whom they can talk with in advance about the potential for emergent symptoms and at what point action should be taken (Caponigro, Lee, Johnson, & Kring, 2012). It is important to note that as manic symptoms become more severe, many will become less able to recognize their behavior as troubling. Hence early feedback about emergent symptoms is highly recommended. Given that the person with bipolar disorder can lose insight and motivation to seek treatment as symptoms intensify, we often ask patients to give permission to their key support person to contact a medical professional if concerns arise, and to specify who that medical contact will be.

Specific business policies can also be in place if there are fears of potential manic symptoms. Tendencies to be overly optimistic and confident during manic symptom periods could be countered by stronger cash control procedures, such as having a cosigner required for major expenditures. Capacity to place brakes on emailing if there are signs of a loss of judgment can also be helpful.

At a broader level, many people avoid seeking diagnosis or treatment or labeling their illness to others because of the fears of stigma. Workplaces stand to gain a good deal from helping people feel safe and supported in good illness management. Close colleagues can offer their support of treatment. One approach involves letting people know that they will be welcomed back into the company once they attain good care. More broadly, the more that partners, funders, and close colleagues understand the strengths that relate to bipolar disorder, the more we can hope for attitudes such as these, reported in a case study of a person named Katharina who developed manic symptoms in the workplace:

> I wanted her to succeed because I could see what she was capable of. That made sense even from a narrow corporate perspective. It is people like Katharina who come up with the breakthrough idea, the breakthrough story, the breakthrough technology that really distinguishes your organization from everybody else's. I felt that if we could just help this woman through her crisis, her potential to contribute to the organization could be very significant. (Pearlstine, 2004, p. 9)

Attitudes like these are promoted by an understanding of the strengths linked to mania risk, and in turn are likely to help at a human level and in preserving the human capital lost through stigma.

In future research, it would be extremely helpful to consider how key personality traits relevant to bipolar disorder may be beneficial or detrimental at different stages of entrepreneurial endeavors (e.g., start-up, growth, and exit) and in the context of entrepreneurial stress events (e.g., seeking investor capital). The adaptive consequences of many traits may differ across workplace environments and organizational contexts (Miller, 2016). The idea that there may be a "goodness of fit" that allows people with certain mental health tendencies to perform exceptionally well in specific job categories is not new. For example, popular literature is replete with stories about how information technology companies employ people in the autism spectrum to be software engineers (Clarke, 2013; Kharif, 2015; Silberman, 2001). Future research could elaborate how bipolar traits influence outcomes depending on the stage of corporate development, the levels of

creativity involved in the entrepreneurial endeavor, or the level of success attained among the entrepreneurs. For example, risk-taking propensities may help a person have the courage to launch a business, but extreme levels of risk taking may not always promote financial stability and may be detrimental to firm performance (Kreiser, Marino, Kuratko, & Weaver, 2013).

Opportunity recognition has been shown to be advantaged by curiosity and novelty seeking (Kashdan, Rose, & Fincham, 2004), which are often associated with mania risk (Minassian et al., 2011). As business plans develop and ideas begin to take shape, a key feature of success is the ability to identify novel solutions, which also appears prominent in many with mania risk (Murray & Johnson, 2010). Starting a new business and sustaining success requires the support of many people, and so bipolar-related traits of extroversion and positive affectivity, as well as the ability to convey a compellingly ambitious idea (vision), might be beneficial in facing those demands and convincing others to participate in taking risk with the founder. Extroversion and positive affectivity are likely to be helpful across a broad spectrum of engagement with investors, with hiring, and with sales. Throughout many steps in business development, confidence and pride—which appear elevated for many with bipolar tendencies (Lam, Wright, & Sham, 2005)—can enhance persistence, striving, the ability to persuade others to support an endeavor, and employee motivation. In short, many of the personality traits related to mania risk are relevant, but they may be particularly relevant at key phases of the business development cycle.

