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A Review and Synthesis of Positive Emotion and Reward Disturbance in Bipolar Disorder

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Although positive emotion research has begun to flourish, the extremes and potential costs of positive emotion remain understudied. This is an ideal clinical model for studying the ways in which positive emotions are disrupted in bipolar disorder. Bipolar disorder is characterized by extreme bouts of expansive and persistent positive feelings. This paper reviews recent experimental studies, selectively examining positive emotion, in individuals at risk for, and diagnosed with, bipolar disorder. As an extension of this body of work, I present an account of positive emotion disturbance in bipolar disorder, referred to as positive emotion persistence. Implications are discussed for the study of bipolar disorder and positive emotion that follow. Copyright © 2011 John Wiley & Sons, Ltd.

Key Practitioner Message:

- Understand mechanisms underlying bipolar disorder.
- Identification of positive emotion as an important target foci in bipolar disorder.
- Application of affective science methods and theory to conceptualize the etiology and maintenance of mood disorders.

Keywords: bipolar disorder, positive emotion, happiness

The case for the dangers of positive emotions is made most straightforwardly by individuals with mania. Their joy is infectious, their optimism and self confidence unbounded. . . One manic may give away his life's savings on a whim, while another joyfully drives 100 m.p.h. to a sexual liaison with a potentially dangerous stranger.' (Nesse, 2004, p. 1341).

The experience of happiness and positive emotions, more generally, is a basic building block of human nature (e.g., Myers & Diener, 1995). Positive emotions motivate us to pursue important goals, savour experiences and reinforce adaptive behaviour patterns. Recent empirical work has led to new insights highlighting several robust benefits of positive emotion (Seligman & Csikszentmihalyi, 2000). For example, positive emotions broaden thought–action repertoires and build vital social, physical and cognitive resources (e.g., Fredrickson, 1998), counteract cardiovascular sequelae of negative emotions (Fredrickson & Levenson, 1998) and allow us to flexibly shift attention to novel stimuli (Carver, 2003).

As robust as these advances are, they are limited in certain regards. Specifically, the majority of research has tended to focus on the ways in which positive emotions

promote improved health outcomes and facilitate the pursuit of important evolutionary goals (e.g., Fredrickson, 1998; Shiota, Keltner & John, 2006). In doing so, psychologists have inadvertently paid less attention to positive emotions, which may be maladaptive. The idea that we need to also consider the costs and not just the benefits of positive emotions is not new. In fact, Nesse (2004) discussed the apparent neglect regarding the downside of positive states in his model of a diagonal psychology. He argued that the emphasis in affective science has been on the disadvantages of the negative states and benefits of the positive states, leaving relatively untouched the potential disadvantages of positive emotions in certain situations.¹

To date, psychology's knowledge base regarding positive emotions is thin with respect to answering the question of whether feeling good can be bad. It may be difficult to imagine the downside of positive emotions without carefully examining the context in which they occur. Anecdotes point to potential scenarios that highlight some milder costs of positive emotions. One might readily imagine a scenario in which a friend seeks consolation after the death of a relative, resulting in a relationship

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¹Nesse's (2004) account of diagonal psychology also points to a dearth of work examining the upside or advantages of negative emotions as the second quadrant that has been less explored along with the downside or disadvantages of positive emotions.

conflict when the friend smiles and laughs at the incident. Recent empirical work also points to potential disadvantages of positive emotion or mood. For example, in the midst of positive emotional states, some individuals are inclined to engage in more problematic behaviours such as alcohol consumption, binge eating, drug use and risky sexual behaviour (Cyders & Smith, 2008). Furthermore, experimentally induced positive moods have been associated with increased selfishness and decreased social politeness (Forgas, 1999; Tan & Forgas, 2010), less attention to detail and more heuristic processing resulting in an increased stereotypic thinking in social judgments (Forgas & Fiedler, 1996), as well as an increased likelihood of committing cognitive reasoning errors (Forgas, 1998). In general, there is some evidence to suggest that positive emotion may also be associated with some negative outcomes. This begs the question—are there more adverse negative consequences of extreme manifestations of positive emotion?

