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The Dynamic Role of Personality States in Mediating the Relationship between Extraversion and Positive Affect

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Abstract

Objective—One of the most noteworthy and robust findings in personality psychology is the relationship between extraversion and positive affect. Existing theories have debated the origins and nature of this relationship, offering both structural/fixed and environmental/dynamic explanations. We tested the novel and straightforward dynamic hypothesis that part of the reason trait extraversion predicts trait positive affect is through an increased propensity to enact extraverted states, which in turn leads to experiencing more positive affect states.

Method—We report five experience sampling studies (and a meta-analysis of primary studies) conducted in natural environments and laboratory settings in which undergraduate participants ($N = 241$) provided ratings of trait extraversion, trait positive affect, extraversion states, and positive affect states.

Results—Results of primary studies and the meta analysis showed that relationships between trait extraversion and trait positive affect were partially mediated by aggregated extraversion states and aggregated positive affect states.

Conclusions—The results supported our dynamic hypothesis and suggested that dynamic explanations of the relationship between trait extraversion and trait positive affect are compatible with structural explanations. An important implication of these findings is that individuals might be able to increase their happiness by self-regulating their extraverted states.

Keywords

extraversion; positive affect; density distributions; personality states

The link between extraversion and positive affect (PA) has been one of the most important and robust findings in personality psychology, with a great deal of evidence that extraversion is related to both trait PA (Costa & McCrae, 1980; Lucas, Diener, Grob, Suh, & Shao, 2000; Watson & Clark, 1992), and state PA (Larsen & Ketelaar, 1991; Lucas & Baird, 2004; Lucas et al., 2000). What remains is the need to explain why extraverts are happier than introverts. The purpose of this paper is to test the hypothesis that part of the reason that extraverts are happier than introverts is that they enact more extraverted states, which lead directly to extraverts experiencing more PA states. Like affective states, personality states

are characterized as having the same content as traits, but varying across short periods of time instead of being stable personality characteristics (Cattell, Cattell, & Rhymer, 1947; Fleeson, 2001; Nesselrode, 1988). Our hypothesis is grounded in the recent finding that state manifestations of extraversion consistently predict state PA (Fleeson, Malanos, & Achille, 2002; Heller, Komar, & Lee, 2007; McNiel & Fleeson, 2006; Schutte, Malouff, Segre, Wolf, & Rodgers, 2003; Wolfe & Kasmer, 1988).

Testing whether extraverts experience more PA than introverts because they actually enact more extraverted states in their daily lives is important for at least four reasons. First, the extraversion – PA relationship is a clear demonstration of the power of personality in affecting quality of life, yet until the mechanism is clear, the relationship remains an intriguing but unexplained phenomenon. The second reason is that it provides a test of a dynamic (e.g., process-oriented) versus a fixed account of traits. In contrast to fixed or temperamental explanations, which by definition treat the relationship between extraversion and PA as fairly immutable, our dynamic explanation suggests that that part of the reason extraverts are happier is because they act more extraverted, which brings about higher levels of PA. If the explanation has to do with what people do, rather than with what people have (Cantor, 1990), it suggests that models of traits ought to focus on mechanisms of state enactment as well as on structural features associated with traits. Third, the dynamic model raises the possibility that introverts, who already act extraverted on some occasions (Fleeson, 2001) and have the ability to act extraverted on demand (Fleeson et al., 2002; McNiel & Fleeson, 2006), might be able to increase their happiness by enacting more extraverted states in their daily lives. Fourth, these studies investigate whether states are meaningfully related to traits and whether aggregated states have the power to predict outcomes above and beyond the predictive ability of traits. Our mediation model tests both of these possibilities, as it provides another test of whether trait extraversion is manifested in daily extraverted behavior (see Fleeson & Gallagher, 2009), and it tests whether aggregates of extraverted states predict PA when accounting for the effects of trait extraversion.

