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Nice to know you: Positive emotions, self–other overlap, and complex understanding in the formation of a new relationship

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Abstract

Based on Fredrickson's ((1998). What good are positive emotions? *Review of General Psychology*, 2, 300–319.; (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist*, 56, 218–226) broaden-and-build theory and Aron and Aron's ((1986). *Love as expansion of the self: Understanding attraction and satisfaction*. New York: Hemisphere) self-expansion theory, it was hypothesized that positive emotions broaden people's feelings of self–other overlap in the beginning of a new relationship. In a prospective study of first-year college students, we found that, after 1 week in college, positive emotions predicted increased self–other overlap with new roommates, which in turn predicted a more complex understanding of the roommate. In addition, participants who experienced a high ratio of positive to negative emotions throughout the first month of college reported a greater increase in self–other overlap and complex understanding than participants with a low positivity ratio. Implications for the role of positive emotions in the formation of new relationships are discussed.

Keywords

Positive emotions; relationships; self–other overlap; broaden-and-build

Introduction

At such moments, you realize that you and the other are, in fact, one. It's a big realization. Survival is the second law of life. The first is that we are all one.

Joseph Campbell

Joseph Campbell's quote suggests that certain moments produce feelings of oneness with others. We argue that among those certain moments are ones characterized by positive emotions. The social and interpersonal benefits of positive emotions seem intuitive. Joy and other positive emotions bring people closer and seem almost necessary for forming and maintaining relationships. In diary studies, high trait positive emotionality predicts greater involvement in social activities (Burger & Caldwell, 2000; Clark & Watson, 1988; Vittengl & Holt, 1998; Watson, Clark, McIntyre, & Hamaker, 1992), more enjoyable social interactions (Study 2; Berry & Hansen, 1996), and greater friendship closeness (Berry, Willingham, & Thayer, 2000). In addition, participants who report greater state positive emotionality before interacting with a stranger show greater range and depth of self-disclosure (Vittengl & Holt, 2000).

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It is not merely that positive affectivity and sociality are related, but that positive emotions can cause people to be more sociable and have more successful social interactions. Experimental studies have shown that induced positive emotions lead to a greater likelihood of initiating a conversation with (Isen, 1970), and disclosing personal information to a stranger (Cunningham, 1988). In addition, a longitudinal study (Lucas, 2001) found that positive emotions at Time 1 predicted greater enjoyment of social activities at Time 2, controlling for level of social activity at Time 1. Moreover, induced social interaction between strangers leads to increased positive emotions (Fredrickson, 2005; McIntyre et al., 1991; Vittengl & Holt, 2000). These experimental studies have demonstrated that positive emotions are important to social activity as both a cause and a result of social interactions.

Theoretical accounts for why positive emotions lead to better social interactions are varied. Isen (2002) theorized that feeling positive affect activates the dopaminergic system in brain areas responsible for executive control and flexible thinking. Isen proposed that, in the context of social situations, flexible thinking might lead to flexible perspective-taking, which results in increased closeness. By contrast, the Affect Infusion Model (Forgas, 1995, 2002) states that when people are engaged in open, substantive interpersonal interactions, positive emotions will prime positive memories, interactions, and interpretations, which in turn produce prosocial behavior (Forgas, 2002).

We do not refute these accounts. Instead, we aim to contribute a unique perspective regarding the role that positive emotions may play when forming interpersonal relationships. Specifically, we propose that, when people feel positive emotions, over time, these positive emotions become associated with greater feelings of self–other overlap and “oneness,” and this broadened sense of self may predict a more complex understanding of others. To explain the logic of this new perspective, we review relevant findings about the broaden-and-build theory of positive emotions (Fredrickson, 1998, 2001) and the self-expansion theory of close relationships (Aron & Aron, 1986).

The broaden-and-build theory of positive emotion

Fredrickson's broaden-and-build theory of positive emotions (1998,2001) models the evolved adaptive significance of a subset of positive emotions. Traditionally, the adaptive significance of emotions within human's environment of evolutionary adaptedness (EEA) is linked with specific action tendencies (Frijda, 1986;Levenson, 1994;Tooby & Cosmides, 1990). For example, fear leads to a flight or freeze response, and anger leads to the effort to remove a goal obstruction. These specific action tendencies reorganize the organism's priorities, and prepare the organism for specific bodily responses, both of which were evolutionarily adaptive strategies for increasing fitness (Tooby & Cosmides, 1990).

Positive emotions do not fit well into this evolutionary account of emotions because the actions generated by positive emotions tend to be vague and non-specific (Fredrickson & Levenson, 1998). Fredrickson (1998, 2001) proposed that, at any given moment, people have a repertoire of potential thoughts and actions. When experiencing a negative emotion, a person's thought–action repertoire narrows to emphasize those specific thoughts and behaviors that were most adaptive as our ancestors negotiated threatening situations. By contrast, positive emotions broaden a person's thought–action repertoire beyond typical patterns of thinking. For example, participants induced to feel positive emotions wrote down more responses to the question “What would you like to do right now?” relative to those experiencing either a neutral state or negative emotions (Fredrickson & Branigan, 2005).

Fredrickson's (1998, 2001) broaden-and-build theory proposes that, over time, positive emotions were beneficial to human ancestors because the broadened thought–action repertoires they sparked created opportunities to build enduring resources, ranging from

physical and intellectual resources to psychological and social resources. For example, joy might have produced a general urge to play and, while playing, human ancestors might have acquired or solidified physical, cognitive, or social skills and resources (Spinka, Newberry, & Bekoff, 2001). These new skills and resources in turn functioned as reserves that could be drawn on later whether escaping a predator, hunting for food, or negotiating a social relationship.

Positive emotions and self–other overlap

In the context of modern day social relationships, the broaden-and-build theory predicts that positive emotions broaden people's sense of self to include others, which over time may produce greater feelings of self–other overlap and “oneness.” These feelings of self–other overlap may in turn predict a more complex understanding of others. Having a more complex understanding of others may then smooth the progress of the relationship, allowing each person to better appreciate the other and continue to become closer.

