Tracking the emotional highs but missing the lows:

Hypomania risk is associated with positively biased empathic inference

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In Press at: *Cognitive Therapy and Research*

Word Count: 4,344
Tables: 1
Figures: 1

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Abstract

Empathy plays a vital role in emotional and social functioning. Research suggests that empathy may be disrupted in disorders of negative emotion (e.g., depression, anxiety), though less work has examined how empathy is impacted in disorders of positive emotion (e.g., mania), which are associated with positive biases in emotion experience and perception. The present research explored how variation in self-reported hypomania risk was associated with performance on an objective empathic accuracy (EA) task for real-world targets. Risk for hypomania was associated with heightened moment-by-moment detection of emotional up-shifts (i.e., increases in positive emotion) for targets describing positive events; however, it was also associated with overly-positive retrospective ratings (i.e., overestimating global positive emotion) for targets describing negative events. These findings suggest that hypomania risk may lead to positive biases in detecting others' emotion across both positive and negative life events when using both micro-level continuous and global retrospective emotion measures.

(Word count: 149)

Key words: Hypomania risk, empathic accuracy, positive emotion

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Although positive emotions are vital to many core social processes, overly intense or frequent positive states can also produce social costs (e.g., Gruber, 2011; Gruber, Mauss & Tamir, 2011). Such social costs have been demonstrated in populations characterized by heightened and persistent positive emotion, including individuals at risk for or with a clinical history of mania (Gruber, 2011). For example, individuals with a clinical history of mania report less social support from close and distant relationship ties, and reduced quality of social interactions (e.g., Romans & McPherson, 1992). As such, understanding social effects of hypomania risk can critically inform our understanding and treatment of affected individuals (e.g., Miklowitz & Johnson, 2006).

One key component in the development and maintenance of social relationships is empathy, which includes attending to, sharing in, and accurately perceiving others' subjective experiences (Zaki & Ochsner, 2012). Although empathy has often been studied in populations that experience heightened negative emotion (e.g., major depressive disorder; Wright et al., 2009), less is known about empathic processes among individuals who experience abnormally elevated positive emotion levels, such as those at risk for or with a clinical history of mania (e.g., Gruber, 2011). Among this population, prior research has suggested that empathic deficits are associated with impairments in social functioning (Cusi, MacQueen, & McKinnon, 2010).

Prior research demonstrates that individuals with risk for or with a clinical history of mania exhibit difficulties across several processes involved in empathy, including perspective-taking, theory of mind (ToM), and perception of others' emotion (e.g., Samamé, Martino, & Strejilevich, 2011). For example, individuals at risk for and with a clinical history of mania self-report engaging in less perspective-taking, defined as adopting and understanding the viewpoints of others (e.g., Cusi et al., 2010). Across various tests of ToM, which assess one's ability to attribute mental states and beliefs to others, individuals with bipolar disorder exhibit poorer ToM performance than healthy controls during depressive and manic mood episodes, but not during remission (Kerr, Dunbar, & Bentall, 2003); however, other studies have found ToM deficits even during periods of remission (Montag et al., 2010). Clinically manic individuals have been found to misidentify negative facial expressions (e.g., fear, disgust) but are accurate in identifying positive facial expressions (e.g., happiness), thereby suggesting a potential positive bias in emotion facial recognition (Lembke & Ketter, 2002). Furthermore, subsyndromal mania symptoms in non-clinical samples predict greater biases in perceiving positive emotion during distressing dyadic interactions with a romantic partner (e.g., Dutra et al., 2013) and in misperceiving hostile non-verbal touches from strangers as positive (e.g., Piff et al., 2012). Taken together, it seems risk for mania or hypomania may lead to positive biases in perceiving others' emotional expressions and behaviors. This could potentially adversely affect empathy and have consequences for overall social functioning, particularly when faced with a target in a negative emotional state.

