

Don't Hide Your Happiness! Positive Emotion Dissociation, Social Connectedness, and Psychological Functioning

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It is now clear that positive emotion leads to enhanced psychological functioning. What is less clear, however, is just why this is so. Drawing on a social-functional perspective, we argue that positive emotional behavior that accurately signals to others the individual's internal state will enhance social connectedness. Positive emotional behavior that does not accurately signal a person's experience—such as a smile that is not felt—may impede social connectedness and, in turn, psychological functioning. This perspective suggests that (a) the degree to which experience and behavior are dissociated during positive emotional episodes, over and above level of positive behavior, should predict worse psychological functioning and (b) the effect of dissociation should be mediated by social connectedness. To test these hypotheses, we conducted a short-term prospective longitudinal study, with a baseline assessment of depressive symptoms and well-being at Time 1. Six months later, at Time 2, we used a novel within-individual laboratory paradigm to measure the degree to which positive emotional behavior was dissociated from (vs. coherent with) a participant's positive emotional experience. We also assessed level of positive behavior and experience. Then, another 6 months later, we assessed social connectedness as a mediator and depressive symptoms and well-being as outcomes at Time 3. Even when controlling for baseline functioning and for level of positive emotion behavior and experience, we found that greater positive experience-behavior dissociation at Time 2 predicted higher levels of depressive symptoms and lower levels of well-being at Time 3. As predicted, these associations were mediated by social connectedness.

Keywords: positive emotion, social-functional, experience-behavior dissociation, psychological functioning, social connectedness

Positive emotions are often associated with good outcomes (Fredrickson, 1998, 2001; Harker & Keltner, 2001; Isen, 2000;

King, Hicks, Krull, & Del Gaiso, 2006). In terms of cause and effect, evidence is accumulating that positive emotions are not just the to-be-expected consequence of good things. Rather, they appear to causally contribute to good outcomes, including enhanced psychological functioning (Fredrickson, 1998; Lyubomirsky, King, & Diener, 2005). These findings raise the crucial question of *how* positive emotions might lead to better psychological functioning.

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From a social-functional perspective (Frijda & Mesquita, 1994; Keltner & Haidt, 1999), a key function of emotions is to coordinate a person's social interactions and relationships. This function hinges on the accuracy with which internal emotional states are communicated to others. The more emotional behaviors match an individual's internal state, the better the social-communicative function of emotions should be served. In contrast, when emotional behavior is dissociated from experience, social communication should be disrupted (cf. Berry & Pennebaker, 1993; Bonanno et al., 2007; Boone & Buck, 2003; Keltner & Kring, 1998). Thus, a social-functional perspective suggests that the degree to which experience and behavior are dissociated (vs. coherent) during

positive emotional episodes should predict individuals' psychological functioning, over and above the overall level of positive experience and of positive behavior. In addition, a social-functional perspective assigns a prominent role to social processes and leads to the prediction that social processes should play a crucial mediating role in the effects of positive emotions on psychological functioning.

Positive Emotions and Psychological Functioning

Positive emotions are associated with enhanced psychological functioning, including higher levels of well-being and lower levels of mental health problems (Bonanno & Keltner, 1997; Folkman & Moskowitz, 2000; Fredrickson, 1998, 2001; Lyubomirsky et al., 2005). Such correlations may seem unsurprising because of course it feels good to be healthy and to do well. Moreover, positive feelings are part of the very definition of some facets of psychological functioning. For example, well-being is often defined as including high levels of positive emotion (Diener, 2000; Kahneman, 1999).

What is somewhat more surprising is that positive emotions also seem to causally contribute to psychological functioning. This is suggested by both experimental and longitudinal evidence (for reviews, see Fredrickson, 1998; Lyubomirsky et al., 2005). For example, Fredrickson, Cohn, Coffey, Pek, and Finkel (2008) randomly assigned participants either to a meditation practice aimed at enhancing positive emotion or to a control group. Over time, the group assigned to the positive-emotion condition exhibited increased positive emotion, which in turn predicted greater well-being and decreased depressive symptoms. These effects were mediated by gains in resources, including social resources.

How Do Positive Emotions Enhance Psychological Functioning?

The finding that positive emotions produce good outcomes leads to the crucial question of how positive emotions might do so. According to the social-functional perspective (Frijda & Mesquita, 1994; Keltner & Haidt, 1999), a key function of emotions is to coordinate a person's social interactions and relationships. In particular, *positive* emotions serve these functions by communicating to others affiliative intent and approachability and by inducing positive emotional states in others (cf. Anderson, Keltner, & John, 2003; Borkenau & Liebler, 1992; Frank, Ekman, & Friesen, 1993; Frijda & Mesquita, 1994; Keltner & Haidt, 1999; King, 2000; Shiota, Campos, Keltner, & Hertenstein, 2004). In this way, positive emotions foster social connectedness (engagement in close, mutually satisfying relationships) and the formation of long-term cooperative bonds (Anderson et al., 2003; Reis & Patrick, 1996).