One approach to begin to address this question is to examine individuals who lie at the upper boundary of typical positive emotion experience. A prime candidate is people with bipolar disorder, also referred to as manic-depressive illness. One of the core diagnostic criteria for bipolar disorder involves periods of abnormally and persistently elevated mood (American Psychiatric Association, 2002).² Mania also includes symptoms of grandiosity, heightened motor activity, pressured speech, decreased need for sleep and engagement in risky and often impulsive behaviours.

As will be discussed in more depth, recent research indicates that individuals at risk for, and diagnosed with, bipolar disorder exhibit an increased degree of positive emotion reactivity across both experiential (e.g., Johnson, 2005; Johnson, Gruber & Eisner, 2007) and physiological (e.g., Gruber, Johnson, Oveis, & Keltner; Sutton & Johnson, 2002; Yurgelun-Todd et al., 2000) levels of measurement. Furthermore, these elevated positive emotional responses in bipolar disorder are also evident across negative and neutral contexts (Gruber et al., 2008a, 2008b; Johnson et al., 2007). For these reasons, bipolar disorder provides a rich context to explore the ways in which positive emotion goes awry, as well as potential clinical consequences. In this paper, I will first review a series of experiments organized along three questions regarding

how positive emotion may be disrupted in bipolar disorder; namely (1) Are amplified positive emotional reactions part of bipolar disorder? (2) Is bipolar disorder associated with impaired regulation of positive emotions? and (3) Which positive emotions are impacted in bipolar disorder? Second, I will synthesize these findings and review a novel framework for understanding positive emotions in bipolar disorder. Third, I will discuss concurrent and prospective associations between clinical symptoms and positive emotion disturbance in bipolar disorder. Finally, I will touch upon potential implications for the study of positive emotions, more generally.

Greater Degree of Positive Emotion?

An emotion is defined as a brief response to salient environmental events that includes changes in subjective experience, behaviour and physiology (Lazarus, 1991; Rottenberg & Gross, 2003; Watson, 2000). Emotional reactions function to facilitate adaptive behaviour to the current environmental context. For example, positive emotions are elicited when conversing with a friend or loved one to promote social bonding, and in advantageous situations, as a sign that things are going well, enabling individuals to broaden their attention to novel ideas (e.g., Carver, 2003; Fredrickson, 1998; Shiota et al., 2006). A prominent view is that bipolar disorder is associated with large positive emotional responses both when anticipating (i.e., wanting), and in response to (i.e., liking) positive or rewarding stimuli (e.g., Berridge & Kringelbach, 2008). Specifically, some models of bipolar disorder suggest that these amplified positive responses are motivated by an overactive behavioural approach system that orients the bipolar individual to seek out and be especially sensitive to incentives in the environment (e.g., Alloy et al., 2009; Johnson, 2005). Supportive evidence includes findings indicating that individuals with bipolar disorder exhibit greater positive emotional reactivity compared to healthy controls independent of current symptom levels (Johnson, 2005; for review, see Johnson et al., 2007). With respect to self-reported emotion experience, increases in self-reported positive emotion after earning a monetary reward have been associated with higher levels of manic symptoms in a college sample (Johnson, Ruggero & Carver, 2005). Euthymic (i.e., neither currently manic nor depressed) individuals with bipolar disorder self-report greater positive affect in response to neutral photos (M'Bailara et al., 2009) and at the prospect of earning rewards in their daily lives compared to controls (Meyer, Johnson & Winters, 2001). Two experimental studies found that individuals at high-risk for and diagnosed with bipolar disorder self-reported greater positive emotion during a variety of contexts, such as when viewing positive, negative and neutral films (Gruber, et al., 2008b; Gruber, Harvey & Johnson, 2009a). Individuals at

²A second emotional theme of mania can also include irritability in addition to, or in place of, euphoria. Recent work has suggested that heightened irritability may also be experienced across contexts in individuals at risk for mania (Gruber et al., 2008b) and diagnosed with bipolar disorder in response to rewards or goals being obstructed (Johnson, 2005). Although it is important to consider broadly in the study of bipolar disorder, for the purposes of this review, the focus will be restricted to the more pleasant emotional variant of mania (i.e., elevated or positive mood).

risk for bipolar disorder have also been found to report greater positive affect in response to false success feedback (Meyer & Baur, 2009). Furthermore, two experience-sampling studies suggest individuals at high-risk for mania (Hofmann & Meyer, 2006) and those exhibiting bipolar spectrum disorders (Lovejoy & Steuerwald, 1995) report feeling elevated levels of positive affect across varied daily life circumstances. This suggests that individuals at risk for, and diagnosed with, bipolar disorder show elevated positive emotional responses across positive, negative and even neutral contexts.