The first part of this model is that positive emotions broaden people's sense of self to include others. The idea that people's sense of self can become broadened to include others was first introduced in Aron and Arons' (1986) self-expansion theory. They theorized that when people perceive another person as part of the self, allocation of resources becomes communal, actor–observer perspective differences are lessened, and the other's characteristics become one's own. As people grow closer, the line between self and other gets blurred and harder to delineate, leading to increased self–other overlap and relationship satisfaction.

Aron and colleagues have also theorized on the peripheral role that positive emotions may play in self-expansion. Specifically, they hypothesized that when people are in an interpersonal situation in which they are experiencing particularly rapid self-expansion (e.g., getting to know a possible significant other for the very first time), they experience positive emotions as a result. The rewarding positive emotions then fuel people's desire to experience the process of self-expansion further (Aron, Norman, & Aron, 1998). In addition to positing that positive emotions are created by the process of self-expansion, Aron and colleagues have data showing that positive emotions may also induce self-expansion. For example, couples who participated in novel and arousing activities together (rolling a ball across mats while bound together) reported increased relationship satisfaction and closeness (Aron, Norman, Aron, McKenna, & Heyman, 2000).

Furthering Aron's self-expansion theory, the broaden-and-build theory posits that positive emotions may play a more central role in self-expansion. Specifically, when people feel positive emotions, they may have a greater sense of self–other overlap and “oneness” with other people. People in whom positive emotion has been induced are more likely to form inclusive social categories (Dovidio, Gaertner, Isen, & Lowrance, 1995; Isen, Niedenthal, & Cantor, 1992) and perceive outgroup members similarly to how they perceive ingroup members (Johnson & Fredrickson, 2005). In one study by Dovidio and colleagues examining the effect of emotion on perceptions of group categorization, those participants who received a positive emotion induction were more likely to give resources to members of the outgroup, and see both groups as one superordinate group (Dovidio et al., 1995). In studies of language and relationship satisfaction, couples who felt positive about their relationship emphasized more communal themes of shared relationship attributes (Sillars, Burggraf, Yost, & Zietlow, 1992; Sillars, Weisburg, Burggraf, & Wilson, 1987) and used more “we” language and less “I” language when describing their relationships (Sillars, Shellen, McIntosh, & Pomegranate, 1997).

Negative emotions in times of stress and threat can also sometimes lead to greater affiliation (Gump & Kalik, 1997; Schachter, 1959). However, the conditions under which stress and threat lead to affiliation are very specific. In the emotional similarity hypothesis (Schachter, 1959), threat leads to affiliation with similar others, because people evaluate their own emotions based on the emotions of others. Gump and Kalik (1997) additionally showed that people affiliated with others when the threat was high and they perceived the other person as being in a very similar situation. In both of these explanations, the goal of the threatened individual is to evaluate their own emotional responses in comparison to another's responses in a similar situation, not necessarily to become friends with the person. Studies have consistently shown that negative emotions do not lead to satisfactory and close relationships (Levenson & Gottman, 1983; see Schaap, Buunk, & Kerkstra, 1988 for review). It may be that negative emotions are enough to get people to talk to each other, but not enough to build a relationship. If these affiliations do become relationships, it is most likely because the two people were able to console each other, thus relieving the negative state, and it may be the positive emotion of relief that is rewarding and begins to fuel relationship development.

In summary, our first and main hypothesis is that positive emotions are associated with greater feelings of self–other overlap. We have proposed that, by broadening cognition, positive emotions produce more inclusive social categorization and subsequently produce feelings of oneness. In the context of interpersonal relationships, these feelings of oneness become a prominent marker of the quality of the relationship (e.g., Aron's self-expansion).

Positive emotions and complex understanding

Our second hypothesis is that, through the increased propensity to include others in one's sense of self, positive emotions may predict a more complex understanding of others. A classic finding within social psychology is that people tend to discount situational influences when explaining the behaviors of other people (Jones & Harris, 1967; Ross, 1977). A related finding is that people are much more likely to attribute their own behaviors to situational factors and other's behaviors to personal dispositions, known as the actor–observer attribution bias (Jones & Nisbett, 1971).

Studies have also shown, however, that this actor–observer attributional distinction is lessened the closer and more familiar individuals are with each other (Aron, Aron, Tudor, & Nelson, 1991; Goldberg, 1981; Nisbett, Caputo, Legant, & Marecek, 1973). When people become more familiar with each other, they are more likely to have experiences with that close other in multiple situations. Seeing close others behave differently across situations affords people a better understanding of situational effects on their close other's behavior. In this way, when becoming closer, people are better able to take the perspective of their close others through this increased knowledge of situational influences on the other's behavior. Aron et al. (1991) introduced this piece of evidence as further support for the notion of self–other overlap. When we become closer to others, the strategies that we use to understand ourselves (attributions based on situational influences) become the strategies we use to understand our close others.

We propose that to the extent that positive emotions are associated with greater feelings of self–other overlap, positive emotions may also predict a more complex understanding of others. In previous studies on person judgment, it has been found that people induced to feel positive emotions tend to use less individuating information and more heuristics when forming judgments of others (Bodenhausen, 1993; Forgas, 1998). Therefore, it may seem like positive emotions may actually lead to a less complex understanding of others. However, our hypothesis is different in that we hypothesize that the relationship between positive emotions and more complex understanding of others will be fully mediated by self–other overlap. We have conceptualized self–other overlap as the cognitive inclusion of the

other in the self. However, self–other overlap is also a valid measure of relationship closeness (Aron et al., 1992). To the degree that relationship closeness represents people's desire to interact and be with others, the previous findings on positive emotions and heuristics in person perception are not dissonant with our own predictions. The studies that have shown that positive emotions lead to deindividuating person perception have typically had strangers as the target of the perception (e.g., Bodenhausen, 1993). However, in studies that have given relational goals to participants, such as telling them they will be interacting with the person later, the deindividuation effect disappears (Neuberg & Fiske, 1987).