The key proposition here is that positive emotions will have these adaptive social outcomes to the extent that they are communicated accurately to others (Buck, 1994; Keltner & Kring, 1998). When positive emotions are not communicated accurately, they should lose some of their positive functions. Thus, to understand when and how positive emotions are adaptive we must focus on the question of whether they are accurately communicated. We argue that accuracy is achieved—and communication is thus most effective—when positive behavior matches a person's feelings. When emotional behavior is dissociated from experience and thus

inaccurate, it may disrupt communication (cf. Berry & Pennebaker, 1993; Bonanno et al., 2007; Boone & Buck, 2003; Keltner & Kring, 1998). For instance, a person who smiles when she does not feel happy or who keeps a stoic face when she is delighted would disrupt rather than enhance communication. We suggest that such experience-behavior dissociation impedes social connectedness because it confuses others about the actual internal states of the individual or makes the individual appear inauthentic and thus not trustworthy (e.g., Berry & Pennebaker, 1993; Bonanno et al., 2007; Boone & Buck, 2003; English & John, 2011). According to this logic, the degree to which positive experience and behavior are dissociated should play a crucial role in predicting psychological functioning, and this effect should hold even when overall levels of positive experience and behavior are controlled. Furthermore, this logic implies that social connectedness plays a mediating role in the effects of positive experience-behavior dissociation on individuals' functioning.

A considerable body of research is consistent with one part of our mediation hypothesis: Lower social connectedness seems to be associated with impaired psychological functioning (Berscheid & Reis, 1998; Cacioppo, Hughes, Waite, Hawkley, & Thisted, 2006; Lee & Robbins, 1998; Steverink & Lindenberg, 2006; Uchino, Cacioppo, & Kiecolt-Glaser, 1996). However, little research has tested the other links in the proposed mediational model directly and in conjunction. The lack of relevant research, we think, is due in part to the lack of an appropriate conceptual and empirical paradigm with which to measure accuracy of positive emotion expression. One motivation for the present research was to introduce just such a paradigm by using a laboratory-based approach to intraindividual assessment of dissociated (less accurate) versus coherent (more accurate) positive emotion expression.

The Present Research

Our goal in the present study was to test two hypotheses: first, whether dissociation between positive emotion experience and behavior predicts two key facets of psychological functioning (depressive symptoms and well-being) and, second, if so, whether these effects are mediated by social connectedness. To address this goal, we employed a design that allowed us to (a) take a within-individual approach to measuring positive experience-behavior dissociation (vs. coherence) in a well-defined laboratory context, (b) isolate effects of experience-behavior dissociation on psychological functioning by controlling for overall level of emotion experience and behavior, and (c) isolate prospective effects of experience-behavior dissociation on psychological functioning by controlling for levels of psychological functioning present before the assessment of dissociation.

The present study began with a baseline assessment of participants' psychological functioning. Six months later, we used a positive emotion induction in the laboratory to assess experiential and behavioral responding and to compute the dissociation between these two components of the emotional response. Our methods were designed to measure within-individual dissociation between experience and behavior (cf. Molenaar & Campbell, 2009). Such an intraindividual approach is considered necessary for indexing the construct of dissociation, which involves the degree to which experience and behavior are disconnected within the indi-

vidual during emotional episodes (e.g., Buck, 1980; Cacioppo et al., 1992; Lacey, 1967; Stemmler, 1992). Six months after this laboratory session, we again assessed participants' psychological functioning, as well as the potential mediator of social connectedness (Lee & Robbins, 1995).

Method

Participants

The participants were 135 undergraduate students who were recruited from a larger project on emotion and adjustment during the college years. College students undergo a number of often emotionally intense transitions, even within the span of a few months (Aspinwall & Taylor, 1992; Harlow & Cantor, 1994), which increases variability in psychological functioning. Technical difficulties in the laboratory session led to missing data for 10 participants (7%; see Control Variables and Predictors section for more detail). This left 125 participants (47% female) for analyses. The mean age of participants in this sample was 21.1 years ($SD = 0.6$), and the ethnic composition was mixed: 2% African American, 30% Asian American, 43% European American, 9% Latino American, 11% of multiple ethnic backgrounds, and 5% other or unknown. Written informed consent was obtained after the procedures had been fully explained, and participants were paid for their participation.

Procedure

The study took place over three sessions. At Time 1, baseline levels of depressive symptoms and well-being were assessed. At Time 2, about 6 months later, positive emotional responding and experience-behavior dissociation were assessed in a laboratory session. At Time 3, another 6 months later, we assessed social connectedness as a potential mediator, as well as the final outcome measures of depressive symptoms and well-being.

In the individual laboratory sessions (Time 2), we assessed moment-by-moment experiential and behavioral responding during a positive emotion induction. This allowed us to obtain levels of experience and behavior as well as to compute an index of experience-behavior dissociation for each individual participant. On arrival, participants were seated in a comfortable chair in a well-lit 3 m \times 6 m room. The experimenter informed them that the session was concerned with their emotional responses and that they would be videotaped. The session began with participants viewing a 5-min neutral film clip in order to create comparable mood in all participants, independent of prior events of the day. Participants then viewed an approximately two-minute amusing film clip. To enhance generalizability, we presented three different films (each depicting a social interaction), to which participants were randomly assigned ($n_s = 41, 39, \text{ and } 42$). All clips had been pretested to primarily evoke amusement and to evoke comparable levels of amusement (cf. Rottenberg, Ray, & Gross, 2007).