A Dynamic Model of Extraversion and Positive Affect

Accumulating evidence suggests that the states of extraversion and PA covary, and that state extraversion causes state PA (e.g., Fleeson, Malanos, & Achille, 2002; McNiel & Fleeson, 2006). Our central hypothesis is that the tendency for extraversion and PA states to co-occur may partially explain the relationship between trait extraversion and trait PA – in other words, at least part of the reason why extraverts are happier in general is because they act extraverted in daily life, which produces feelings of happiness. This explanation complements past theories about why trait extraversion and trait PA are associated.

It is useful here to specify a distinction between constitutional features of a trait (i.e., what an extravert “has”) and expressions of those features (i.e., what an extravert “does”; Cantor, 1990), and how these might differentially explain the link between extraversion and PA. Past theories have emphasized a structural or fixed explanation whereas our theory postulates a more dynamic explanation. We argue it is what extraverts do (i.e., the fact that they act extraverted), in addition to the temperamental or constitutional features they possess, that results in extraverts having higher levels of PA than introverts. That is, our hypothesis is that the constitutional features associated with trait extraversion lead to PA partially through their manifestations as state extraversion. The temperamental explanations, in contrast, suggest that manifestations of the trait in the environment (what extraverts do) have nothing to do with the relationship between trait extraversion and trait PA. Rather, they claim that constitutional features (what extraverts have) entirely explain the covariation between trait extraversion and trait PA.

Temperamental explanations

Three prominent temperamental, or fixed, explanations are the affect-level model (Gross, Sutton, & Ketelaar, 1998), the affect-threshold model (Rosenberg, 1998), and the affect-reactivity model (Carver, Sutton, & Scheier, 2000; Depue & Collins, 1999), the latter of which is based on Gray's (1970) theory (Fleeson et al., 2002). The affect-level model maintains that extraverts have a higher set point for PA than introverts, the affect-threshold model argues that extraverts have a lower threshold for experiencing PA than introverts, whereas the affect-reactivity model postulates that extraverts respond more strongly to positive stimuli because of structural differences in the brain. Given typical situational circumstances, extraverts will be happier than introverts because of some set structure or mechanism, regardless of how extraverted they act. We call these explanations less active and dynamic because the extravertedness of individuals' behavior is not relevant, and that introverts cannot act more extraverted in order to enjoy the positive affect increase of extraverts; rather, the continuous operation of extraverts' fixed and stable properties leads to their positive affect. All three explanations presuppose a temperamental, neurobiological basis which reinforces a stable difference in the tendency to experience PA between extraverts and introverts.

Evidence for the various temperamental hypotheses listed above is typically obtained by having participants fill out questionnaire measures of extraversion, obtaining a measure of the proposed mechanism explaining the connection between trait extraversion and trait PA (e.g., affective reactivity), and then determining whether participants with higher extraversion questionnaire scores have a tendency to have higher levels on the proposed mechanism.

It is important to make clear that these kinds of tests assume that a participant's score on an extraversion questionnaire indicates his/her constitutional level of extraversion. Although questionnaire measures ask participants to rate themselves with regard to how they typically act, feel, and think (Pytlik Zillig, Hemenover, & Dienstbier, 2002; Wilt & Revelle, 2009), they do not actually measure whether those characteristics are manifested during daily life (Fleeson & Gallagher, 2009). Therefore, regardless of the content of extraversion questionnaires, whether it is gregariousness, cheerfulness, leadership, liveliness, boldness, etc. (Ashton, Lee, & Goldberg, 2007; Costa & McCrae, 1992b; Hofstee, de Raad, & Goldberg, 1992), they do not measure such characteristics as they occur and thus cannot tell us how extraverted the individuals act in their daily lives (Furr, 2009). In other words, one's score on a trait extraversion questionnaire represents the features of extraversion that person possesses (what the person has) and not what that person actually does. In order to assess the states that a person actually manifests, it is necessary to obtain online ratings of behavior as it occurs (Furr, 2009).

While it is clear from previous research that questionnaire scores of trait extraversion relate to trait PA, what is not clear is whether this link is due solely to the constitutional features of the extraversion. If the link is explained by constitutional features alone (i.e., if temperamental theories are correct), then manifestations of state extraversion over the course of daily life should be irrelevant to the connection between trait extraversion and trait PA.