However, a few critical gaps remain. Most work to date on empathic deficits among individuals at risk for or, with a clinical history of, mania has assessed empathy through the use of static stimuli (e.g., photographs of caricature expressions), as opposed to more dynamic and ecologically valid social stimuli (e.g., videos of real-world targets). One type of task that utilizes video stimuli to provide a naturalistic assessment of emotion perception is the empathic accuracy (EA) task (e.g., Zaki, Bolger, & Ochsner, 2008; 2009). Such tasks more closely mirror everyday social exchanges, which require incorporating social cues from multiple channels (facial, vocal, etc.) in order to draw ongoing inferences during a dynamic social exchange (Lee, Zaki, Harvey, Ochsner, & Green, 2011; Zaki & Ochsner, 2009). In addition, no work to date has concurrently examined the relationship between hypomania risk and the ability to accurately perceive a target person's emotions using both a micro-level *continuous* measurement of second-by-second shifts in online emotional experience and a more macro-level *retrospective* measurement of the overall impression of the target's emotion experience. Importantly, EA tasks allow for this more nuanced analysis of emotion perception. Lastly, it is unclear if biases in emotion perception will persist across positive and negative contexts; therefore, the present study examined how risk for hypomania may be linked to positive biases in EA toward targets describing both positive versus negative emotional life events.

The Present Investigation

The present investigation sought to examine how hypomania risk contributes to two aspects of empathy: (1) *emotion experience* upon encountering another person's emotions, and (2) accurate *emotion perception* (i.e., EA) of that target's emotions. Among a large analogue sample of young adults who completed a self-reported measure of hypomania risk (Eckblad & Chapman, 1986), we employed a validated and standardized EA task (Zaki, Bolger, & Ochsner, 2008; 2009) that involved watching videos of real-world targets describing positive or negative life events. This enabled us to test two main study aims. The first aim focused on hypomania risk and emotion experience during the EA task. Given that hypomania risk has been associated with increased positive emotion experience across positive, neutral, and negative contexts (e.g., Gruber, 2011; Gruber et al., 2008), we predicted that hypomania risk would be associated with greater positive emotion while targets described both positive and negative life events, thus extending previous literature to more dynamic social stimuli (**Hypothesis 1**). The second aim focused on associations between hypomania risk and emotion perception, and is the first study of our knowledge to address this question across both micro-level (moment-by-moment continuous reports) and macro-level (retrospective global reports) measurements. Given prior work associating hypomania risk with inaccurate and overly positive biases in their interpretation of others' emotional expressions (Dutra et al., 2013; Piff et al., 2012), we predicted that hypomania risk would be significantly associated with greater positive biases in emotion perception across both positive *and* negative contexts (**Hypothesis 2**).

Method

Participants

The sample was comprised of 121 young adults (57.0% female; 47.1% Caucasian; *M* age=20.07; *M* years of education=13.66) from Yale University or the New Haven, CT community who received course credit or $10 for their participation. Power analyses (using standard estimates of adequate power of 0.90) suggested that our sample size was adequately powered to detect a medium effect size (i.e., $\eta_p^2 \geq 0.1$). The present investigation of the relationship between HPS and EA was examined within a study designed to test the state effects of positive emotion on EA, which included an experimental manipulation of mood (i.e., positive vs. neutral). The findings in the present study were unaffected by this experimental induction; namely, all results reported remain the same when the mood condition was included as a covariate.

Hypomania Risk Measure

The Hypomanic Personality Scale (HPS; Eckblad & Chapman, 1986) is a well-validated measure of hypomania risk with strong predictive validity for the onset of manic and hypomanic episodes (Eckblad & Chapman, 1986; Kwapil et al., 2000). The HPS is comprised of 48 true/false statements (e.g., "I often feel excited and happy for no reason") that tap into affective, cognitive and behavioral domains. The mean HPS score was 19.31 (*SD*=8.58) and the scale demonstrated high internal consistency (α=.87). In the current sample, 4.1% (*n*=5) of participants fell within the clinically high-risk group, according to cut-offs established in prior research (scores ≥ 36; Kwapil et al., 2000). Thus associations between continuous HPS scores (*M*=19.31, *SD*=8.58) were used in the present investigation. Prior work has found that HPS scores correspond to bipolar disorder diagnoses (e.g., Eckblad & Chapman, 1986) and current mania symptoms (Klein, Lewinsohn, & Seeley, 1996). Previous research studies have used the HPS as a continuous measure of hypomania risk and uncovered similar outcomes to those found among individuals with bipolar disorder (e.g., Eisner, Johnson, & Carver, 2010, Study 2; Giovanelli, Hoerger, Johnson, & Gruber, 2013; Jones, Shams, & Liversidge, 2007; Thomas & Bentall, 2002).