To permit continuous recording of emotion experience during the film clip, we instructed participants in the use of a rating dial (cf. Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005; Ruef & Levenson, 2007). Participants adjusted the dial as often as necessary so that it would always indicate the amount of emotion they felt ("Rate how you feel at each moment"). The dial consisted of

a pointer that could be moved along a 180-degree scale, with the legends "extremely sad" at 0 degrees and "extremely amused" at 180 degrees. It was attached to a potentiometer in a voltage-dividing circuit that was monitored by a computer to enable determination of the dial position at a sample rate of 1,000 Hz. Laboratory software was used to compute averages for each second of data during the film clip.

Control Variables and Predictors: Laboratory Measures of Emotion Experience, Behavior, and Experience-Behavior Dissociation

Control variables: Levels of positive emotion experience and behavior. We obtained two control variables. First, overall level of *positive-emotion experience* was measured by the maximum amusement rating from the second-by-second experience ratings from the film clip. Self-report ratings were excluded for five participants because they did not use the dial properly, as indicated by no movement in their ratings.

Second, *positive-emotion behavior* was coded by five trained coders who rated facial expressions of amusement from the video recordings of participants' faces such that each participant's tape was rated by two coders. Coders used laboratory software to rate the amount of amusement displayed in each second of video. To do so, they used a global cultural-informant approach (Gross & Levenson, 1993) that was informed by microanalytic approaches (Ekman & Friesen, 1978). It was anchored at 0 with neutral (no sign of emotion) and at 8 with strong laughter. Coders were unaware of other coders' ratings, of the experimental hypotheses, and of the stimuli participants were watching. Average interrater reliabilities were satisfactory, with a mean coefficient alpha of .89 ($SD = .13$). We thus averaged the coders' ratings to create one second-by-second positive behavior rating for each participant. To index a participant's level of positive emotion behavior, we used that participant's maximum behavior rating from the film clip. Technical problems led to five missing videotapes. Together with the five missing self-report cases, this resulted in the 10 missing cases (7%), leaving 125 participants for analyses.

Positive experience-behavior dissociation. A within-individual index of dissociation (d) was obtained using a procedure similar to that described in Mauss et al. (2005) and Sze, Gyurak, Yuan and Levenson (2010). Figure 1 summarizes the main steps in this procedure. After obtaining second-by-second experience and behavior across the film clip (Figure 1, Step 1), we calculated for each participant cross-correlations between experience and behavior within lags from -10 to 10 s within the amusing film clip (Figure 1, Step 2). The time window of -10 to 10 was chosen because theoretical considerations led us to expect that there might be meaningful time lags among measures not greater than 10 s in either direction (e.g., Gratton, 2000; Kettunen, Ravaja, Näätänen, Keskivaara, & Keltikangas-Järvinen, 1998; Levenson, 1988). We chose the highest value of the resulting 21 cross-correlations for each participant because it likely reflects the most accurate index of association among responses (cf. Mauss et al., 2005). The resulting cross-correlation for each individual indicates the extent to which positive experience and positive behavior covaried across time within that individual, while taking into account potential lags between measures. To render these individual-level indices linearly scaled and usable in individual-difference analyses, we stan-