Research investigating physiological responses to positive stimuli yields some data, which are (albeit mixed) suggestive of pervasive positive emotional responses across contexts. First, one startle eyeblink study demonstrated that individuals at risk for, and diagnosed with, bipolar disorder exhibited more attenuated startle while viewing photos of peaceful landscapes and pleasant imagery. Clinically diagnosed bipolar participants were not found, however, to exhibit differences in their startle reflex responses to positive photos. More pronounced startle attenuation is regarded as an indirect physiological measure that correlates with the experience of positive emotion. Another study assessing autonomic responding to emotional film clips indicated that those at high-risk for bipolar disorder demonstrated elevated levels of cardiac vagal tone, a putative parasympathetic marker of positive emotion, and resilience (e.g., Porges, 1991) to positive, negative and even neutral film clips, compared to the low-risk participants (Gruber et al., 2008a, 2008b). Neuroimaging studies further suggest that bipolar patients, compared to healthy controls, exhibit increased activity in the amygdala and putamen (Lawrence et al., 2004), as well as the orbitofrontal cortex (Elliott et al., 2004) in response to photos of human smiles (but see Yurgelun-Todd et al., 2000 and Almeida et al., 2010 for null findings). In addition, Bermophl et al. (2009) found that hypomanic and manic patients with bipolar disorder demonstrated elevated left amygdala activity in response to positive affective pictures, and this activation was correlated with concurrent manic symptoms. Neural activity in these brain regions has been associated with the experience of positive affect and reward (e.g., Ketter et al., 1997).

Although this paper is focused on positive emotion, it is important to acknowledge work that has emphasized the role of *negative* emotional responses in bipolar disorder. Of the few studies examining responses to standardized emotional stimuli, Malhi et al. (2004) found that currently depressed patients with bipolar disorder demonstrated more widespread subcortical activation in response to both negative (as well as positive) pictures. Interestingly, several studies suggest that greater negative emotional responses may emerge in bipolar disorder as symptoms of depression increase (although these studies relied on

non-traditional indices of emotion). For example, one study found that bipolar disorder was associated with performance deficits on a cognitive task after failure feedback (Ruggero & Johnson, 2006). A second study reported associations between prolonged cortisol reactivity and current depressive symptoms following a stressor in bipolar spectrum (Depue et al., 1985). Finally, left amygdala activity in currently depressed patients with bipolar disorder has also been observed in response to sad and neutral facial expressions (Almeida et al., 2010). In general, people with bipolar disorder may demonstrate greater negative emotional responsiveness during periods of depression. However, these findings do not hold when symptoms of depression are no longer present. This pattern of results concerning negative emotion reactivity suggests that any findings pertaining to negative emotional reactivity in bipolar disorder are likely correlated with the severity of the depressive symptoms. It is important to note that few studies have specifically focused on teasing apart how positive emotional processes are impacted during periods of depression in bipolar disorder. Drawing from the literature on unipolar depression, it would be plausible to predict that positive emotion reactivity would become attenuated in response to both positive and also negative (e.g., Rottenberg, 2005) stimuli during periods of depression. Future work is needed to better understand the interaction between depressed mood state and positive emotion dysfunction in bipolar disorder.

Taken together, the results above suggest that bipolar disorder is associated with greater physiological responses, indicative of positive emotion across different stimulus modalities (e.g., normative film and video clips, as well as idiographic memory recall tasks) and different valenced contexts (e.g., positive, negative and neutral). As such, results from these studies diverge from the perspective that bipolar disorder is associated with an elevated positive emotion *only* in response to positive stimuli (e.g., Johnson, 2005). Bipolar disorder appears to be associated with a persistent pattern of positive emotional response insensitive to context and present across a vast array of stimuli types.

Difficulty Regulating Positive Emotion?

Emotion regulation has been defined as 'the process by which individuals influence which emotions they have, when they have them, and how they experience and express those emotions' (Gross, 1998, p. 227). In this paper, I focus specifically on regulatory processes referred to as spontaneous emotion regulation, in which individuals naturally engage. Emotions are typically conceived of as brief responses that decay in intensity over time. In healthy populations there is a general homeostatic effort to return to someone's baseline emotional state following

an emotion-relevant event. This natural decline in emotion, following an emotional event is referred to as emotion recovery (Davidson, 1998). Examining emotion recovery in bipolar disorder provides an opportunity to understand whether individuals with bipolar disorder exhibit trouble regulating positive emotions.