EA Task

The EA task and stimuli were taken from existing work (see Zaki et al., 2008; 2009). Specifically, a prior sample of participants (whom we refer to as "targets") was videotaped while discussing positive and negative emotional events from their lives. After recording the videos, targets watched their videos back and provided continuous ratings of how they had felt while discussing the event, using a 9-point sliding scale from *extremely negative* to *extremely positive*, allowing targets to continuously update their emotion rating throughout the clip. After filming the video, targets also provided global ratings of the experience of three negative emotions (i.e., sadness, anger, fear) and two positive emotions (i.e., contentment, amusement) on a scale from 1 (not at all) to 9 (extremely). In the current study, a new sample of participants watched four of these videos, including two positive video clips (high and low intensity) and two negative video clips (high and low intensity). The high-intensity positive video described receipt of a childhood ballet scholarship (102*s*), the low-intensity positive video described a late-night drive through the desert (117*s*), the high-intensity negative video described the death of a parent (181*s*), and the low-intensity negative video described a dispute with a landlord (113*s*). Videos were blocked together by valence, and block order was counterbalanced across participants.

Emotion Experience

After viewing each video, participants in the present sample reported on the degree to which they were currently experiencing six positive emotions (i.e., contentment, amusement, joy, gratitude, love, and pride) and three negative emotions (i.e., anger, sadness, fear) on a 1 (not at all) to 9 (extremely) scale. These items were then averaged to create composite PA (all αs > .69) and NA (all αs > .50) scores for the participant's self-reported emotion experience after each video.

Emotion Perception

Two types of emotion perception were measured including (1) EA - continuous (**EAC**) and (2) EA - global (**EAG**), to determine participants' accuracy in perceiving targets' emotions at the micro and macro level, respectively. For EAC, participants watched each of the four video clips and provided second-by-second online ratings of how they perceived the target to be feeling at each moment of the video, which captures participants' abilities to track micro-level fluctuations in the target's emotions. The text "how did this person feel while talking?" was displayed with a 9-point continuous rating scale (from *extremely negative* to *extremely positive*) on the screen directly beneath the video to allow for continuous rating while viewing the clip. Participants were instructed to adjust their rating any time they sensed a change in the target's emotional state, just as the target had done in rating their own emotions during the video. For each video, the participants' continuous inferences about targets' affect were compared to targets' continuous self-report to produce an *online EAC measure*. Following the analytic strategy used in prior research (Zaki et al., 2008; 2009), affect-rating data from both the target and perceiver were averaged across 2*s* periods, and each 2*s* mean served as a time-point in the subsequent analyses. Targets and perceiver ratings were then correlated, yielding coefficient referred to as an online empathic accuracy score for each perceiver-clip combination (Zaki et al., 2008). Coefficients were r-to-Z transformed using the Fisher technique so as to be normally distributed for the analyses.

In addition, a second measure of EAC involved quantifying participants' sensitivity to positive and negative *changes* in the target's self-reported emotions, which we term as *accuracy for affective change* (AAC). This measure allows for a more nuanced analysis of participants' differential sensitivity to micro-level positive and negative changes in each target's emotions. Emotional changes were calculated by computing the first derivative, or rate of change, in both target and perceivers' affect ratings. As a concrete example, the change in emotion rating at time interval t will be the rating at time interval t minus the rating at time interval (t-1), and will be positive if there is an increase in the rating (i.e., an "emotion upshift" or positive change in the online rating), and negative if there is a decrease (or "emotion downshift") in the rating. We can further isolate only the emotion upshifts by looking at when the derivative was positive. Perceivers' judgments of positive changes in the target's emotions were then correlated with the target's own positive changes to get a score for the perceivers' differential sensitivity to positive changes in emotion in that particular video. This was similarly repeated for negative changes to identify sensitivities to negative changes in emotion. See Figure 1 for an illustration of how EAC and AAC can track orthogonal components of empathy.