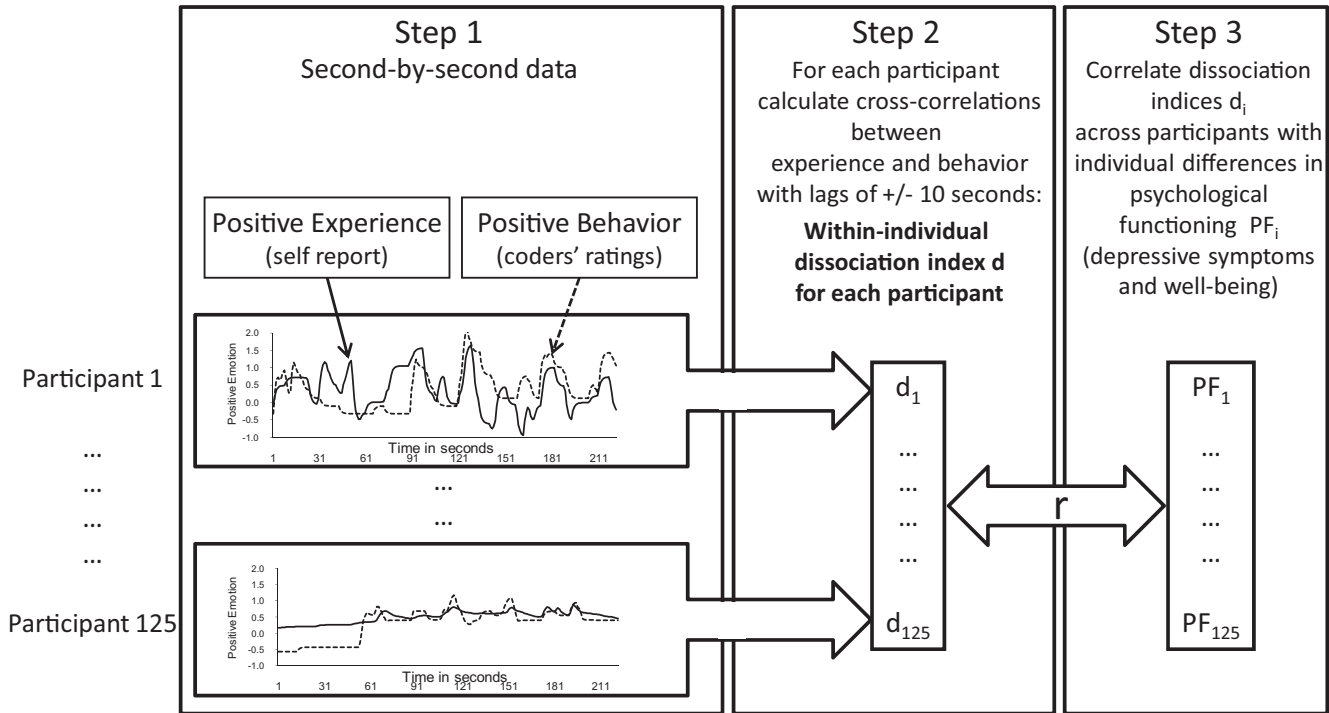


Figure 1. Schematic of steps used to compute within-individual experience-behavior dissociation index d (Steps 1 and 2) and to obtain correlates between individual differences in experience-behavior dissociation and psychological functioning (Step 3). Data displayed are hypothetical. PF = psychological functioning.

standardized them using Fisher’s r -to- z transformation and then reverse-scored them, so that higher values denote greater dissociation. Dissociation indices can range from -1.0 (perfect coherence between experience and behavior) to 0 (no relationship between experience and behavior) to 1.0 (perfect inverse relationship: dissociation). This is the index of dissociation we used to predict individual differences in psychological functioning (Figure 1, Step 3) and test mediation via social connectedness.

We also computed the sample mean of this index of dissociation, which can be transformed back into r via Fisher’s equations to yield an estimate of the average extent to which positive experience and positive behavior were dissociated in this sample of participants. On the basis of prior research (Mauss et al., 2005), we expected that on average the positive experience and behavior would be relatively more coherent than dissociated (i.e., a negative average dissociation index).

Figure 2 illustrates response patterns that lead to high (Panel A) versus low (Panel B) dissociation. As can be observed in Panel A, this participant’s experience and behavior were relatively dissociated. Across time, experience and behavior do not move in the same direction or they move in directions opposite from one another (e.g., 150–170 s). In contrast, Panel B illustrates a case in which experience and behavior were coherent across time. Whenever the participant experienced positive emotion during the film clip, a greater degree of positive emotional behavior was observed by the independent judges who had (blindly) coded behavior.

Outcomes and Mediators: Measures of Psychological Functioning and Social Connectedness

Depressive symptoms at baseline (Time 1) and outcome (Time 3) were measured with a five-item short version of the Center for Epidemiologic Studies Depression scale (Radloff, 1977). Coefficient alpha reliability was .87 at Time 1 and .83 at Time 3.

Well-being at baseline (Time 1) and outcome (Time 3) was measured with the five-item Satisfaction With Life Scale (Diener, Emmons, Larsen, & Griffen, 1985). Coefficient alpha reliability was .91 at Time 1 and .86 at Time 3. As expected, depressive symptoms and well-being were negatively correlated (r about $-.60$). However, because these two indices of psychological functioning are conceptually distinct and can show divergent effects (e.g., Ryff et al., 2006; Ryff & Singer, 2008), we considered them separately.

Social connectedness was assessed with three scales. Appraisal social support and belongingness social support were each assessed with four-item scales from the Interpersonal Support Evaluation List (Cohen & Hoberman, 1983). Loneliness was assessed with the eight-item UCLA Loneliness Scale (Russell, 1996). Preliminary results showed that these three scales show considerable conceptual and empirical overlap and that our main results held for each of the three scales individually; we therefore formed a social connectedness aggregate across the three scales, with the items indicating loneliness and low social support reverse-keyed. Coefficient alpha reliability for the 16-item composite of social connectedness was .91.