Recent empirical studies suggest that bipolar disorder involves difficulties in emotion recovery (Green et al., 2007); Gruber, 2011; Gruber, Eidelman & Harvey, 2008a; Johnson et al., 2007; Leibenluft, Charney, & Pine, 2003). Specifically, several studies suggest that people with bipolar disorder, relative to healthy controls, exhibit prolonged emotional responses following the removal of both positive and negative stimuli. First, using a startle eyeblink paradigm, participants with bipolar disorder continued to exhibit heightened startle eyeblink magnitude during a 3–5 s period, following the presentation of positive and negative, but not neutral photos, whereas unipolar depressed and healthy control participants did not exhibit this prolonged response (Forbes et al., 2005). Second, Depue et al. (1985) reported that college-aged participants with bipolar spectrum continued to exhibit higher cortisol (a corticosteroid hormone associated with the experience of stress) levels, 3 h after a stressful math task, compared to controls. Together, these empirical demonstrations of prolonged, heightened physiological responses to emotion-eliciting stimuli suggest that individuals with bipolar disorder may be characterized by difficulty in decreasing emotional responses over time. Third, related work by Goplerud and Depue (1985) found that cyclothymic participants exhibited a more sustained change in mood, behaviour and cognitions by following a stressful event. Fourth, a recent body of work suggested that bipolar participants demonstrate a tendency to dwell on positive feelings and thoughts by following a positive life event, rather than return to the baseline. This has been referred to as 'positive rumination.' Work indicates that trait positive rumination may uniquely differentiate bipolar disorder from both healthy controls (Gruber, Mauss and Tamir, 2011) and major depressive disorder (Johnson, McKenzie, & McMurrich, 2008). Positive rumination has also been found to be correlated with greater symptoms of hypomania in college samples (Feldman, Joormann, & Johnson, 2008; Raes, Daems, Feldman, Johnson, & Van Gucht, 2009). Another study found that individuals with bipolar disorder report greater positive emotion when instructed to engage in positive rumination compared to adopting a more reflective third-person perspective (Gruber & Johnson, 2009). Finally, a study by Farmer et al. (2006) demonstrated that after a positive mood induction, remitted patients with bipolar disorder reported sustained elevations in self-reported happiness relative to controls across four different sampling periods throughout an experiment. These studies suggest that bipolar individuals have trouble in spontaneously recovering from emotional events that may, in part,

be explained by a tendency to dwell on and amplify positive emotional states. In summary, research investigating on physiological, behavioural and cognitive responses to emotional stimuli in bipolar disorder has converged to form a general consensus that these individuals experience trouble in regulating positive emotions following an emotional provocation compared to healthy individuals.

Which Positive Emotions Are Impacted?

Several studies suggested that people with bipolar disorder generally report higher global positive affect in their everyday lives than those without the disorder (Bagby et al., 1996; Hofmann & Meyer, 2006; Lovejoy & Steuerwald, 1995). It is unclear, however, which specific positive emotions are operating in these studies. Recent advances by affective scientists have begun to uncover a diverse landscape of positive emotions that differ in their function, design and response profile (e.g., Fredrickson, 1998; Shiota, et al., 2006; Tracy & Robins, 2004). This includes differentiating between emotions associated with the consumption or liking of rewards (e.g., joy; Berridge & Kringelbach, 2008; Rolls, 2000), self-focused achievement (e.g., pride; Tracy & Robins, 2004) and those that promote prosocial behaviours and connection with others (e.g., love and compassion; Bowlby, 1979).

Recent research has suggested that bipolar disorder is associated with elevations in positive emotion specific to reward and achievement-oriented emotions relative to prosocial emotions. Specifically, my colleagues and I have found that people at risk for bipolar disorder reported trait levels of reward (e.g., joy) and achievement-oriented emotions (e.g., pride) relative to other-oriented prosocial emotions such as compassion. Supportive evidence includes data indicating that individuals at putative risk for bipolar disorder also report elevated levels of joy and pride, but not compassion, in response to positive, negative and neutral film clips (Gruber & Johnson, 2009; Gruber et al., 2008b).