For EAG, participants rated the degree to which they thought the target had experienced each of the following emotions overall after the film clip ended: contentment, amusement, sadness, anger, and fear, using the same anchors that had been provided to targets when rating their own emotions post-video. These individual items were again averaged to compute PA and NA subscales. EAG scores were computed as the absolute value of the difference score between the participant's perceptions of the target's global affect and the target's actual self-reported global affect; therefore, higher scores indicate greater discrepancies (or biases) in retrospective EAG. As such, we will henceforth refer to this as "errors in EAG" when describing the results of the present study for the sake of clarity

Current Symptom Covariates

In order to examine the impact of hypomania risk independent of current symptom severity, both mania symptoms and depressive symptoms were assessed. Mania symptoms were measured using the 5-item Altman Self-Rating Mania Scale (ASRM; Altman, Hedeker, Peterson, & Davis, 1997), which assesses heightened cheerfulness, inflated self-confidence, reduced need for sleep, talkativeness, and excessive activity over the past week. Depressive symptoms were measured using the Beck Depression Inventory Short Form (BDI-SF; Beck & Beck, 1972), which is a 13-item self-report measure that taps into current affective, cognitive and somatic symptoms of depression over the past week. Internal consistency was adequate for the ASRM (α=.72, *M*=11.90, *SD*=4.02) and BDI (α=.78, *M*=5.00, *SD*=4.03). HPS, BDI, and ASRM were assessed for skewness and kurtosis. BDI was the only variable that was skewed (positively skewed), and was therefore log-transformed for analyses.

Results

To test our first hypothesis regarding the relationship between hypomania risk and emotion experience, we ran a multivariate regression. The predictor variable in this regression was hypomania risk and the outcome variables included self-reported emotional experience for both positive and negative emotions while watching each video of the EA task (i.e., high-intensity negative, high-intensity positive, low-intensity negative, and low-intensity positive). All reported *p* values are two-tailed and reported beta values are standardized coefficients. Contrary to Hypothesis 1, hypomania risk was not significantly related to self-reported positive or negative emotion after viewing the videos overall ($F(8,112)=1.12$, $p=.35$); hypomania risk was significantly associated with higher positive emotion experience only after viewing the high-intensity negative video ($\beta=0.186$, $t\,(119)=2.07$, $p=.041$), but was not significantly associated with positive emotion experience after viewing the low-intensity negative video or either of the positive videos (*p*s > .24).

Next, we examined the second study hypothesis regarding the relationship between hypomania risk and emotion perception. As previously described, three continuous empathic accuracy (EAC) variables were calculated from the EA task – online EAC, AAC sensitivity to upshifts, and AAC sensitivity to downshifts. Separate regressions were conducted to examine the relationship between hypomania risk and these three continuous EAC variables. Risk for hypomania was not significantly associated with online EAC collapsed across all four videos ($F(4,116)=.48$, $p=.75$), or toward any of the four targets individually (*p*s>.31), suggesting that risk for hypomania does not interfere with the ability to accurately track continuous fluctuations in targets' emotions for positive or negative life events. Additionally, hypomania risk was also not associated with sensitivity to negative changes in emotion for any of the four videos ($F(4,116)=.16$, $p=.96$), or towards any of the four individual targets (*p*s>.47). Hypomania risk was marginally positively associated with sensitivity to positive changes (i.e., upshifts) in targets' emotions overall ($F(4,116)=2.36$, $p=.057$). On closer examination of the individual videos, we found that hypomania risk was significantly associated with sensitivity to positive changes in the target's emotions only in the high-intensity negative video ($\beta=0.179$, $t\,(119)=1.98$, $p=.049$) and low-intensity positive video ($\beta=0.223$, $t\,(119)=2.49$, $p=.014$), but was not associated with sensitivity to positive changes in the other two videos (*p*s>.41). As predicted, this suggests that greater hypomania risk contributes to greater sensitivity to positive changes in others' emotions, although this appears to depend on context. The present results suggest that hypomania risk does not hamper online empathic accuracy, and instead might even enhance in-the-moment sensitivity to positive changes in a target's emotions in some cases.