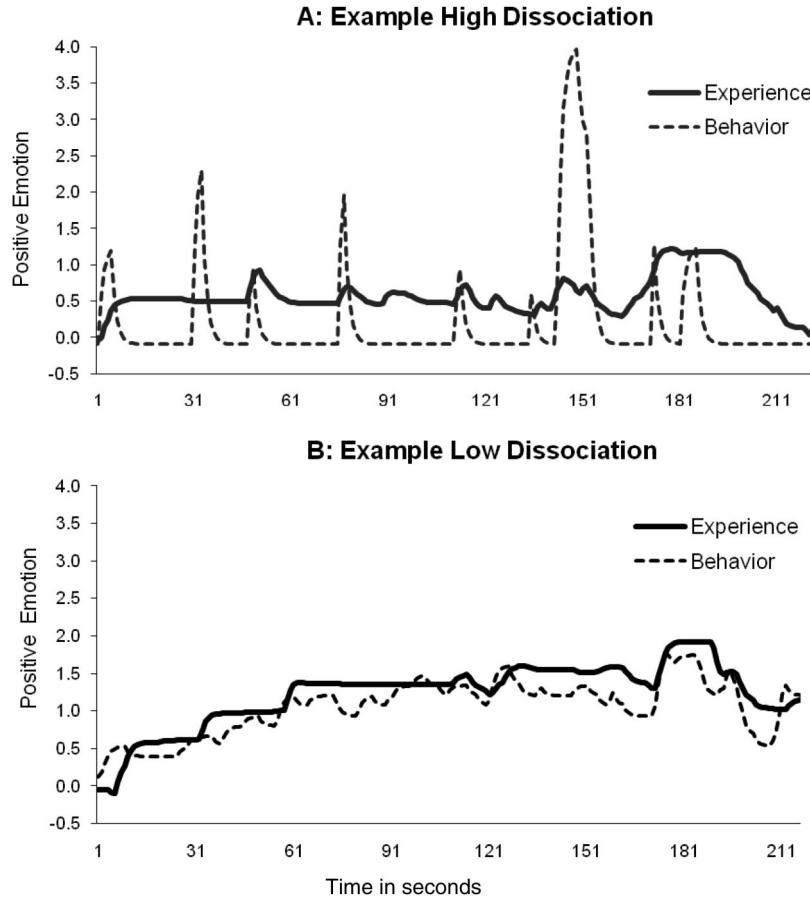


Figure 2. Second-by-second plots for z-scored emotion experience and behavior (greater values represent more positive emotion experience and behavior) for the amusing film clip. Each panel depicts a representative participant with high dissociation (Panel A, corresponding to a dissociation index of .36) and low dissociation (Panel B, corresponding to a dissociation index of $-.90$).

Results

Preliminary Analyses

To assess the films' effectiveness at inducing positive emotion, we examined levels of experience and behavior during the film clips. On average, the film clips induced moderate to high levels of amusement, as evidenced by relatively high average amusement experience and behavior on a 0–8 scale: amusement experience, $M = 6.1$, $SD = 1.5$, range = 1–8; amusement behavior, $M = 5.1$, $SD = 1.1$, range = 1.9–7.0.¹ To ascertain that the film clips induced an appropriate range of emotional responding over time, we considered the range of second-by-second experience and behavior across time. As indicated by Figure 2, within participants, the clips induced a range of positive emotion experience and behavior.

As expected, on average the experiential and behavioral components of the emotion response were relatively more coherent than dissociated, as indicated by a negative sample mean of our index of experience–behavior dissociation (i.e., $M = -.68$, indicating a fairly low average level of dissociation). Most important,

however, we found evidence for substantial individual differences in dissociation, with a standard deviation of .34 and a dissociation score range from a low of $-.92$ to a high of .36.²

¹ The three amusing film clips were comparable in terms of their effectiveness, as indicated by two analyses of variance comparing across-participant average levels of experience and behavior across the three films clips: amusement experience, $F(2, 119) = 0.10$, $p = .91$, $\eta^2 = .002$; amusement behavior, $F(2, 119) = 1.0$, $p = .35$, $\eta^2 = .02$.

² We examined whether sex affected dissociation using an analysis of variance with sex as the independent variable and the dissociation index as the dependent variable. Female participants did not differ from male participants in positive experience–behavior dissociation ($p = .61$, $\eta^2 = .002$). To examine ethnic differences, we compared Asian/Asian American and European/European American participants, because these groups generate the clearest expectations for differences in dissociation (Gross & John, 2003). However, the two groups did not differ from one another in positive experience–behavior dissociation ($p = .47$, $\eta^2 = .006$). Because sex and ethnic group were not associated with positive experience–behavior dissociation, these variables are not further discussed.

Did Positive Experience–Behavior Dissociation Predict Psychological Functioning?

To examine whether positive experience–behavior dissociation predicted the two measures of psychological functioning, we computed correlations between positive dissociation measured at Time 2 and well-being and depressive symptoms measured at Time 3. As predicted by a social-functional perspective and as summarized in Table 1, greater experience–behavior dissociation predicted higher levels of depressive symptoms at Time 3 ($r = .25, p < .01$) and lower levels of well-being at Time 3 ($r = -.22, p < .01$).

To test whether these associations held when controlling for overall levels of emotion experience and behavior, we controlled for levels of positive experience and behavior at Time 2 as covariates in partial correlations. Indeed, the links between dissociation and both functioning measures held even when we controlled for levels of positive emotion behavior and experience.

Next, to test whether experience–behavior dissociation would predict change in psychological functioning independent of prior levels of psychological functioning, we controlled for levels of depressive symptoms and well-being at Time 1 by using these measures as covariates in partial correlations. These analyses indicated that dissociation at Time 2 predicted change in psychological functioning at Time 3, such that participants who exhibited relatively dissociated positive experience and behavior tended to exhibit greater increases in depressive symptoms and greater decreases in well-being than did those whose experience and behavior were more coherent.³

Did Social Connectedness Mediate the Link Between Positive Experience–Behavior Dissociation and Psychological Functioning?

We tested whether the associations between positive experience–behavior dissociation at Time 2 and depressive symptoms and well-being at Time 3 were mediated by social connectedness, following Baron and Kenny’s (1986) regression approach. The findings are summarized in Figure 3.

Table 1
Linking the Laboratory-Based Experience–Behavior Dissociation Index to Subsequent Depressive Symptoms and Well-Being: Zero-Order and Partial Correlations

Dissociation index	Depressive symptoms at Time 3	Well-being at Time 3
Zero-order correlation	.25**	-.22**
Partialing experience	.24**	-.23**
Partialing behavior	.25**	-.23**
Partialing experience and behavior	.24**	-.23**
Predicting change in		
Depressive symptoms (i.e., controlling Time 1 depressive symptoms)	.18*	—
Well-being (i.e., controlling Time 1 well-being)	—	-.23**

Note. $N = 125$. Dissociation was computed as a within-subject index relating the individual’s positive emotion experience and positive behavior to one another over time in a laboratory task.
* $p < .05$. ** $p < .01$.