Current study

The current study is a prospective study that aims to test our two hypotheses that (a) positive emotions are associated with greater feelings of self–other overlap and (b) this inclusion of other in the self then predicts a more complex understanding of others. Another aim of this study was to examine the effect of positive emotions on self–other overlap during the initial formation of a relationship. We tested participants who had just arrived at their first year of college and did not know their new roommate. Aron & Aron (1986) described the process of self-expansion as occurring very rapidly within the first couple of days of knowing a person. In addition, the broaden-and-build theory posits that positive emotions build consequential social resources. Initial interactions between people present an opportunity for people to gain a social resource (the relationship itself) that can guard against stress and promote better health, especially in times of adversity (see House, Landis, & Umberson, 1988). Therefore, we expect that positive emotions may be particularly associated with self–other overlap during these first few days of a relationship.

We measured complex understanding in this study as the degree to which participants recognize that their roommate's behavior in general can be influenced by situation factors. We used a modification of the opposite-pairs procedure (Nisbett et al., 1973; Sande, Goethe, & Radloff, 1988), in which participants attribute their roommate's behavior to one of two opposite traits (i.e., carefree or serious), “both,” or “neither.” Sande and colleagues (1988) argued that when participants rate a target as having both traits, they are recognizing that the target person has a multifaceted personality and can flexibly respond to situations with either trait. For example, one can imagine that the target person is carefree around friends at a party, yet serious when exams are the next day. In the current study, we call this measure “complex understanding,” because this recognition of the roommate's multifaceted personality reflects the participant's understanding that the roommate is a complex individual able to flexibly adapt to various situations.¹

An advantage to the current prospective design is that we can assess whether positive emotions experienced at the very beginning of the semester predict changes in self–other overlap and complex understanding over the first month of the semester. Even though we cannot show causation, we may be able to provide evidence consistent with the contention that positive emotions are not just markers of self-expansion but also contribute to self-expansion.

Method

Overview

We contacted incoming first-year undergraduate students the summer before they arrived on campus. Participants completed web-based batteries of questionnaires at three times. Time 0 was 3 weeks before the semester started. Time 1 was 1 week after classes began. Time 2 was 1 month after Time 1, around 5 weeks into the semester.² In addition, between Times 1 and 2, participants completed daily reports of emotions.

Participants

Recruitment—We recruited incoming first-year undergraduate students at the University of Michigan to serve as participants. Approximately 6 weeks before the semester began, we sent an e-mail, with the help of the Registrar Office, to all 3,200 incoming first-year students to “help researchers in UM’s psychology department understand how students’ lives change as they enter college” and offered payment for their participation.

In the e-mail, students interested in participating were provided a link to a website where the study was described more fully and where they could provide demographic data for inclusion or exclusion purposes. We included participants if they were: (1) about to begin their first year at the University, (2) fluent English speakers, and (3) would be at least 18 years old 3 weeks before the beginning of the semester.

Demographics—Four hundred and thirty-eight individuals responded to this initial screening, of whom 347 were eligible to participate. Of these 347, 66% were female. A total of 80.1% were Caucasian, 7.5% were Asian, 2.9% were African-American, 3.8% were Hispanic, 5.8% identified as multiracial, and 3.5% identified as some race not listed. Average age was 18 years ($SD = 0.25$).

For the purposes of our study, we sought to include approximately 220–250 participants. We also sought to include roughly equal proportions of males and females. Of the 324 eligible respondents, we included all of the males and racial minorities, and randomly selected from among Caucasian females. Of the 247 individuals we invited to participate in the study, 56.7% were female; 74.1% were Caucasian, 10.1% were Asian, 3.2% were African-American, 5.3% were Hispanic, 7.7% identified as multiracial, and 4.4% identified as some race not listed. Average age was 18 years ($SD = 0.25$).

Time 0: Approximately 3 weeks before the beginning of the semester, 247 participants were sent an email inviting them to continue the study. Of these 247, 208 participated in the study at Time 0 (57.2% female; 74.0% Caucasian, 10.1% Asian, 3.4% African-American, 4.4% Hispanic, 7.2% multiracial, 4.8% other. Average age 18 years [$SD = 0.23$]).

Time 1: Approximately 1 week after the beginning of the semester, 164 continued participation in our study (61.0% female; 73.8% Caucasian, 11.6% Asian, 3.0% African-American, 4.9% Hispanic, 7.9% multiracial, 3.0% other. Average age 18 years [$SD = 0.17$]).

Time 2: Finally, 28 days after completing Time 1, 134 participants completed Time 2 measures (61.2% female; 74.6% Caucasian, 12.3% Asian, 2.3% African-American, 3.8% Hispanic, 7.7% multiracial, 2.3% other. Average age 18 years [$SD = 0.17$]). Therefore, there was an overall participation attrition rate from Time 1 of 18.3% (17.2% for males and 19.0% for females).