In sum, current findings clearly contradict simplistic summaries that focus only on the negative consequences of mental illness in the workplace. We find a set of personality traits that are highly correlated with mania risk and that are also tied to positive entrepreneurial outcomes in both our own pilot analyses and a much broader literature. These findings suggest the importance of mania risk as conferring certain benefits, along with risks, within entrepreneurship. These findings have implications for managers, investors, and partners. We believe that greater awareness and understanding could foster more careful screening, identification, risk management, and coaching toward success for entrepreneurs with bipolar disorder or at risk for the development of mania who are attracted to the world of entrepreneurship, and in the process, could protect the strengths of this group of people for innovation, business development, and job creation. We hope that future research will continue to elaborate on the specific contexts and roles in which mania risk is most likely to confer advantages.

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APPENDIX

HYPOTHESES AND GOALS OF THE CURRENT STUDY

We tested the idea that people with certain personality traits associated with mania risk might be likely to move toward entrepreneurship. We selected a set of 16 personality traits from the literature on mania risk, or from parallel traits shown to relate to entrepreneurship. We focused particularly on personality traits that have been suggested to relate to heightened accomplishment. We gathered personality data, a measure of entrepreneurial intent, and a well-validated measure of mania risk (the HPS) among 224 persons. We tested our model on individuals recruited through academic programs, as those are critical phases of life for people thinking about entry into entrepreneurship.

Analyses were conducted to address three goals. We provide the first examination of how this broad set of personality traits tied to mania risk correlate with each other; identify which of these 16 traits most robustly and uniquely relate to mania risk; and then examine whether traits related to mania risk differed among those who were engaged as entrepreneurs or had intent to become entrepreneurs, as compared to controls with neither intent nor engagement.

METHOD

Procedures were approved by the university ethics board before data collection commenced. Participants completed written informed consent procedures after verifying that they were at least 18 years old.

Participants

Participants were recruited through two research participation pools at a large public university: one for students (and open to affiliated staff) of a business school offering BA and MBA programs, in which participants were paid $15 for study participation, and a second for undergraduate students who received partial course credit in psychology classes (participants were offered alternative assignments to taking part in the research). For each research participation pool, potential participants viewed a website listing multiple studies; this particular study was briefly described as an online survey of entrepreneurship and personality. Responses were gathered online and anonymously, and surveys took about one hour to complete. After six participants from the business pool and eight from the psychology pool were excluded for failing catch items (e.g., "Please select two as your answer"), 75 business pool participants and 149 psychology students participated. Three participants were excluded from analyses for missing data.

Measures

Participants completed self-report measures targeting entrepreneurial experience and intent, the Hypomanic Personality Scale, and a set of personality traits.

Entrepreneurial scale. Participants were first asked about their previous entrepreneurial experience with the question "Have you ever been self-employed, a business founder, or a business co-founder (including nonprofit businesses)?" (Zhang et al., 2009). Those who reported no prior experience were then asked, "Do you have the intention to become self-employed, a business founder, or a business co-founder (including nonprofit businesses)?" Responses to these two questions were used to define three discrete groups: those who were currently or had previously been entrepreneurs ($n = 32$), those with intent to become entrepreneurs ($n = 101$), and controls with no experience as and no intent to become entrepreneurs ($n = 91$).

Hypomanic Personality Scale (HPS). The Hypomanic Personality Scale is a 48-item measure designed to assess risk for bipolar disorder (Eckblad & Chapman, 1986). The scale covers both subsyndromal symptoms of mania (e.g., "I frequently get into moods where I feel very sped up and irritable") and related traits, such as positive affectivity. In the original validation sample, the HPS was shown to have sufficient internal consistency ($\alpha = 0.87$) and high test–retest reliability after 15 weeks ($r = 0.81$),

and the scale predicted onset of bipolar spectrum diagnoses (78% in those with high HPS scores; 0% in those with low HPS scores) (Kwapil et al., 2000). Predictive validity for onset of symptoms meeting threshold for a bipolar spectrum diagnosis was established in a 10-year follow-up study (Kwapil et al., 2000). In a second three-year longitudinal study, 58% of those with HPS scores in the upper quartile met diagnostic criteria for bipolar spectrum disorder (Walsh, DeGeorge, Barrantes-Vidal, & Kwapil, 2015). The scale has also been shown to relate to genetic polymorphisms associated with bipolar diagnoses (Johnson, Carver, Joormann, & Cuccaro, 2015). Internal consistency in the current study was good (α = 0.92). Importantly, although persons with high scores may be at relatively higher risk, only four persons in our sample reported having received a diagnosis of bipolar disorder.