Separate regressions were used to examine the relationship between hypomania risk and global retrospective attributions, for both positive and negative emotion (i.e., attributions that participants made about the target's global positive and negative affect after watching the entire video). As hypothesized, hypomania risk was significantly associated with greater errors in global empathic accuracy (EAG) for positive affect ($F(4,116)=2.58$, $p=.04$). Upon examining the individual videos, this seemed to be primarily driven by a significant association of hypomania risk with increased errors in estimating PA for the high-intensity negative target ($\beta=0.26$, $t\,(119)=2.93$, $p=.004$) and low-intensity negative target ($\beta=0.17$, $t\,(119)=1.84$, $p=.069$). Greater risk for hypomania did not predict errors in detecting global PA in individuals who described positive life events (*p*s>.5). Taken together, these findings support the hypothesis that hypomania risk is associated with a bias towards overestimating global positive emotion in others, but this only seems to apply in emotion-incongruent contexts, such as when faced with individuals in distress. Hypomania risk was not significantly associated with errors in global empathic accuracy

(EAG) for negative affect overall ($F(4,116)=0.88$, $p=.48$), or for any of the individual videos (all *p*s > .08), suggesting that hypomania risk does not interfere with retrospective empathic accuracy regarding targets' global negative emotion.

Secondary analyses examined if the observed relationships were due to other mood symptom covariates. Parallel results emerged when re-running analyses controlling for current manic symptoms (ASRM) and depressive symptoms (BDI), except that the association between hypomania risk and AAC (via sensitivity to positive changes) for the high-intensity negative video was no longer significant (see **Table 1**).

Discussion

Whereas much of the prior work on empathy among individuals at risk for or with a clinical history of mania has used static stimuli, the current study aimed to utilize more naturalistic, dynamic social stimuli (i.e., videos of targets discussing emotional events) in order to investigate the relationship between hypomania risk and empathy. This allowed for a nuanced analysis of emotion perception abilities through both micro-level continuous and macro-level retrospective measures. Furthermore, the present study examined how increased risk for hypomania may be linked to positive biases in emotion experience and perception in the face of targets describing positive versus negative emotional life events. Regarding emotion experience, hypomania risk was associated with increased positive emotion as hypothesized; however, this relationship was only significant in viewing a target who discussed a high-intensity negative event. This may be due to the fact that positive emotion experiences were quite common across all participants when viewing targets discuss positive (or mildly negative) events, and therefore, the high-intensity negative video was the only context that was sensitive enough to pick up a striking difference in persistent positive emotion experience.

Regarding emotion perception, the findings provide support for our overarching prediction that hypomania risk would predict positive biases in EA, and this dovetails with prior research on the overly positive biases in interpreting others' behaviors often found among individuals at risk for mania (e.g., Dutra et al., 2013; Piff et al., 2012). We extended this prior work by examining emotion perception across two levels of assessment (e.g., continuous and global) and across both positive and negative events, which uncovered some interesting findings regarding how these positive biases in emotion perception may serve as both a potential strength and weakness. Regarding potential weaknesses, retrospective global reports revealed that hypomania risk was associated with an overestimation of positive emotion in targets who had described a negative (but not positive) event. It is of note that this finding was no longer significant when controlling for mood covariates (i.e., current manic and depressive symptoms); however, this may be an issue of statistical power given that the original finding was just below the threshold of significance. Furthermore, these mood covariates were not significantly associated with any emotion perception outcomes on their own, suggesting that the measured aspects of emotion perception appear more closely related to trait-like hypomania risk than state-dependent mood factors.

Regarding potential strengths, continuous online measures revealed that hypomania risk was associated with a heightened sensitivity to moment-to-moment positive changes in emotion toward the low-intensity, but not high-intensity, positive target. This could be due in part to the nature of the videos used. Specifically, the high-intensity positive target maintained a relatively stable level of high positive affect with few emotion shifts for most of the video, and this emotion expression may have been easier for all participants to identify, thereby limiting our ability to detect effects. Given prior work on elevations in the Behavioral Activation System

(BAS) among individuals at risk for or with a clinical history of mania (Alloy et al., 2012; Johnson, 2005; Stange et al., 2013), it seems possible that this heightened sensitivity to others' positive emotion upshifts could in part represent an approach tendency toward potential forms of social reward among individuals at greater risk for hypomania. Future work is needed to explore this and related conceptual opportunities.

Therefore, it seems that the potential link between hypomania risk and positive biases in emotion perception may have both strengths and drawbacks. Retrospectively, risk for hypomania may be associated with a tendency to inaccurately overestimate the global levels of positive emotion being experienced by a target in distress. However, in-the-moment, risk for hypomania is associated with a heightened sensitivity to detect upshifts in positive emotion among individuals describing positive events. These findings advance our understanding of the relationship between hypomania risk and emotion perception within a non-clinical sample, and provide some indirect evidence of how experiences of persistent positive emotion more generally might impact the ability to relate to others.