Selection criteria for analyses

In this study, we aimed to test how positive emotions relate to the formation of a new relationship. Therefore, we only report data from those participants who responded that they had a roommate.³ Seventeen participants (15 of whom also completed Time 2) reported having no roommate, leaving a sample size of 147 participants at Time 1 (59% female) and 118 participants at Time 2 (61% female). To retain power, we used these sample sizes for those analyses including only Time 1 and Time 2 variables. For the analyses including reports of daily emotions, we further excluded those participants who provided fewer than 10 (out of 28 possible) daily reports. Of the 118 participants, 8 did not complete more than

10 daily reports, leaving a sample size of 110 participants for the daily emotion analyses (60% female).⁴

Materials

Positive and negative emotions—To measure positive and negative emotions, we used a modified Differential Emotions Scale (see Izard, 1977, for original; see Fredrickson, Tugade, Waugh, & Larkin, 2003, for this modified version). At Times 0, 1, and 2, participants were asked "... Looking back over the past [Time 0: *month*; Time 1: *2 weeks*; Time 2: *month*] please indicate how often you have experienced each of the following." Participants reported how often they had felt each of 20 emotions on a 5-point scale (0 = never, 4 = most the time). For daily measures of emotion, participants were asked "Looking back over the past 24 hours, please indicate the greatest amount that you have experienced of each of the following feelings." Participants then rated the intensity with which they felt each of 20 emotions on a 5-point scale (0 = not at all, 4 = extremely). The positive emotion subscale consisted of 11 items (*amused, awe, content, joyful, grateful, hopeful, interested, love, proud, sympathy, surprise*) with $\alpha = 0.79, 0.79, \text{ and } 0.86$ for Time 0, 1, and 2, respectively. The negative emotion subscale consisted of 8 items (*angry, contempt, ashamed, disgust, sad, scared, guilty, embarrassed*) with $\alpha = 0.80, 0.84, \text{ and } 0.82$ for Time 0, 1, and 2, respectively. We omitted one emotion item (*sexual*) that did not load with either the positive emotion or negative emotion scale. For Times 0, 1, and 2, and daily reports, we created aggregate subscales of positive emotions and negative emotions by averaging the individual responses.⁵

We created an additional variable for the daily reports designed to tap the ratio of positive to negative emotions felt throughout the month. We created this ratio measure in light of recent theory that posits that the benefits of positive emotions may only be evident when experienced positive emotions outnumber negative emotions by a certain ratio (Fredrickson & Losada, 2005). For this measure, we counted a positive emotion as being felt if it was greater than or equal to 2, and a negative emotion as being greater than or equal to 1. These different thresholds for positive and negative emotions stem directly from Fredrickson & Losada (in press), who explain that these thresholds correspond to the well-documented effects of negativity bias and positivity offset. Negativity bias is the asymmetrical weight that negative emotions receive over positive emotions and is reflected by the principle "Bad is stronger than good" (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001). The positivity offset, by contrast, reflects that people most frequently experience mild positive moods (Cacioppo, Gardner, & Bernston, 1999). We then divided the number of positive emotions across the month by the number of negative emotions across the month to create a measure of the participant's positivity ratio.

Self-other overlap—The Inclusion of Other in Self Scale (IOS; Aron, Aron, & Smollan, 1992) is a measure of perceived relationship closeness. It is a single-item measure with seven pairs of overlapping circles differing in the degree to which the circles overlap. One circle of each pair represents the self, and the other circle represents, in this case, their roommate. Participants were asked whether they had a roommate (if they had multiple roommates, they were asked to think of the roommate whose first name came first alphabetically), and whether they knew their roommate before coming to college. Participants were then asked to indicate which diagram of overlapping circles best represented their relationship with their roommate. Participants completed the IOS at Times 1 and 2.

Complex understanding of others—We used a modified version of an opposite-pair attribution procedure (Nisbett et al., 1973; Sande et al., 1988). Participants were given 15

bipolar pairs of traits and asked to rate their roommate as having either one of the two traits, “both” traits, or “neither” trait. The measure consisted of Sande et al.'s (1988) 11-pair measure (e.g. *serious–carefree*, *skeptical–trusting*), plus 4 from Nisbett et al.'s (1973) original measure (*energetic–relaxed*, *sensitive–tough-minded*, *steady–flexible*, *lenient–firm*). Complex understanding was calculated as the number of times the participants rated their roommates as having “both” traits.

Extraversion—We assessed extraversion from the Ten-Item Personality Measure (TIPI; Gosling, Rentfrow, & Swann, 2003). Participants were asked to “select the extent to which each pair of traits applies to you, even if one characteristic applies more strongly than the other” on a scale from 1 (disagree strongly) to 7 (agree strongly). The extraversion subscale consisted of two items (“extraverted, enthusiastic,” “reserved, quiet”) reverse-scored. This scale was reliable at Times 0 and 2 ($\alpha = 0.71$ and 0.74 , respectively), and had a test–retest reliability of $\alpha = 0.89$.

Procedure

Time 0—Three weeks before the beginning of their first semester at the university, those participants who were selected to be in the study (see *Participants* for eligibility criteria) completed a battery of questionnaires on a secure website. Among the battery were measures of positive and negative emotions and extraversion.

Time 1—Approximately 1 week into the semester, we contacted participants by e-mail and scheduled them to come to a computer lab. There, the experimenter instructed a group of participants on how to complete the on-line daily reports. During this lab session, participants also completed the above-mentioned questionnaires (except for the extraversion measure) plus measures of self–other overlap, and complex understanding of the other.

Daily measures—Each day for 28 days, participants logged on to a secure website and reported how they felt in the past 24 hours on the modified DES measure.

Time 2—Twenty-eight days after completing Time 1, participants were instructed to once more return to the website and complete the same measures as they had at Times 0 and 1. Participants were then debriefed as to the true purpose of the study, and paid for their participation at Times 0, 1, 2, and the daily reports. Participants were paid \$10 for each of the two questionnaire batteries (Times 0 and 2) they had completed, and \$2 for each valid daily entry. Participants who completed at least 25 valid entries received a bonus of \$24.

Results

Descriptive statistics

First, we ran descriptive statistics on all of the relevant Time 1 and Time 2 variables (see Table I). Participants reported having relatively moderate levels of self–other overlap with their roommate at Time 1 ($M = 3.65$ out of a possible 7). The reports of complex understanding were positively skewed (skewness = 1.09; modal response = 0), so we performed a square root transformation (+1) on this variable (resulting skewness = 0.49). All subsequent analyses use this transformed variable.

Hypothesis 1: Positive emotions are associated with greater feelings of self–other overlap

Time 1 measures—The results support the hypothesis that positive emotions predict self–other overlap (see Table II). People who reported experiencing more positive emotions during their first weeks of college also report greater self–other overlap with their roommate.