Extraversion States: The Density Distributions Approach

In contrast to temperamental theories, our dynamic model proffers that it is precisely the enacting of extraverted states over the course of daily life that (at least partially) explains that the trait extraversion – trait PA relationship. The dynamic model draws from the density distributions approach (Fleeson, 2001; 2004). According to this approach, a personality state

contains the same content and scale as a personality trait, but describes how the person is at the moment rather than how he or she is in general. Thus, state extraversion can be defined as how talkative, bold, adventurous, etc., one acts over a short period of time. According to the density distribution approach, over the course of daily life, each person enacts a variety of states, and these states form a distribution that can be described by its average (mean) and variability (standard deviation), among other indices (skew, kurtosis, etc.).

Our hypothesis is concerned specifically with the mean level of the density distribution for extraverted states. Individuals with different means enact different *total* amounts of extraverted states over time. Our hypothesis is that those individuals enacting more extraverted states, as indicated by higher means, will also experience more PA over time. Indeed, our dynamic model outlined below predicts that it is the aggregated mean of extraverted states that is important for explaining the link between trait measures of extraversion and trait PA. In brief: (i) individuals with higher standings on measures of trait extraversion tend to enact more extraverted states (ii) extraverted states cause PA states, and (iii) the accumulation of PA states leads to higher overall standing on trait measures of PA.

Pathways Leading from Extraversion to Positive Affect

The model we propose (depicted in Figure 1a) is a mediation model. Our theory is that extraverts engage in more extraverted states, and that extraverted states predict PA. In the model, the direction of influence flows from extraversion to PA, which is the typical causal direction assumed when considering the relation of personality traits to affect (Rosenberg, 1998; Wakefield, 1989; Yik & Russell, 2002). In this paper, the central interest is in the ability of personality to influence affective outcomes. However, we acknowledge that causality probably flows in both directions, such that affect probably also causes behavioral states. The question in this paper is, to the extent that causality flows in the direction from the trait to the affect, does it flow through the enactment of extraversion.

Each of the individual paths in this model is supported by at least some existing evidence. A vast amount of evidence has shown that *trait extraversion predicts trait positive affect* (Lucas & Fujita, 2000) even across cultures (Lucas et al., 2000). Second, a recent meta-analysis of 15 experience sampling studies demonstrated that *trait levels of extraversion did indeed strongly predict enacted mean levels of extraversion* (Fleeson & Gallagher, 2009). Third, *trait extraversion has been shown to relate to aggregated levels of experienced PA states*. For example, Spain, Eaton, and Funder (2000) found that trait extraversion correlated .40 with mean levels of experienced PA taken four times per day for eight days. Fourth, *enacted extraversion predicts experienced positive affect*. The relationship between enacted extraversion and experienced PA is a recent discovery, but Heller et al. (2007) and Fleeson et al. (2002) used diary methodologies (with multiple reports per day) to find that enacted extraversion predicted experienced PA within-persons. Fleeson et al. (2002) and McNiel and Fleeson (2006) showed that instructing people to act extraverted in 10-minute discussions causally produced enhanced PA states. Finally, *experienced positive affect predicts trait positive affect*. Studies have found moderate to large correlations between aggregated experienced PA means and one-time trait PA questionnaire measurements: *r*s from .34 to .77 (Cohen, Doyle, Turner, Alper, & Skoner, 2003).

Specific Hypotheses and the Present Research

Past studies have discovered simple bivariate links between the variables in the mediation model. However, the mediation model has the potential to coherently organize these links between variables into one parsimonious mediation model which specifies how each variable is related to every other variable.