Behavioral Activation Scale (BAS). The Behavioral Activation Scale (BAS) is a 13-item scale designed to measure individual differences in motivational sensitivity to cues of reward (Carver & White, 1994). The scale comprises three factor-analytically derived subscales, all of which target responsivity to cues of reward. Briefly, the Drive scale measures the degree to which one pursues desired goals energetically (e.g., "If I see a chance to get something I want I move on it right away"), the Reward Responsiveness scale measures the degree to which one responds energetically and enthusiastically when coveted events occur or are anticipated (e.g., "When good things happen to me, it affects me strongly"), and the Fun Seeking scale measures impulsive behavioral pursuit of pleasurable opportunities when they arise (e.g., "I will often do things for no other reason than that they might be fun"). Individuals respond to items on a scale ranging from 1 ("very true for me") to 4 ("very false for me"). Item responses across the three subscales were averaged (with reversals as necessary) to form a BAS total scale. Internal consistency in this study was high (α = 0.90).

Proactive Personality Scale (PPS). The Proactive Personality Scale was designed to capture the extent to which one takes initiative to meaningfully change his or her environment (e.g., "If I see something I don't like, I fix it") (Bateman & Crant, 1993). The measure has achieved convergent validity demonstrated by moderate correlations with need for achievement (r = 0.45, $p < 0.01$) and need for dominance (r = 0.43, $p < 0.01$). We used the shortened 10-item version of this scale developed by Seibert, Crant, and Kraimer (1999), which shows high correlation with the original scale (r = .96) and comparable reliability (17-item α = .88; 10-item α = .86). Individuals responded to items on a scale from 1 ("strongly disagree") to 7 ("strongly agree"). Item responses were averaged to create a total.

Willingly Approached Set of Statistically Unlikely Pursuits (WASSUP) scale. The Willingly Approached Set of Statistically Unlikely Pursuits scale was designed to target the extent to which one sets highly lofty life goals (Johnson & Carver, 2006). Factor analysis supported separable subscales, and we focused on the Popular Fame (e.g., "Celebrities will want to be your friend") and Financial Success (e.g., "You will have 20 million dollars or more") subscales, as these have been most widely validated across 12 studies as relevant to diagnoses of and risk for mania (Gruber & Johnson, 2009; Johnson & Carver, 2006; Johnson, Edge, Holmes, & Carver, 2012; Johnson & Jones, 2009). Rather than considering these subscales separately in analyses, we used a composite score of these two z-transformed subscales (α = .92). Individuals responded to the items on a scale from 1 ("No chance I will set this goal for myself") to 5 ("Definitely will set this goal for myself").

New General Self-Efficacy scale (NGSE). The New General Self-Efficacy scale was designed to assess confidence in ability to perform in achievement situations (e.g., "I am confident that I can perform effectively on many different tasks"). This scale comprises eight items and has demonstrated higher construct validity than other widely used measures of self-efficacy (Chen, Gully, & Eden, 2001). The NGSE has been shown to have high internal consistency reliability (α = 0.90) and good test-retest reliability (r = 0.67) (Chen, Gully, & Eden, 2001). Individuals responded to each item on a scale from 1 ("strongly disagree") to 5 ("strongly agree").

Positive Overgeneralization scale (POG). The Positive Overgeneralization scale was designed to assess the extent to which people respond with exaggerated confidence to positive events or personal successes (Eisner, Johnson, & Carver, 2008). We used the Upward Generalization (UG) subscale, a six-item measure that targets the degree to which an individual overgeneralizes from small, everyday successes or compliments to much larger, grandiose ambitions in the same domain (e.g., "When someone admires me, I believe I could become famous"), because this subscale has been more robustly related to mania risk (Eisner, Johnson, Carver, 2008; Stange et al., 2012). Individuals responded to items on a scale from 1 ("I disagree with the statement a lot") to ("I agree with the statement a lot"). Item responses were averaged. Internal consistency in the Upward Generalization subscale has been shown to be adequate (α = .69) (Stange et al., 2012).