One alternative possibility is that our measure of positive emotions reflects trait positive emotionality. When people retrospectively report on emotions felt over a wide range of time (e.g., months or years), they tend to rely on beliefs about their trait emotionality to judge the frequency of actual emotions (Feldman-Barrett, 1997; Robinson & Clore, 2002). Extraversion is known to be related to both positive emotionality and relationship closeness (Costa & McCrae, 1980; Diener & Lucas, 1999; Watson & Clark, 1997). In our study, extraversion at Time 0 is correlated with positive emotions and marginally correlated with self–other overlap (both at Time 1; see Table I). To control for the effects of positive emotionality, we entered extraversion at Time 0 and positive emotions at Time 1 simultaneously as predictors in a regression equation with self–other overlap as the dependent variable. We found that positive emotions remained a significant predictor of self–other overlap ($\beta = 0.25, p < 0.01$), and that extraversion no longer significantly predicted self–other overlap ($\beta = 0.10$ ns). Positive emotions, then, can uniquely predict self–other overlap even after accounting for extraversion.

Another possibility is that the absence of negative emotions and not necessarily the presence of positive emotions predict increased closeness and self–other overlap. Negative emotions at Time 1 is negatively correlated with self–other overlap. However, when both negative emotions and positive emotions at Time 1 are entered simultaneously into a regression equation with self–other overlap as the dependent variable, only positive emotions at Time 1 remained a significant predictor ($\beta = 0.23, p < 0.05$). This finding suggests that it is not the absence of negative emotions alone but rather the presence of positive emotions that predicts greater self–other overlap at Time 1.

Time 2 measures—We performed the above analyses on the Time 2 measures and found that, even though positive emotions still correlate with self–other overlap (see Table II), this relationship appears weaker than at Time 1. Indeed, entering positive emotions into a regression equation with either extraversion or negative emotions at Time 2 renders the relationship between positive emotions and self–other overlap insignificant ($\beta = 0.13$ and 0.18 , respectively, both ns).

Daily measures—By analysing daily reports of emotions, we can more directly test the hypothesis that frequently experienced positive emotions can lead to increased feelings of self–other overlap. We first entered self–other overlap at Time 1 into a regression analysis as the predictor and self–other overlap at Time 2 as the dependent variable. Next, we examined whether emotions uniquely predict self–other overlap at Time 2 controlling for self–other overlap at Time 1 by performing three separate regression analyses with aggregated daily report measures of positive emotions, negative emotions, and positivity ratios entered separately as predictors. Only the positivity ratios remained a significant predictor of self–other overlap at Time 2 controlling for self–other overlap at Time 1 ($\beta = 0.17, p = 0.05$). The more frequently participants felt positive emotions relative to negative emotions, the more the participants experienced an increase in self–other overlap across the month.

According to Fredrickson & Losada's (2005) general theory of positivity, people are most likely to flourish and build positive resources when their ratio of positive to negative emotions (P/N) is above 2.9:1, a tipping point they term the Losada line. This line is mathematically derived, and represents the point at which people's thoughts and actions become more complex and less predictable. This complexity is thought to lead to greater creativity, resiliency, and the ability to balance between self-interests and the interests of others. Fredrickson and Losada's (in press) theory is consistent with the above finding that only the positivity ratios derived from participant's daily reports predicted change in self–other overlap. We next performed a stricter test of the theory by dividing participants along the Losada line of $P/N \geq 2.9$, and performing a *t* test comparing participants with high

positivity ($P/N \geq 2.9$, $n = 26$) to those with low positivity (<2.9 , $n = 75$) with the residual of self–other overlap at Time 1 on self–other overlap at Time 2 as the dependent variable.⁶ Results support the theory and showed that those participants with higher positivity ratios experienced more self–other overlap change ($M = 0.50$, $SE = 0.15$) across the month, than those participants low in positivity ($M = -0.17$, $SE = 0.12$), $t(97) = 3.09$, $p < 0.01$. To test whether this change in self–other overlap reflected an increase on the IOS measure from Time 1 to Time 2, we performed separate one-sample t tests for the high and low positivity ratio participants testing the difference in IOS (Time 2 IOS – Time 1 IOS) against zero. Consistent with the prediction that only high positivity ratios will build resources, only those participants with high positivity ratios showed significant increases in self–other overlap from Time 1 to Time 2, $t(25) = 2.49$, $p < 0.05$ (see Figure 1).

Hypothesis 2: Positive emotions, through their effect on self–other overlap, lead to more complex understandings of others

Time 1 measures—Our second hypothesis was that the amount of positive emotions experienced in the 2 week period at the beginning of college would predict more complex understandings of participants' new roommates during that same period, but only through the effect of positive emotion on self–other overlap.

In order to test our second hypothesis, we ran a mediation analysis according to the statistical specifications of Baron and Kenny (1986). One must run four regression equations to show mediation. The first regression equation must show that the path between the predictor variable (positive emotions) and mediator variable (self–other overlap) is significant, which was indeed the case (see Hypothesis 1). The second regression equation must show that the path between the mediator variable (self–other overlap) and the dependent variable (complex understanding) is significant, which was the case ($\beta = 0.29$, $p < 0.01$). The third regression equation must show a significant relationship between the predictor variable (positive emotions) and the dependent variable (complex understanding), which there is ($\beta = 0.18$, $p < 0.05$). To show that self–other overlap mediates the relationship between positive emotions and complex understanding, the effect of the predictor variable (positive emotions) on the dependent variable (complex understanding) must be rendered nonsignificant when controlling for the effect of the mediator variable (self–other overlap) on the dependent variable. We simultaneously entered both T1 positive emotions and T1 self–other overlap as predictors and T1 complex understanding as the dependent variable in a regression equation, and positive emotion was no longer a significant predictor of complex understanding ($\beta = 0.10$ ns). Figure 2 illustrates this model. Through these four steps, we have shown that the data fit a mediational model. Using Sobel's test, we found that the reduction in the effect of Time 1 positive emotions on complex understanding when controlling for self–other overlap was significant, $t(146) = 2.38$, $p < 0.05$. We conclude, at Time 1, self–other overlap mediates the relationship between positive emotions and complex understanding.