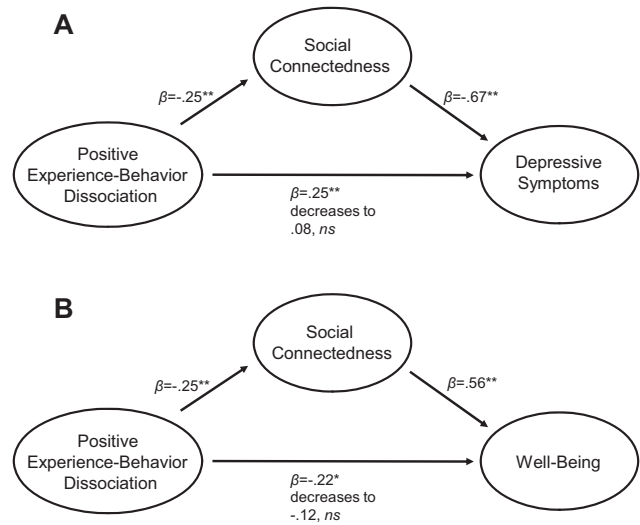


Figure 3. Mediation of the relationship between positive experience–behavior dissociation and depressive symptoms (Panel A) and well-being (Panel B) by social connectedness. Values are standardized betas. *ns* = nonsignificant. * $p < .05$. ** $p < .01$.

First, as predicted, positive experience–behavior dissociation predicted social connectedness such that greater dissociation was associated with lower social connectedness.⁴ This relation held even when controlling for overall levels of positive experience and behavior at Time 2, as well as for baseline depressive symptoms and well-being at Time 1. Second, social connectedness was negatively associated with depressive symptoms (Figure 3, Panel A) and positively associated with well-being (Figure 3, Panel B). Third, the associations between positive experience–behavior dissociation on the one hand and depressive symptoms and well-being on the other hand were no longer significant ($ps > .13$), consistent with the requirement for full mediation. Sobel tests indicated that the effects of experience–behavior dissociation were significantly reduced when social connectedness was entered into the regressions (Sobel’s $z_s > 2.2, ps < .03$). Finally, these mediation results held even when controlling for overall levels of positive emotional behavior and experience (Sobel’s $z_s > 2.1, ps < .04$) and for baseline levels of depressive symptoms (Sobel’s $z = 3.6, p < .001$) and well-being (Sobel’s $z = 2.0, p = .05$). When we controlled for all three variables simultaneously (positive emotional behavior and experience and initial levels of depressive symptoms for depressive symptoms; positive emotional behavior and experience and initial levels of well-being for well-being), the Sobel test for depression became a statistical trend (Sobel’s $z = 1.7, p = .09$) and the Sobel test for well-being held (Sobel’s $z = 2.0, p = .05$). In each case, all other conditions for mediation were met when controlling for all three variables simul-

³ Curvilinear (quadratic or cubic) relationships between the variables did not present a better fit for the data than the linear relationships, as evidenced by nonsignificant quadratic and cubic models ($ps > .59$).

⁴ Positive experience–behavior dissociation predicted each of the three subscales that composed the social connectedness measure (appraisal social support, belongingness social support, and loneliness; $ps < .05$).

taneously. Together, these analyses provide consistent evidence that the prospective longitudinal effects of positive experience–behavior dissociation on depressive symptoms and well-being were mediated by social connectedness.

Discussion

We have argued from a social-functional perspective that behavioral expression of positive emotion leads to higher levels of psychological functioning only when these behaviors provide accurate information about the individual's internal state and that one critical mediator in this effect is enhanced social connectedness.

Consistent with this argument, our findings show that the more participants' positive experience and behavior were dissociated during a positive emotion induction, the greater levels of depressive symptoms and the lower levels of well-being participants experienced 6 months later. In our prospective longitudinal design, we were able to show that these associations were, as expected, mediated by social connectedness and that they held even when overall levels of positive emotional experience and behavior and baseline levels of preexisting psychological functioning were controlled. Thus, rather than overall level of positive emotional behavior, it is the extent to which this behavior accurately reflects positive emotion experience that leads to positive outcomes.

Methodological Implications

In the past, dissociation of emotion response systems has been assessed primarily with relatively crude methods that often relied on between-individual approaches (e.g., Gross, John, & Richards, 2000). This type of research assesses, for example, whether individuals who experience greater levels of emotion than the average person in a sample but behaviorally express lower levels of emotions than average show less favorable functioning than do other individuals. In this approach, crucial information about patterning of emotional responses across time is lost. Indeed, several researchers have argued that such between-individual approaches are not appropriate for indexing the kind of dissociation that is expected to have consequences for individual-level functioning, namely, the degree to which experiences and behavior are disconnected within a person during emotional episodes (e.g., Buck, 1980; Cacioppo et al., 1992; Lacey, 1967; Molenaar & Campbell, 2009; Stemmler, 1992).

Here, we used a novel approach to measure within-individual dissociation between experience and behavior. We did so by obtaining moment-by-moment experience and moment-by-moment behavior ratings during a standardized positive emotion induction and assessing the dissociation between these two emotional-response components over time. We showed that this within-individual dissociation predicted social connectedness and psychological functioning. Thus, by capturing the patterning of multiple emotional responses as they unfolded over time, we were able to gain insights over and above those afforded by between-individual measures of mean-level responding. In future research, studies of response-system dissociation as well as other phenomena, such as emotional awareness (Schooler & Mauss, 2010; Sze et al., 2010), might benefit from this method.