Associations between bipolar disorder and reward-relevant positive emotions is consistent with the notion that patients with bipolar disorder engage in heightened pursuit of rewards and responsivity to reward (e.g., Berridge & Kringelbach, 2008). More specifically, a central psychosocial factor associated with bipolar disorder involves excessive pursuit of rewards (e.g., Johnson, 2005). Research has demonstrated that people at risk for, and diagnosed with, bipolar disorder report greater excitement at the prospect of earning or 'wanting' rewards (Meyer et al., 2001). Bipolar disorder is also associated with high levels of overly ambitious goal setting (Gruber & Johnson, 2009; Johnson, 2005). For example, undergraduates at risk for bipolar disorder endorse highly ambitious aspirations (Johnson &

Carver, 2006). Interestingly, there are age-related differences in the experience of rewarding emotions in individuals with bipolar disorder. Specifically, a recent study of middle-aged remitted patients with bipolar disorder reported lower levels of reward-relevant emotions such as joy relative to a non-psychiatric comparison sample (Gruber et al., 2009b). These findings point to the possibility of age-related and illness-related changes in how positive emotions are impacted by a diagnosis of bipolar disorder. Over time, diagnosed patient samples often endured more social and occupational disruptions, as well as co-morbid medical conditions, that may reduce opportunities for experiencing joy relative to a younger undiagnosed college sample. It may also be the case that psychotropic medications, especially those with sedative effects, dampen the experience of high arousal emotions such as joy.

It is possible that bipolar disorder would be associated with extreme prosocial emotions such as compassion. This expectation is grounded in clinical observations of mania involving overly intimate social encounters, such as initiating conversations with strangers or sexually promiscuous behaviours (American Psychiatric Association, 2002). As noted above, initial work has not supported the speculation that bipolar disorder is associated with excessive elevations in compassion (Gruber et al., 2008b; Gruber & Johnson, 2009). However, a major limitation of this incipient line of research has been its constrained ecological validity in the methods used to elicit and capture compassion-related behaviour. Compassion is an emotion embedded within rich social contexts; one experiences compassion in interacting with others and trying to soothe others in distress or pain. It is important that future work on compassion be conducted in more social and interpersonal contexts (e.g., dyadic interaction paradigms, experience-sampling studies of naturally occurring social exchanges). Emerging evidence suggested that this line of inquiry will be promising. Specifically, when communicating emotion via touch, individuals at risk for mania tended to attribute increased prosociality (e.g., love) across a variety of touches received from an unknown partner (Piff, Purcell, Gruber, Hertenstein, & Keltner, 2011). This suggests that mania may be associated with a bias towards perceiving the emotions of others as overly prosocial and compassionate. Future work is warranted to disentangle whether bipolar disorder is also associated with elevations in compassion or is specific to reward-relevant positive emotions.

RETHINKING POSITIVE EMOTION DISTURBANCE IN BIPOLAR DISORDER

There is a widespread consensus that individuals with bipolar disorder exhibit a heightened positive emotionality.

The data reviewed suggest that this amplified positive emotion may extend across different types of emotional situations or contexts. Specifically, the studies reviewed converge on the claim that individuals with bipolar disorder respond to positive stimuli with reports of happiness and physiological indicators of positive emotion. Quite remarkably, however, such individuals *also* show a similar pattern of emotional responding to sad, disgusting and even neutral stimuli as they do to positive stimuli. In other words, bipolar disorder appears to be associated with heightened positive emotional responses across different stimulus types, manifested as an expansive and persistent pattern of pleasant emotional responses across the differing contexts. Individuals with bipolar disorder spontaneously engage in regulatory strategies that promote the persistence of positive mood states.

I have labeled this emotionally expansive pattern of pleasant feelings evident in bipolar disorder *positive emotion persistence* (PEP; Gruber, 2011). PEP can be distinguished from non-clinical populations characterized by high levels of trait positive emotion, characterized in the literature as 'very happy people' (Diener, & Seligman, 2002). Although very happy people report high levels of positive emotion more generally relative to a control group, they do not exhibit a persistent elevation in the intensity of positive emotion reactivity in inappropriate contexts. That is, such very happy people should be able to adaptively shift their emotional responses in order to decrease positive emotion when the context warrants such responses. By contrast, a core feature of PEP involves a lack of flexibly shifting their emotional responses to match the context. This psychological inflexibility inherent in PEP leads to the elevated positive emotional responses to a variety of emotional (positive and negative) and non-emotional (neutral) contexts.