The current findings have implications for advancing our understanding of the interpersonal disturbances among individuals with various forms of positive emotion persistence, including individuals at risk for or with a clinical history of mania. The present findings are consistent with previous models of positive emotion disturbance in bipolar spectrum disorders (e.g., Gruber, 2011) and also extend this work in important ways. For example, these findings suggest that sensitivity to positive emotional cues may not only be associated with heightened positive emotion experience but may also lead to overly positive estimates in the emotional perception of others. Specifically, these findings seem to suggest that this positive bias in emotion perception may play out across various contexts, towards both positive targets (in a heightened sensitivity to their positive emotion changes) and negative targets (in a global overestimation of positive emotion experienced). Questions remain regarding if the current findings are a result of context insensitivity or a more general inability or unwillingness to shift emotion perception appropriately across contexts.

The study findings suggest that individuals at greater risk for hypomania may have particular difficulty with emotion perception toward individuals in distress, particularly when thinking back on the interaction more globally. It seems possible that this could manifest as a miscalibrated “EA radar” in perceiving the level of positive emotion being experienced by others in distress (e.g., perhaps overestimating the degree to which others are amused or joking). This is consistent with literature that has found individuals with a clinical history of mania often disregard advice perceived as negative from concerned others (Mansell & Lam, 2006). Given that social support is critical in the course of illness and recovery of these individuals (Johnson et al., 1999), attention should be directed towards establishing a better understanding of why relationships are often strained in this population, and impairments in emotion perception seems to be an important factor to consider in this line of work.

There are a few limitations of the present study that should be noted. First, this study explored the relationship between hypomania risk and EA using a non-clinical sample primarily comprised of college undergraduates who varied in their dispositional levels of risk for hypomania. Furthermore, only a small number of participants in the present sample qualified as a “high risk” group according to previously-established cut-offs for the HPS (Kwapil et al., 2000), which may have made it more difficult to detect effects. Given these limitations, it is not entirely clear how these results would generalize to a clinical sample, and further research is needed to address this question. Second, a potential concern is that our assessment of EA uses standardized videos of strangers discussing life events and directly instructs participants to attend to a target's emotions. This method has its own unique strengths in that it ensures greater control and standardization (e.g., Zaki et al., 2008), but it may not entirely reflect the ways in which participants would spontaneously perceive others' emotions outside of the laboratory. In addition, only one target was used for each emotion video condition, and therefore, the present results could be confounded by characteristics specific to these targets.

In summary, the present findings suggest that hypomania risk is significantly associated with unique strengths and difficulties in perceiving emotion in others. This is consistent with prior work that has found individuals at risk for or with a clinical history of mania often exhibit overly-positive biases in perceiving the emotions and behaviors of others (e.g., Piff et al., 2012). Although hypomania risk was associated with some potential deficits (i.e., a retrospective bias in overestimating positive emotion experienced by targets describing *negative* events), it was also associated with some potential strengths (i.e., a heightened online sensitivity to emotion upshifts experienced by targets describing *positive* events). This is of note in considering the empathic abilities of individuals at risk for hypomania, and it could provide hints that persistent positive emotion (even outside of individuals at risk for hypomania) may both help and hinder one's empathic accuracy, and this may vary as a function of the target's emotional state. These findings help to lay the groundwork for further exploring the empathic abilities of individuals at risk for hypomania.

Disclosures

Data from this manuscript was presented as a poster at the 2012 Society for Research in Psychopathology (SRP) conference.

Conflict of Interest

Hillary Devlin, Jamil Zaki, Desmond Ong, & June Gruber declare that they each have no conflict of interest.

Informed Consent

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (national and by the Yale University institutional review board). Informed consent was obtained from all participants prior to the study.

Animal Rights

No animal studies were carried out by the authors for this paper.