Overclaiming Questionnaire (OCQ). The Overclaiming Questionnaire (OCQ) is a well-established scale designed to measure the tendency to claim knowledge about persons or concepts that do not actually exist (Phillips & Clancy, 1972). Participants were asked to rate their familiarity with a given person or concept on a scale of 0 ("Never heard of it") to 4 ("Very familiar"). Out of the total 45 items, nine serve as foils, referring to plausible, yet fictitious, persons or concepts (e.g., "Queen Shattuck" versus "Ronald Reagan"). We used a shortened version of the original measure comprising three domains—historical names and events, fine arts, and language—each containing 15 items (Paulhus & Bruce, 1990). Using signal detection theory, we computed two scores: accuracy scores

and bias scores. Accuracy scores are calculated as the *z*-score for selection of correct items minus the *z*-score for selection of fictitious items. Bias scores capture an individual's tendency to indiscriminately endorse items. Bias scores are calculated as the *z*-score for selection of correct items plus the *z*-score for selection of fictitious items. As a previous publication has noted that accuracy was unrelated to mania risk (HPS scores) in this sample ($r = -0.02$, $p = 0.74$) (Johnson, Freeman, & Staudenmaier, 2015b), we focus on bias scores, which are typically used to index overconfidence.

Improvisational proclivity. Proclivity for improvisational action was measured using a subscale of the Improvisation Scale (Hmieleski & Corbett, 2006). The Creativity and Bricolage dimension of the Improvisation Scale includes nine items that measure an individual's trait-like levels of ingenuity and ability to problem solve in novel situations ($\alpha = 0.89$). These items are designed to capture tendencies to seek and discover opportunities that require resourcefulness and creativity (e.g., "I identify ways in which resources can be recombined to produce novel products") (Hmieleski & Corbett, 2006). Individuals responded to items on a scale ranging from 0 ("never") to 100 ("always"). Item responses were averaged. The scale has obtained factor analytic support (Hmieleski & Corbett, 2006).

Six-factor dominance scale. The six-factor dominance scale was constructed to assess a broad range of variables relevant to the motivation and behavioral strategies to pursue dominance, perceived success in achieving power, and emotions relevant to dominance. The scale was constructed as a composite of already validated self-report measures covering these specific dimensions. Factor analysis supports the distinction among subscales (Tang-Smith, Johnson, & Chen, 2015). We focus on factors other than coalition building, as this dimension had not been related to manic tendencies. Mania risk has been found to be related to both pride subscales, comfort with leadership, and ruthlessness (Tang-Smith et al., 2015).

Authentic Pride and Hubristic Pride scales cover self-confidence from accomplishments and from a general belief in one's status without regard to accomplishments, respectively (Tracy & Robins, 2007). Both of the pride subscales comprise seven adjectives or phrases (e.g., "like I am achieving"), which are rated on a scale from 1 ("not at all") to 5 ("extremely") based on how well the item describes the respondent. Both subscales achieved high internal consistency in the original validation study ($\alpha = 0.88$–0.90) (Tracy & Robins, 2007) and in subsequent studies ($\alpha = 0.869$–$.904$) (Tang-Smith et al., 2015). Authentic Pride scores have has been found to correlate with prosocial behaviors and increased self-esteem, whereas Hubristic Pride scores have been found to correlate with narcissistic self-aggrandizement (Tracy & Robins, 2007), aggression, hostility, relationship conflict, poor interpersonal skills, and low self-esteem (Tracy, Cheng, Robins, & Trzesniewski, 2009).

Dominance motivation was measured using a subset of the Personality Research Form Dominance Scale items (Jackson, 1984). Participants respond to eight true-false items that assess their comfort in leadership (e.g., "Feel confident when directing the activities of others"). The original scale has shown strong internal consistency ($\alpha = 0.81$), high two-week test-retest reliability ($r = 0.91$), and robust positive correlations with other measures of dominance motivation (Jackson, 1999). Internal consistency for this shortened subset of items is adequate ($\alpha = 0.681$) (Tang-Smith et al., 2015).

Perceived power was measured using five items from the Generalized Sense of Power Scale (Anderson, John, & Keltner, 2012) that cover the extent to which others listen to and accept the respondent's ideas (e.g., "I can get people to listen to what I say"). Participants responded to items on a scale from 1 ("disagree strongly") to 7 ("agree strongly"). The original scale has been shown to have positive correlations with behavioral activation and narcissism (Raskin & Terry, 1988) and has demonstrated high internal consistency ($\alpha = 0.82$–0.85) (Anderson, John, & Keltner, 2012); internal consistency for this shortened item set is adequate ($\alpha = 0.786$) (Tang-Smith et al., 2015).