Although PEP is a new label, it is consistent with previous accounts of bipolar disorder. First, PEP is consistent with the naturalistic descriptions of the emotional behaviour of people with bipolar disorder. For example, patients with bipolar disorder (especially during a manic state) often exhibit intense and unchanging euphoria in situations that are not only inappropriate but also potentially dangerous (e.g., sexual liaisons with strangers; Nesse, 2004). Behavioural observations further note an inappropriate behaviour in innocuous contexts such as excessive laughter and 'exuberant speech' (Bech, 2002) and more animated gestures (Young et al., 1978). Second, PEP is consistent with the patients' (with bipolar disorder) qualitative accounts of their own disorder, which often feature unrelenting feelings of emotional expansion (e.g., Jamison, 2004; Hornbacher, 2008). Third, PEP is consistent with recent empirical findings of positive emotion in bipolar disorder as reviewed earlier in this paper.

This new account for understanding positive emotion disturbance in bipolar disorder needs to be interpreted

within the confines of several caveats. First, future work is needed to more conclusively examine whether PEP holds across a vast array of stimuli types (i.e., idiographic) and contexts (individual experimental versus dyadic interactions). Second, work thus far to date has primarily focused on relatively asymptomatic bipolar populations. Work to date suggests that PEP is a trait-like feature of bipolar disorder. Further work would go a long way towards elucidating interactions between PEP and current mood state, however. It is possible that a current mood state of mania, for example, may amplify PEP while periods of depression might slightly attenuate patterns of emotional responding consistent with PEP. Third, there is a limited understanding of the biological underpinnings of PEP. Indeed, as greater knowledge is empirically gathered regarding bipolar disorder and the function of positive emotions more generally, additional insights will follow.

What is the clinical significance of PEP? Clinical anecdotes point readily to the potential hazards of unyielding positive emotions in bipolar disorder, as illustrated by the quote at the beginning of this paper. It becomes clear that a state of intense positive emotion, as is the case in mania, can lead individuals to neglect important life problems and approach potentially dangerous situations. Could it be the case that the unyielding persistence in feeling good is a precursor to relapse? Despite its importance, few studies to date have explored the clinical significance of positive emotion persistence in bipolar disorder.

Emerging evidence suggests that patients with bipolar disorder, who exhibit more pronounced disturbance in positive emotion, may face a worse prognosis. For example, several studies suggest that self-reported sensitivity to positive stimuli predicts increases in manic symptoms over time (Johnson, 2005; Meyer et al., 2001). Greater reports of reward-relevant emotions, such as joy also predict increased manic symptom severity at a 6-month follow-up in clinically diagnosed patients with bipolar disorder (Gruber et al., 2009a). Overall, these findings suggest that increased levels of reward-related positive emotions across contexts and heightened reactivity to positive stimuli (consistent with the pervasive pattern of positive emotion in PEP), are associated with a poorer illness course and impaired functioning in bipolar disorder. At the same time, mood in bipolar disorder has been shown to account for less of the variance in manic symptoms than depressed mood across several independent factor analyses (e.g., Cassidy et al., 1998). Second, there are multiple pathways that predispose individuals with bipolar disorder to experience manic symptoms that appear unrelated to positive emotion, including negative cognitive styles (e.g., Alloy et al., 1999; Mansell & Pedley, 2008) and impulsivity (Swann et al., 2008). Given the incipient nature of this line of prospective research, it will be important for future work to carefully ascertain the clinical significance of PEP.