Time 2 measures—Again, we replicated the previous analyses with Time 2 measures, and found that the relationship between positive emotions and complex understanding disappears (see Table II); however, the relationship between self–other overlap and complex understanding remains relatively strong (see Table II).

Daily measures—To examine the relationships between positive emotions and self–other overlap on change in complex understanding of the roommate from Time 1 to Time 2, we created an index of complex understanding change by taking the residual of T1 complex understanding regressed on T2 complex understanding. We found no significant relationship between the aggregate measures of daily positive emotions, negative emotions, or positivity

ratios on change in complex understanding (all $p > 0.1$). However, there was a significant difference in complex understanding change between High Positivity Ratio and Low Positivity Ratio participants, $t(84) = 2.00, p < 0.05$. Those participants who experienced more positive emotions relative to negative emotions experienced a greater change in complex understanding from Time 1 to Time 2 ($M = 0.35, SE = 0.22$) than those participants who experienced fewer positive emotions relative to negative emotions ($M = -0.13, SE = 0.12$). Similar to the analyses with self–other overlap, we wanted to test whether this significant difference in complex understanding between high and low positivity participants is reflected by a significant increase from Time 1 to Time 2 for the high positivity but not the low positivity group. For this analysis, we used difference scores in complex understanding (Time 2 complex understanding – Time 1 complex understanding). Consistent with the findings with self–other overlap, only those participants with high positivity ratios showed significant increases in complex understanding from Time 1 to Time 2, $t(25) = 2.48, p < 0.05$ (see Figure 3).

There was also a significant relationship between change in self–other overlap and change in complex understanding ($\beta = 0.23, p < 0.05$). Those participants who had greater self–other overlap change from Time 1 to Time 2 also experienced a greater change in complex understanding of their roommates from Time 1 to Time 2.

Validation of positivity ratio—We have already shown that dividing the participants along the mathematically derived Losada line predicts change in self–other overlap and complex understanding from Time 1 to Time 2. We further support this theoretical prediction by deriving the positivity ratio from those participants in our study who experienced the greatest relationship building from Time 1 to Time 2. To do this, we first averaged the indexes of self–other overlap and complex understanding change to create an overall index of “relationship building.” Next, we split our sample into those who experienced high (>0.5 SD above mean of index, $n = 32$) and low relationship building (<0.5 SD above mean of index, $n = 69$)⁷ and averaged the positivity ratios for the two groups. The high and low relationship building groups had mean positivity ratios of 2.91 ($SE = 0.35$) and 2.13 ($SE = 0.17$), respectively, thus providing data-driven support for our theoretical prediction that only at or above a positivity ratio of 2.9 would people experience the benefits of positive emotions for relationship building.

Discussion

First, results from this study provide support that positive emotions are associated with greater feelings of self–other overlap. We showed that positive emotions predicted self–other overlap during the beginning weeks of the semester beyond the effects of conceptual cousins like extraversion and negative emotions. It is also important to note that we found the relationship between positive emotions and self–overlap for participants who had known their roommates for only a week. Aron and Aron (1986) described self-expansion as a rapidly expanding sense of self to include others, and we have shown that the more positive emotions people are feeling, the more rapid their self-expansion with their roommate (increased feelings of self–other overlap).

Second, we found that the amount of positive emotions that participants' felt during the beginning weeks of the first semester of college predicted their complex understanding of their roommate, and that this association was mediated by self–other overlap. In this study, we posited that positive emotions generate greater feelings of self–other overlap, which in turn may predict a more complex understanding of others (as measured by situational attributions for roommate). These results contrast with previous research that people in whom positive emotions have been induced are less likely to make situational attributions

for strangers (Forgas, 1998). In our study, the participants rated the behaviors of their new roommates, people with whom they already had contact and expected to interact with in the future. To the degree that self–other overlap reflects greater feelings of familiarity and desire to get to know a person, research (including the current study) has shown that people would generate a more complex understanding of such persons (Aron et al., 1991; Neuberg & Fiske, 1987).

Third, the prospective nature of this design allowed us to examine how daily reports of emotion may influence participant's feelings of self–other overlap and complex understanding at the end of the month. Interestingly, we found no effect of summed positive emotion measures (the summed magnitude of positive emotions felt throughout the month) on changes in self–other overlap or complex understanding. However, we did find evidence that those participants who had ratios of positivity to negativity (P/N) greater than 2.9:1 experienced changes in self–other overlap with and complex understanding of their roommates over the month. Those with daily ratios lower than this critical threshold did not show these changes. The observation that, in low doses, positivity appears inert, whereas in doses above a critical threshold (i.e., $P/N \geq 2.9:1$), positivity builds social resources bolsters the proposal that the processes underlying the broaden-and-build effects of positive emotions may indeed be nonlinear (Fredrickson & Losada, 2005). These findings also speak to the distinction between the intensity and frequency of positive emotions. Diener and colleagues argue that it is the frequency, not the intensity, of positive emotions that bear the most weight in predicting life satisfaction (Diener et al., 1991). More specifically, it is the frequency of positive emotions relative to negative emotions that produces life satisfaction (Diener et al., 1991) and flourishing (Fredrickson & Losada, 2005). Our results are thus consistent with a range of views about the relative frequency of positive affectivity and its relation to positive life outcomes.

We found that the relationship between positive emotions and the social outcome variables (self–other overlap, complex understanding) was weak and sometimes nonexistent at Time 2. This is consistent with our prediction that the influence of positive emotions on the social outcome variables would be the strongest during the initial formation of the relationship. As a relationship grows and becomes more stable, it may become less influenced by small fluctuations in emotions. Indeed, according to the broaden-and-build theory, this relationship would become a built resource that would serve to buffer stress in times of adversity.