The Role of Emotion Coherence

One important contribution of the present study is that it allowed us to validly estimate the degree to which experience and behavior were dissociated (vs. coherent) during a standardized positive emotion induction. Consistent with previous research (e.g., Mauss et al., 2005), our results indicate that for the average participant, our dissociation index was low, suggesting that in the sample overall experience and behavior were positively associated (i.e., positive behavior was typically an accurate reflection of positive emotion experience).

This finding is consistent with theories that postulate that emotions involve coordinated responses across multiple response domains (Darwin, 1872/1965; Ekman, 1992; Levenson, 2003). Although a number of emotion theorists have argued in favor of this view, little empirical support has been garnered in support of it, especially when within-individual approaches have been used to measure coherence. By demonstrating considerable average levels of coherence between experience and behavior, the present results add an important piece of empirical evidence in support of a basic assumption in affective science. We did not find effects of either sex or ethnicity (comparing Asian/Asian American to European/European American groups). This is consistent with the notion that response-system coherence is a relatively general property of emotions. Last, the fact that we found longitudinal effects of dissociation (vs. coherence) suggests that individual differences in coherence are relatively stable across 6 months.

At the same time, coherence between experience and behavior was not perfect. Thus, in line with theories that presume variability and context specificity of response system coherence (e.g., Barrett, 2006), the present results do not imply that experience–behavior coherence is absolute. Indeed, we found substantial individual differences in the degree of dissociation versus coherence, with an observed range from $-.92$ to $.36$. This variation made it possible for us to examine the functional implications of positive experience–behavior dissociation.

Functions of Positive Emotions

Individuals who exhibited relatively dissociated positive experience and behavior tended to fare worse psychologically than those whose experience and behavior were more coherent. This effect of experience–behavior dissociation held over and above the effects of overall levels of positive experience and of positive behavior. These findings are consistent with the notion that the function of positive emotions is best served when positive behaviors accurately match feelings (cf. Buck, 1994; Keltner & Kring, 1998). That is, smiling when not happy or keeping a blank face when feeling delighted disrupts the functions of positive emotions. These findings are inconsistent with the behavioral ecology view (e.g., Fridlund, 1991), which predicts that emotional behavior affects individuals' functioning regardless of internal experience. Rather, the relationship between behavior and experience matters for the functional outcomes of emotional behaviors: It is the degree to which positive experience and behavior are dissociated versus coherent during positive emotional episodes that contributes to the functions of positive emotions.

One question one might have is whether the present associations were primarily driven by individuals on either extreme of disso-

ciation or coherence (e.g., only people who exhibited extreme levels of experience–behavior dissociation suffered negative consequences). Examination of the shape of the bivariate distributions suggests this was not the case: There was no evidence for curvilinear effects, and linear relationships presented the best fit for the data. This suggests that functional implications of dissociation are not limited to individuals who exhibit either extreme dissociation or extreme coherence.

The present findings also point to a possible mechanism for divergent effects of different emotion-regulation processes on psychological functioning and health. Some regulation processes, such as expressive suppression (Gross & John, 2003), experiential avoidance (Campbell-Sills, Barlow, Brown, & Hofmann, 2006; Kashdan, Barrios, Forsyth, & Steger, 2006), and alexithymia (Sifneos, 1973; Taylor, 1984), increase the possibility of experience–behavior dissociation because they involve the regulation of only one response system (e.g., only behavior or only experience; Berry & Pennebaker, 1993; English & John, 2011; Gross & John, 2003; John & Gross, 2004). As such, experience–behavior dissociation may be one important mechanism by which these regulation processes impair individuals' functioning. Indeed, expressive suppression has been linked to worse social functioning in the short term (Butler et al., 2003) and in the longer term (English & John, 2011; Gross & John, 2003; Srivastava, Tamir, McGonigal, John, & Gross, 2009). This points to social processes as a shared pathway in the link between maladaptive emotion-regulation processes, dissociation, and outcomes. In contrast, other regulation processes, such as cognitive reappraisal (Gross & John, 2003) and acceptance (Shallcross, Troy, Boland, & Mauss, 2010), appear to affect different components of the emotional response in the same way. As such, experience–behavior coherence may be one important mechanism by which these regulation processes enhance individuals' functioning. Together, these considerations suggest that response-system dissociation versus coherence may be an important mechanism for the divergent health effects of different types of emotion regulation.

Positive Emotion Dissociation, Social Connectedness, and Psychological Functioning

Research into the mechanisms by which positive emotions have positive effects for individuals' functioning has identified several intraindividual factors that may mediate the salutary effects of positive emotions, including cognitive and self-regulatory mechanisms (Fredrickson, 1998, 2001; Isen, 2000; Lyubomirsky et al., 2005; Tugade & Fredrickson, 2004; Tugade, Fredrickson, & Feldman Barrett, 2004). In addition, the present findings suggest that a relational factor, namely, social connectedness, provides an important social pathway in linking positive emotions to desirable psychological outcomes.

By what specific mechanisms might positive experience–behavior dissociation impede social connectedness? Two related mechanisms appear plausible. First, experience–behavior dissociation may affect others' judgment of the individual. A tendency to dissociate felt experience from displayed behavior may lead others to conclude that the individual withholds important aspects of the self and thus perceive the individual as inauthentic (e.g., Boone & Buck, 2003; English & John, 2011). Inauthenticity, in turn, signals lack of trustworthiness and predictability (Boone & Buck, 2003;

Kernis & Goldman, 2006; Reis & Patrick, 1996), leading interaction and relationship partners to decrease closeness or commitment.