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Table 1. *Standardized Coefficients for Hypomania Risk as Predictor of Emotion Perception Controlling for Mood Symptom Covariates*

Type of Assessment	Outcome Measure	β (Controlling for BDI and ASRM)
Online EA	Online EA (High Positive Target)	-0.13 n.s.
	Online EA (Low Positive Target)	-0.025 n.s.
	Online EA (High Negative Target)	-0.003 n.s.
	Online EA (Low Negative Target)	0.052 n.s.
	AAC for positive changes (High Positive Target)	0.049 n.s.
	AAC for positive changes (Low Positive Target)	0.26**
	AAC for positive changes (High Negative Target)	0.144 n.s.
	AAC for positive changes (Low Negative Target)	0.059 n.s.
Retrospective EA	Global EA for PA (High Positive Target)	0.09 n.s.
	Global EA for PA (Low Positive Target)	0.12 n.s.
	Global EA for PA (High Negative Target)	0.29**
	Global EA for PA (Low Negative Target)	0.20*

Note. All standardized coefficients reported are when controlling for ASRM and BDI (log-transformed) scores as covariates.
*p<.05, ** p<.01.

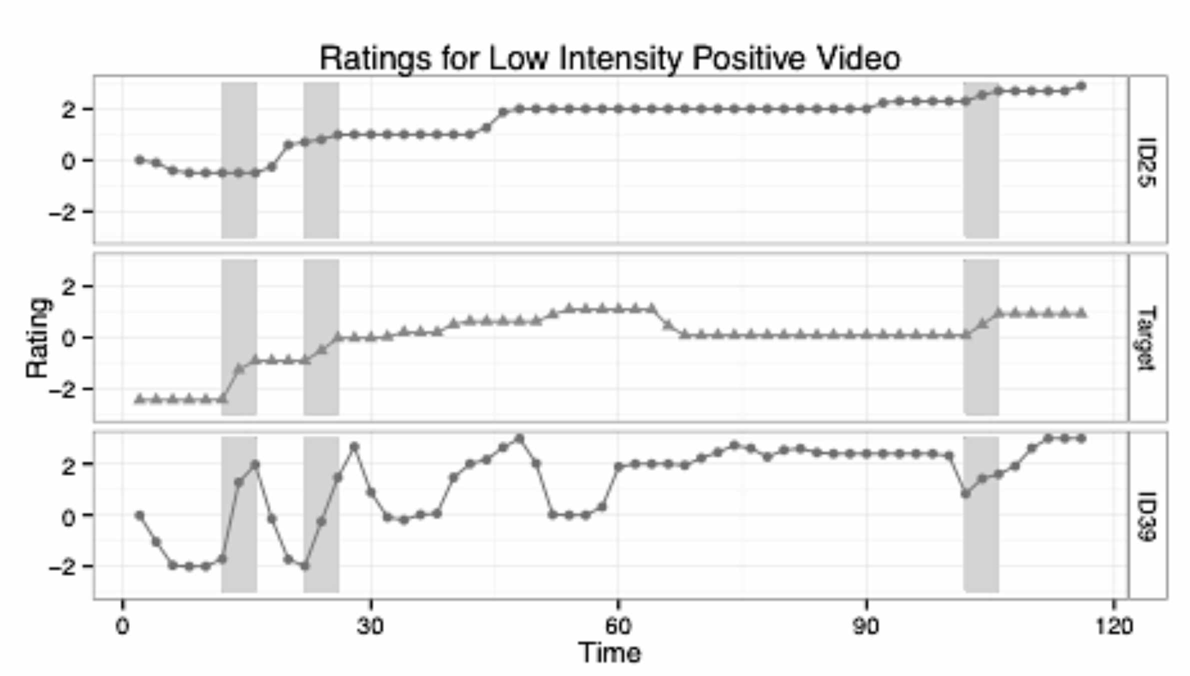

Figure 1. Depiction of Continuous Empathic Accuracy (EAC) and Accuracy for Affective Change (AAC). This figure illustrates online EAC and AAC in two participants (top and bottom panels) compared against a target (center panel). Light grey shaded boxes depict the target's emotion upshifts. This figure is meant to be illustrative of how EAC and AAC can be dissociated and form orthogonal components of empathy. Note that Participant ID25 has high continuous EA, as his/her online ratings generally tracked the target's ratings well, but his/her ratings did not capture the upshifts in the grey boxes. In contrast, Participant ID39 has high sensitivity to emotion upshifts (high positive-AAC), as he/she accurately captured the upshifts in the grey boxes, yet his/her overall continuous EA is lower.