In the current study, we did not theorize specifically about how individual positive emotions might produce self–other overlap and complex understanding. The original work by Aron and Aron (1986) posits that self-expansion is most directly related with love. Beyond love, one might predict that interpersonal positive emotions (e.g., amusement, love, joy, gratitude) in general might produce self–other overlap and complex understanding, whereas intrapersonal positive emotions (e.g., pride, awe) might not be associated with these social outcomes. This is an interesting hypothesis that would require future experimental studies to be fully tested. In correlational studies, such as the present study, it is difficult to tease apart the differential effects of positive emotions because reports of individual positive emotions tend to be highly intercorrelated, perhaps due to memory biases and individual differences (e.g., emotional granularity; Feldman-Barrett, 2004).

In relationship research, our hypothesis that positive emotions increase self–other overlap and build relationships is challenged by findings that stress can bring people together (Gump & Kalik, 1997; Schachter, 1959). However, our current finding that negative emotions were negatively correlated with self–other overlap are consistent with the broaden-and-build theory, and other evidence that negative emotions in general do not lead to better relationships (Levenson & Gottman, 1983; see Schaap et al., for a review). In addition, in

the current study, positive emotions still significantly predicted self–other overlap controlling for the effect of negative emotions. Overall, these results suggest that beyond negative emotions, positive emotions may be of primary importance in the formation of a new social relationship.

A limitation of the current design is that we did not include the responses from the roommates of the participants. A future study should gather responses from both roommates on measures of emotion, self–other overlap, personality, and complex understanding to examine a number of questions. First, would increases in mutual self–other overlap accompany increases in roommate similarity? In other words, do feelings of oneness actually lead to a merging of the roommates' personalities and ways of thinking? Second, do positive emotions lead to an understanding of the roommate that is consistent with how the roommate feels about themselves – including biases towards stable positive traits and unstable negative traits? Third, if the roommates are both feeling high negative emotions, do they then feel more self–other overlap as predicted by stress–affiliation models (Gump & Kalik, 1997; Schachter, 1959)? Examining these questions would greatly improve our understanding of the dynamic interaction between positive emotions and self–other overlap at the beginning of a relationship.

Social broadening

We take the data from this study as preliminary evidence that generating feelings of self–other overlap may be one effect of positive emotions' propensity to broaden people's momentary mindsets. In particular, our results suggest that positive emotions broaden and expand people's sense of self to include close others. Past experiments have already demonstrated that positive emotions produce broadened attention (Fredrickson & Branigan, 2005; Johnson, Waugh, Fredrickson, & Wager, 2006) and cognitive flexibility (Isen & Daubman, 1984; Isen, Daubman, & Nowicki, 1987). These cognitive effects of positive emotions may in turn account for the self-expansion reported here. Positive emotions may, for instance, broaden people's attention to external stimuli that have potential to become part of the self, and instill people with the cognitive flexibility to see these external stimuli as relevant to self-development. Considering close others, these cognitive effects of positive emotions may allow the characteristics, perspectives, and resources of the close other to more completely merge with the self. People with flexible self-images, and for whom the boundaries between self and other is blurred, have a greater propensity to assimilate other's positive characteristics into their own self-concept (Stapel & Koomen, 2000).

If, during positive emotions, self-boundaries expand and become more permeable, at such moments people might more readily see their oneness with others and think in terms of “we” instead of “me” versus “you.” Consistent findings have emerged within the intergroup relations literature. Induced positive emotions get people thinking more in terms of one superordinate group than in terms of “us” versus “them” (Dovidio et al., 1995). Perhaps related, we have recently found that positive emotions eliminate the formidable own-race bias in face perception. That is, an induced positive emotion enabled White participants to recognize Black faces at the same high rates at which they recognize White faces (Johnson & Fredrickson, 2005). Together with the study reported here, these findings suggest that the broadening triggered by positive emotions may indeed extend to social targets.

What consequences might be linked to social broadening? First, Dovidio and colleagues (1995) have already shown that more inclusive group representations predict more favorable outgroup evaluations and less intergroup bias. In addition, more inclusive social categorization can lead to decreased focus on race and allow individuals to better “see” and remember individual outgroup members (Johnson & Fredrickson, in press).

Second, having a more complex understanding of others may enhance relationships, and lead to greater relationship satisfaction. People may enjoy it when others attribute their behavior similarly to how they attribute their own behavior; to malleable situational factors. Studies have shown that people tend to like others who view them as they view themselves, even when this self-verification is negative (Swann, Stein-Seroussi, & Giesler, 1992). In addition, a study on college roommates found that people felt more positively about their roommates when their roommates' perception of them was consistent with how they perceived themselves (Katz & Joiner, 2002).

In sum, these data extend the evidence that positive emotions do more than simply feel good (for reviews, see Fredrickson, 1998, 2001). Indications that positive emotions increase feelings of self–other overlap shed light on a possible mechanism through which positive emotions cultivate social closeness, forge lasting relationships, and build complex understanding of others. Through these pathways, greater perceived oneness with others can contribute to Joseph Campbell's second law of life: survival.