The Ruthlessness subscale comprises three items from the Rank Style With Peers Questionnaire designed to cover the extent to which one will engage in unsympathetic self-advancement (e.g., "An ambitious person cannot afford excessive loyalty to others") (Zuroff, Fournier, Patall, & Leybman, 2010). Participants respond to the items on a scale from 1 ("not at all like me") to 5 ("very much like me"). Internal consistency for this domain is good ($\alpha = 0.741$) (Tang-Smith et al., 2015).

Revised Domain-Specific Risk-Taking (DOSPERT) scale. The revised DOSPERT was used to assess proclivity to engage in risky behaviors. This scale comprises 35 items that cover four types of risky situations: ethical, investment, gambling, and social. Participants are asked to rate the likelihood that they would engage in a particular situation. Research supports high internal reliability within these domains, moderate test-retest reliability, and moderate correlation with other measures of risk perception and behavior (Weber, Blais, & Betz, 2002). Individuals responded to each item on a scale of 1 ("not at all risky") to 5 ("extremely risky").

NEO Five-Factor Inventory. (NEO) The NEO-FFI is a widely used 60-item measure that assesses broad dimensions of personality (Costa & McCrae, 1992). Participants were administered the subscales for neuroticism, designed to assess the tendency to experience frequent and intense negative affect; conscientiousness, designed to assess the tendency toward order, self-discipline, and dutiful behavior; and extroversion, designed to assess the tendency toward energy, stimulation-seeking, and interaction with the external world. Individuals responded to each item on a scale from SD ("strongly disagree") to SA ("strongly agree"). Item responses were averaged. The

TABLE 2
Correlations Among Personality Variables (n = 221)

	BAS	Proactive personality	Ambition (WASSUP)	Self-efficacy (NGSE)	POG upward	OCQ Bias	Improv proclivity
Proactive personality	.353**						
Ambition (WASSUP)	.197**	.343**					
Self-efficacy (NGSE)	.231**	.485**	.098				
POG upward	.010	.276**	.492**	.110			
OCQ Bias	.038	.110	.092	.147*	.016		
Improv. proclivity	.252**	.465**	.247**	.298**	.213**	.168*	
Authentic pride	.201**	.463**	.052	.535**	.144*	.062	.303**
Hubristic pride	−.093	.054	.255**	−.158*	.240**	−.048	−.024
PRF dom.	.364**	.457**	.249**	.416**	.235**	.087	.341**
Perceived power	.276**	.286**	.024	.381**	−.048	.068	.112
Ruthlessness	.069	.289**	.447**	.153*	.422**	.005	.274**
Risky propensities (DOSPERT)	.068	.139*	.279**	.072	.220**	.168*	.154*
Extroversion (NEO)	.424**	.393**	.106	.304**	.183**	.141*	.273**
Conscientiousness (NEO)	.221**	.325**	.000	.393**	.011	.001	.107
Neuroticism (NEO)	−.148*	−.230**	.045	−.373**	.029	−.196**	−.150*

scale has shown high two-week test-retest reliability (r = 0.86–0.90) across all subscales (Robins, Fraley, Roberts, & Trzesniewski, 2001), as well as moderate to high internal consistency (α = 0.68–0.86) (Costa & McCrae, 1992)

Analysis Plan

Given the large number of potentially overlapping personality traits that have been tied to mania risk, we first constructed a correlation matrix to examine the degree of correlation among this set of personality traits. Then we conducted a multivariate linear regression model to identify the variables that were most closely and uniquely tied to mania risk. Because we were invested in obtaining a model of the set of variables that uniquely related to mania risk, we used forward selection. We then conducted analyses of variance to examine whether mean levels of those traits that were significantly related to mania risk differed among those with entrepreneurial intent, those engaged as entrepreneurs, and controls.