Second, experience–behavior dissociation may negatively affect quality and coordination of communication, because successful communication relies in part on the accurate behavioral expression of felt emotions (Buck, 1994; Reed & McIntosh, 2008; Wubben, De Cremer, & Van Dijk, 2009). Both of these factors—others' perception of one's trustworthiness and predictability as well as effective emotional communication—have important effects on longer term relationship outcomes, including social connectedness (e.g., Anderson et al., 2003; Boone & Buck, 2003; Donahue, Robins, Roberts, & John, 1993; Swann, De La Ronde, & Hixon, 1994).

Limitations and Future Directions

The results obtained in this research present an important step toward our understanding of functions of positive emotion. Nonetheless, the present research has limitations, of which we highlight four, each pointing to important future directions for research.

First, the present research focused on the relationships among three specific factors (positive experience–behavior dissociation, social connectedness, and psychological functioning). Our model was theoretically motivated and showed generality across sex and ethnic groups. Nonetheless, it will be important for future research to further examine its specificity and boundary conditions. In particular, it will be important to (a) extend this work to different socioeconomic and age groups; (b) consider other positive emotions that may differ in their interpersonal implications, such as love or pride; (c) examine other components of emotional responding, such as central or peripheral physiology; (d) assess additional candidate mediators, such as inauthenticity; and (e) test the role of other kinds of outcomes, particularly in the context of clinical populations.

Second, although we used a prospective longitudinal design, causal interpretations on the basis of this study alone can be made only with caution. For instance, lower levels of psychological functioning might lead to greater experience–behavior dissociation, rather than the other way around. However, three considerations argue against alternative causal explanations. First, we controlled for preexisting psychological functioning and found this did not eliminate the prospective relationship between dissociation and psychological functioning. Second, although psychological functioning can affect social connectedness, we know from previous research that social connectedness causally contributes to psychological functioning (Cacioppo et al., 2006; Holahan & Moos, 1991; Piquart & Sörensen, 2000). Third, experimental studies of expressive suppression (which arguably engenders experience–behavior dissociation) lend support to the notion that dissociation can cause impairment in social connection (e.g., Butler et al., 2003) and in psychological functioning (Gross & Levenson, 1997). Together, these considerations increase confidence in the sequence of processes we propose, but because the potential for bidirectional relationships among these measures does not allow for firm tests of alternative models, we do not present statistical tests of alternative models. It will ultimately be important to conduct studies that experimentally manipulate experience–behavior dissociation (e.g., by teaching nonverbal communicative

skills) so confident conclusions can be made about its causal effects.

Third, to test the mediation model we propose, one ideally would measure the mediator before the outcome so as to be able to perform cross-lagged analyses (Kessler & Greenberg, 1981). However, for practical reasons, we were not able to add a fourth measurement time point. The present design included three measurement points, in which we measured initial levels of psychological outcomes (psychological functioning) before the predictor variable (experience–behavior dissociation), and we measured the predictor variable before the mediator (social connectedness) and the outcome (psychological functioning). This design was optimized to test the key hypothesis, namely, that experience–behavior dissociation would predict psychological functioning when controlling for initial levels in psychological functioning. In future studies, it will be important to use complementary designs to test our mediational model.

Fourth, some of the effect sizes in the present research were relatively modest; in absolute terms, beta coefficients ranged from .22 to .67. However, even our smallest effect size is comparable to similar effects of individual differences in emotional processes (e.g., $r = .25$ for cognitive reappraisal and depressive symptoms; Gross & John, 2003). Because of the relatively stable and general nature of these effects, they likely affect people cumulatively, and even relatively small effect sizes can end up generating important consequences. Moreover, three features of our design suggest that the effect sizes reported here are conservative, lower bound estimates. First, current-state factors, such as stress, affect psychological functioning (Kendler, Karkowski, & Prescott, 1999). These influences likely introduced additional “noise” in the data that we were not able to control. Second, our effects not only were longitudinal (assessed 6 months apart) but were also obtained from different data sources and modes of assessment (laboratory assessment of emotional responding to film clips vs. self-report questionnaires). Third, although the film clips we employed to induce amusement all depicted social interactions, dissociation was assessed in a nonsocial laboratory situation. Given that we assessed an effect on a social process (social connectedness), it stands to reason that effect sizes would be greater if dissociation were measured in a social context; future studies will be needed to test this possibility.

Concluding Comment

How and why do positive emotions lead to good outcomes? We argued from a social-functional perspective that one key to answering these questions lies in the social-communicative function of emotions: Positive emotions should be adaptive inasmuch as they are accurately communicated. In turn, accurate communication is ensured when positive emotional behaviors are tightly coupled with positive experiences. Thus, the degree to which experience and behaviors during positive emotions are dissociated (vs. cohere with each other) should predict psychological functioning, and it should do so via social processes. We used a laboratory probe optimized to measure positive experience–behavior dissociation with within-individual methods, and our results lend support to these ideas. The more positive behaviors were dissociated from experiences, the lower social connectedness people exhibited, which over time under-

mined their psychological functioning. Thus, we add an important piece of knowledge to our understanding of how positive emotions lead to good outcomes.

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