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Notes

1. We note that this study was not designed to test the accuracy of the participant's judgments of their roommate. Indeed, previous studies have shown that people in positive relationships actually have a positive bias when judging their close other (Murray & Holmes, 1997). We cannot test for accuracy because we did not gather information from the roommates themselves to compare to the participants' judgments. So our concept of complex understanding is not the degree of accuracy when judging traits, but rather the degree to which the participant employs an attributional strategy in judging the roommate that would most likely mimic the roommate's own attributional strategy in judging themselves (Aron et al., 1991).
2. The original study also contained an experimental manipulation. Between Times 1 and 2, participants logged on to a secure website every evening for 28 days and were prompted to describe an event from the past day (following the positive emotion measures we included in our analyses). Participants were randomly assigned at the beginning of the study to either find positive meaning in each day's events, or just describe their events with no specific meaning attached. There were no significant interactions between this experimental manipulation and any of our dependent measures, so these experimental manipulations are not discussed further.
3. We also asked the participants if they had previously known their roommate before coming to college. Twenty-two participants did state that they had known their roommate before college. We included these participants in these analyses to retain power. These participants did differ from the participants who did not previously know their roommate on self-other overlap at Time 1, $t = 6.8$, $p < 0.01$, and at Time 2, $t = 2.45$, $p < 0.05$, however, excluding these participants did not change any of the reported analyses.
4. We did not find significant gender differences on any of our main dependent variables, and adding gender to the regression equations did not change the significance of any of the beta weights. Therefore, the reported analyses collapse across gender.
5. The positive and negative subscales were created using a principle component analysis on the emotion reports at Time 1 (DES). Surprise and sympathy are not usually included in subscales of positive emotions; however, these items clustered together statistically with the positive subscale in this sample, so we included them in this positive emotions subscales for Times 1 and 2. However,

the principal component analysis for the daily emotion reports revealed that sexuality, and not surprise clustered with the other positive emotion subscale items. Therefore, the positive emotion subscales for daily reports include sexuality and not surprise.

6. The positive to negative ratios are slightly skewed towards positivity because each emotion report contained 11 positive items and only 8 negative items. The skew of this ratio does not affect the correlations; however, when we split the sample along the Losada line of 2.9, we include in the High Positivity group some people who may have been in the Low Positivity group had there equal numbers of items (i.e., if someone felt “equal” amounts of emotions during the day, then their ratio should be 1, whereas their ratio would actually be 11/8 or 1.38). Including possible Low Positivity participants in our High Positivity sample works against our hypotheses, so our tests are more conservative. In addition, if we multiply the positivity ratios by 8/11 to center the ratios around 1, we lose no significance in the statistical analyses. After splitting the groups into High and Low positivity, the sample sizes become very different. This is consistent with previous findings using the Losada line (see Fredrickson & Losada, 2005). Plus, the Losada line is mathematically derived from other samples, which excludes the possibility that we split the sample a posteriori into subsamples that would confirm our hypotheses.
7. We chose to split the sample at 0.5 *SD* above the mean of the index for two reasons. First, we wanted the high relationship building group to only include participants who exhibited increased self–other overlap and complex understanding at Time 2 controlling for these variables at Time 1. Therefore, this group should have standardized residuals well above 0. Second, splitting the sample at 1 *SD* above the mean of the index includes only 10% of the sample, so in the interest of including more people in the high relationship building group, we split the sample at 0.5 *SD*.

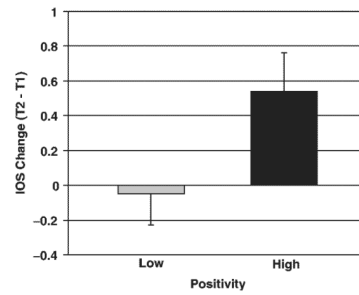


Figure 1. Mean values for change in self–other overlap from Time 1 to Time 2 by positivity averaged across daily emotion reports. High positivity is ≥ 2.9 positive to negative emotion ratio; Low positivity is < 2.9 positive to negative emotion ratio. Error bars are standard error of the mean.

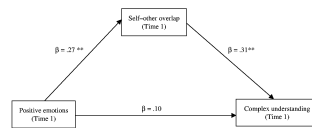


Figure 2. Beta coefficients for the pathways among positive emotions, self–other overlap, and complex understanding at Time 1. $*p < 0.05$; $**p < 0.01$.

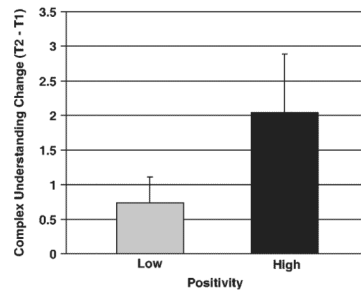


Figure 3. Mean values for change in complex understanding from Time 1 to Time 2 by positivity averaged across daily emotion reports. Values for complex understanding are raw scores for graphical clarity. Error bars are standard error of the mean.

Table I

Descriptive statistics for relevant variables at Times 1 and 2.

	<i>M</i>	<i>SD</i>	<i>n</i>
Time 1			
Self–other overlap (IOS)	3.64	1.59	147
Positive emotions	2.56	0.46	147
Negative emotions	1.35	0.59	147
Extraversion (Time 0)	4.3	1.6	146
Complex understanding	3.07	3.18	147
Time 2			
Self–other overlap (IOS)	3.89	1.61	109 [†]
Positive emotions	2.44	0.56	118
Negative emotions	1.41	0.54	118
Extraversion	4.16	1.65	118
Complex understanding	4.36	3.88	96 [*]

* The sample size for Time 2 IOS and complex understanding are lower as a result of participants switching roommates or not completing the measure.

Table II

Correlations among Time 1 and Time 2 measures.

	1	2	3	4	5
Time 1 (<i>n</i> = 147)					
1. Self-other overlap (IOS)	-	0.27**	-0.19*	0.14^	0.31**
2. Positive emotions		-	-0.48**	0.18*	0.18*
3. Negative emotions			-	-0.16^	-0.16*
4. Extraversion (Time 0)				-	0.15^
5. Complex understanding					-
Time 2 (<i>n</i> = 118 [†])					
1. Self-other overlap (IOS)	-	0.21*	-0.25**	0.32**	0.40**
2. Positive emotions		-	-0.23*	0.29*	0.00
3. Negative emotions			-	-0.30**	-0.15
4. Extraversion				-	0.12
5. Complex understanding					-

[†]Sample sizes for Time 2 IOS and complex understanding are 109 and 96, respectively.

* *p* < 0.05;

** *p* < 0.1.