DIRECTIONS FOR FUTURE RESEARCH

This review suggests that studying bipolar disorder could yield important insights about the potential ways positive emotion can be disrupted. Three major directions for future research are highlighted below. First, what potential metacognitive beliefs could be fostering the maintenance of positive emotion in bipolar disorder? Metacognition refers to the processes and structures by which a person is able to examine the content of his emotions and make judgments about it (e.g., Dunlosky & Metcalfe, 2009). One hypothesis is that individuals with bipolar disorder possess a pattern of metacognitive beliefs that may cause them to engage in strategies to enhance positive emotions (e.g., 'Feeling happy is an important part of who I am') and interfere with down-regulating such feelings (e.g., 'It is wrong to tune-down my happiness'). A second possibility is that individuals with bipolar disorder tend to engage in a more present-oriented temporal frame that is associated with immediate pleasure seeking (referred to as 'present hedonistic'; Zimbardo et al., 1997; Zimbardo & Boyd, 1999). Continuing work in this area using multi-method investigations will be critical in untangling the bifurcation between emotional disruptions in everyday life despite the ability to overcome when instructed (Gruber, Cunningham, Kirkland & Hay, in press).

Second, is the persistence of positive emotions evident across other clinical disorders? One route to address this question is to examine how positive emotional processes manifest across a variety of disorders by taking a 'transdiagnostic' approach (Harvey, Watkins, Mansell, & Shafran, 2004; Kring, 2008). This approach capitalizes on the observation that many psychological processes are not confined to a specific disorder, but rather is evident in varying degrees across a host of different disorders. For example, heightened positive emotion reactivity is evident in both pathological gambling and substance abuse (e.g., Goudriaan et al., 2004; Spanagel & Weiss, 1999). Furthermore, behavioural displays of excessive positive affect, including chronic and inappropriate laughing and smiling, is evident in Angelman syndrome (resulting from a deletion at chromosome 15q11-q13), suggesting a potential genetic basis for excessive positive affect (Williams et al., 2006). These findings suggest the importance of examining PEP not just in bipolar disorder, but that it may be an important process across several disorders.

Finally, to turn to a more general question about positive emotion, can milder experiences of positive emotion or happiness also be maladaptive in certain contexts or intensity levels (for further discussion see Gruber, 2011)? Although the case for the dangers of positive emotion in bipolar disorder is clear, future work is needed to delineate the potential downside of the milder states of hypomania and positive emotions more generally in healthy non-clinical populations. Recent empirical work was cited pointing to the potential disadvantages of positive emotion, including engagement in

risky behaviours (e.g., Cyders & Smith, 2008) to increased selfishness and intergroup discrimination (Forgas & Fiedler, 1996; Tan & Forgas, 2010). Indeed, it appears that positive emotions may not always be beneficial in a more general sense. Careful assessment of emotional responses across the range of positive mood states may help reveal whether even milder positive feelings may, at times, lead to undesirable outcomes.

CONCLUDING REMARKS

There is a strong human desire to achieve and experience happiness. Indeed, the pursuit and experience of positive emotions is often seen as an indicator of psychological health (Fredrickson, 1998). As discussed earlier in this paper, positive emotions facilitate the pursuit of important goals, formation of vital social bonds and broaden our scope of attention to enable processing of new ideas and stimuli in the environment. Despite these advances in our understanding of the benefits of positive emotions, there has been a relative neglect in discussing the potential disadvantages of positive emotions.

This paper focuses on bipolar disorder as a focal point to examine one way in which positive emotions may go awry. Bipolar disorder represents a unique clinical opportunity to make the case for the disadvantages associated with positive emotions, given extreme states of positive emotion and mood associated with the disorder. Indeed, studying clinical disorders with extreme variants in a given emotion state have the potential to elucidate our understanding of positive emotion as a natural kind (Barrett, 2006), perhaps by tearing apart classes of positive emotions tied to reward (but not those tied to non-reward prosocial triggers) that are uniquely impacted in specific illnesses.

This review suggests that bipolar disorder was associated with heightened magnitude of positive emotions across contexts, specific elevations in emotions related to reward and achievement and a tendency to engage in strategies that promote an upward spiral of positive mood states. From this review, I argue that troubled emotional functioning in bipolar disorder might be explained by an unrelenting experience of heightened positive emotions regardless of the external context. I also considered the question of how positive emotion may lead to undesirable outcomes more generally. In conclusion, what causes happiness to go awry might be the persistence of good feelings in situations that clearly call for wariness to potential threats or remorse over the loss of resources or loved ones. Future research has yet to explore the intricate ways in which positive emotions may not always be for our benefit; in fact, feeling 'too' good may actually be detrimental. Nesse's (2004) account of diagonal psychology also points to a dearth of work examining the upside or advantages of negative emotions as the second quadrant that has been less

explored along with the downside or disadvantages of positive emotions.

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