RESULTS

Because findings were substantively the same across the two participant pools, and only nine participants from the business program reported that they had completed any graduate training, analyses report on the two samples combined. The two samples did not vary significantly in their entrepreneurial status (χ^2 = 1.389, p = .499). Across both samples, approximately 14.3% were engaged as entrepreneurs, 45.1% expressed intent to become an entrepreneur, and 40.6% endorsed neither. In the combined sample (38.7% male), 73.6% reported ages between 18 and 21, < 1% over the age of 30, and the rest between ages 22 and 30. Ethnicity was endorsed as Asian by 27.5%, Caucasian by 55.3%, Middle Eastern by 3.9%, and biracial or other by 13.2%; across ethnicities, 9.6% described themselves as Hispanic/Latino. The HPS and personality trait distributions approximated normalcy. Visual examination of plots was conducted to check assumptions for correlation analyses, including linearity and heteroscedasticity. As published previously (Johnson et al., 2015a), mania risk (HPS scores) differed significantly by entrepreneurial status ($F(2, 222) = 21.90$, $p < .0005$), though they were significantly higher in controls (M = 28.33) than in the entrepreneurial intent (M = 24.42) and current entrepreneur (M = 21.31) subgroups.

Before conducting hypothesis tests, correlations among personality traits were considered (see Table 2). Large correlations ($r > .4$) were observed for proactive personality with self-efficacy, improvisational proclivity, authentic pride, and PRF dominance motivation. Large correlations were also observed for BAS with extroversion, and for WASSUP ambition with POG upward and with ruthlessness. More modest significant correlations were also observed for several variables. Neuroticism was negatively correlated with several personality variables.

Personality Traits Relevant to Mania Risk

A multivariate linear regression was conducted to examine the unique links of personality traits with mania risk (HPS scores). Seven participants were excluded from this analysis for missing data on various scales. In the first block, sample source (psychology or MBA program) was entered as a control variable. Because we had no a priori reason to order the magnitude of personality traits given the absence of literature integrating these measures in the study of mania risk, we used forward selection regression

TABLE 2
(Continued)

Authentic pride	Hubristic pride	PRF dominance	Perceived power	Ruthlessness	Risky propensities (DOSPERT)	Extroversion (NEO)	Conscientiousness (NEO)
−.010							
.413**	.031						
.363**	−.006	.515**					
.149*	.379**	.185**	−.098				
−.103	.125	.182**	.131	.183**			
.425**	−.021	.489**	.408**	.046	.083		
.522**	−.120	.303**	.316**	−.024	−.115	.214**	
−.466**	.094	−.361**	−.465**	.059	−.146*	−.326**	−.332**

Note: BAS = Behavioral Activation Scale. DOSPERT = Revised Domain-Specific Risk-Taking Scale. NEO = NEO Five-Factor Inventory. NGSE = New General Self-Efficacy. OCQ = Overclaiming Questionnaire. POG = Positive Overgeneralization. PPS = Proactive Personality. PRF-DOM = Personality Research Form Dominance Scale. WASSUP = Willingly Approached Set of Statistically Unlikely Pursuits.

N's vary from 215 to 221 due to missing data.

$^{*}p < .05$ $^{**}p < .01$

analyses after this first block to assess which of the 16 personality variables most robustly explained unique variance in the HPS scale using forward selection.

Of the 16 variables tested, nine were significantly and uniquely related to mania risk. The overall model was significant ($F(10,202) = 23.811$, $p < .001$) and accounted for 54.1% of the variance in mania risk. As shown in Table 3, mania risk was significantly related to higher scores on improvisational proclivity, positive overgeneralization, hubristic pride, extroversion (NEO), proactive personality (PPS), perceived power, and self-efficacy (NGSE), and was inversely related to conscientiousness (NEO) and authentic pride. Behavioral activation (BAS), overclaiming bias (OCQ), dominance motivation (PRF-DO), ruthlessness, ambition for fame and wealth (WASSUP), neuroticism (NEO), and risky propensities (DOSPERT) did not add significant variance above and beyond the role of the other traits, (bivariate $r \leq .121$, $p \geq .084$).

Links of Personality Traits With Entrepreneurship

We conducted a multivariate analysis of variance (MANOVA) to examine whether entrepreneurs, those with intent to become entrepreneurs, and non-entrepreneurs differed on the nine personality traits that were uniquely

TABLE 3
Personality Variables Regressed on Mania Risk (HPS) (n = 215)

	R^2*total*	ΔR^2	*p*	Final β	*t*	*p*	Partial correlation
Participant pool source	.009	.009	.178	−.023	−.459	.647	
Improvisational proclivity	.264	.256	.000	.369	6.637	.000	.508
POG upward	.350	.086	.000	.212	4.008	.000	.391
Hubristic pride	.392	.042	.000	.211	4.133	.000	.257
Extroversion (NEO)	.437	.045	.000	.213	3.723	.000	.362
Conscientiousness (NEO)	.486	.049	.000	−.256	−4.373	.000	−.157
Proactive personality	.507	.021	.004	.159	2.463	.015	.405
Perceived power	.519	.012	.023	.117	2.074	.039	.164
Authentic pride	.529	.010	.039	−.178	−2.665	.008	.093
Self-efficacy (NGSE)	.541	.012	.022	.145	2.301	.022	.213

Note: NEO = NEO Five-Factor Inventory. NGSE = New General Self-Efficacy. POG = Positive Overgeneralization.

TABLE 4
Personality Variables by Entrepreneur Status

Personality Variable	Entrepreneurs (n = 29)		Intent (n = 101)		Controls (n = 92)					Entrepreneurs vs. controls contrast		Intent vs. controls contrast	
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	*ηp2*	*Contrast coefficient*	*p*	*Contrast coefficient*	*p*
Improvisational proclivity	67.035	18.607	61.426	19.717	52.705	20.371	7.694	.001	.066	14.329	.001	8.721	.003
POG upward	2.414	.754	2.307	.754	2.140	.678	2.118	.123	.019	.274	.077	.167	.111
Hubristic pride	1.734	.607	1.845	.654	1.541	.564	5.977	.003	.052	.193	.140	.304	.001
Extroversion (NEO)	3.540	.491	3.360	.514	3.256	.486	3.698	.026	.033	.284	.008	.104	.151
Conscientiousness (NEO)	3.523	.691	3.480	.557	3.540	.601	.247	.781	.002	−.017	.896	−.059	.489
Proactive personality	5.352	.843	5.172	.842	4.819	1.001	5.431	.005	.047	.532	.007	.352	.008
Perceived power	3.159	.551	2.982	.631	2.913	.567	1.883	.155	.017	.246	.054	.069	.421
Authentic pride	3.020	.576	3.014	.644	2.994	.618	.033	.968	.000	.026	.846	.020	.821
Self-efficacy (NGSE)	4.047	.482	3.947	.658	3.825	.634	1.714	.183	.015	.223	.098	.122	.179

Note: NEO = NEO Five-Factor Inventory. NGSE = New General Self-Efficacy Scale. POG = Positive Overgeneralization.

tied to mania risk. Before conducting tests of hypotheses, we tested for effects of sample source by including sample source in the MANOVA. As neither the main effect of sample source (Wilks' lambda = .085, F(10,199) = 1.685, p = .09) nor the interaction of sample source x entrepreneurial status (Wilks' lambda = .914, F(20, 398) = .912, p =.572) was significant, simple main effects of entrepreneurial status are presented. Entrepreneurial status was significantly related to mean levels of personality traits in the overall model (Wilks' lambda = .821, F(18, 422) = 2.425, p = .001, partial eta^2 = .094). Univariate ANOVAs were conducted to test which of the personality variables was related to entrepreneurial status. As shown in Table 4, entrepreneurial status were significantly related to improvisational proclivity, hubristic pride, extroversion (NEO), and proactive personality (PPS), but not to positive overgeneralization (POG), conscientiousness (NEO), perceived power, authentic pride, or self-efficacy (NGSE).

More specific contrasts were conducted to compare entrepreneurs to non-entrepreneurs, and to compare those with entrepreneurial intentions to controls. Entrepreneurs scored significantly higher than the control participants on improvisational proclivity, extroversion (NEO), and proactive personality (PPS), but did not differ significantly on positive overgeneralization (POG), hubristic pride, conscientiousness (NEO), perceived power, authentic pride, or self-efficacy (NGSE). Participants with entrepreneurial intent obtained significantly higher scores than the control participants on improvisational proclivity, hubristic pride, and proactive personality (PPS) but did not differ significantly on the other personality variables that were considered.

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