The model yields the following specific hypotheses: Hypothesis 1 is that trait extraversion will predict both trait PA and aggregated experienced PA (this is the trait-level relationship we are trying to explain). Hypothesis 2 is that trait extraversion will predict aggregated enacted extraversion, i.e., that people who are higher in extraversion will act more extraverted more of the time (Path 2). Hypothesis 3 is that aggregate enacted extraversion will predict aggregate experienced PA, controlling for trait extraversion (Path 3). Support for Hypotheses 2 and 3 would demonstrate that enacted extraversion mediates the relationship between trait extraversion and experienced PA (MacKinnon et al., 2002). Hypothesis 4 is that aggregate experienced PA will predict trait PA, while controlling for trait extraversion and enacted extraversion (Path 4). Support for Hypothesis 4 in conjunction with support for Hypotheses 2 and 3 will demonstrate that the trait extraversion to trait PA path is mediated by enacted extraversion and experienced PA (MacKinnon et al., 2002). Finally, we will also test the trait extraversion to experienced PA (Path 5) and trait extraversion to trait PA (Path 1) relationships after accounting for the mediation, in order to reveal whether other additional pathways also explain the extraversion to PA relationship.

These hypotheses require obtaining measures of extraversion and PA traits and also measures of enacted extraversion and experienced PA. Trait measures will be obtained by distributing trait questionnaires once during the study, whereas enacted extraversion and experienced PA will be obtained by employing experience sampling methodology (ESM), in which ratings of personality and affect states are taken multiple times during a set period of time (Conner, Barrett, Tugade, & Tennen, 2007). ESM was used in all of the current studies, a technique which is especially well-suited to discovering the processes underlying traits (Fleeson & Nofhle, in press).

Overview of the Present Studies

We tested the hypotheses in six studies. In five of the studies, participants provided ratings of state extraversion and state PA across multiple occasions. To simplify the presentation of the findings, we group these studies by similarity of method. For Studies 1 and 2 we employed a traditional ESM paradigm, in which participants were reporting on their daily lives. Study 1 used a typical college age sample, and Study 2 broadened the age range to include both young and middle-aged adults. A limitation of Studies 1 and 2 is that they were conducted within individuals' typical environments, which may have influenced on individuals' average levels of PA. Therefore, with Studies 3 and 4 we addressed these limitations by adapting the ESM paradigm for the laboratory: having participants interact in a laboratory setting in a set of structured activities. In Study 5, we conducted a meta-analysis of the first 4 studies to address possible low power issues in Studies 1 and 3. Finally, in Study 6 we collected new ESM data using a more temporally-precise measure of trait PA, to eliminate a potential time-frame dependency in previous studies¹. (Each of these studies has been included in other publications or will be included in other publications in the future, for other purposes. In particular, Study 1 was Study 1 in Fleeson et al., 2002.)

Study 1 and 2: ESM in Daily Life

Methods

Participants: In Study 1, participants were 44 undergraduates enrolled at Wake Forest University who completed the study as partial requirements of an introductory psychology course. Two participants provided fewer than 20 reports so they were excluded from all analyses.

In Study 2, participants were 62 college students age 18 to 51 ($M = 27.9$) enrolled in a psychology course at High Point University who volunteered to complete the ESM portion of a larger study. Participants received extra credit based on completion of the materials.

Procedures: In Study 1, participants attended an information session describing the study. At the information session, participants learned how to operate Palm Pilots, and completed trait ratings of the Big Five and affect. Participants were instructed that they could miss ratings to due a major inconvenience (e.g., driving, examinations, etc.).

The daily rating procedure required participants to complete ratings of personality states and PA on Palm Pilots for 13 consecutive days five times per day. These reports occurred at fixed times each day (Noon, 3 p.m., 6 p.m., 9 p.m., and Midnight) and took about two minutes to complete. Participants completed about 77% of reports (2,208 out of 2,860 possible reports), which is a typical rate of completion for ESM studies (Fleeson, 2001; 2007). Of these reports, 236 were excluded from analysis because they failed to meet at least one of the following criteria: no more than three missing values; no more than 85% identical responses (e.g., the participant recorded 4s for all responses); and completed no more than 1 hour before or 3 hours later than scheduled.

In Study 2, participants received study instructions and completed trait ratings of personality and affect during a regular class meeting at the beginning of the semester. Several weeks later, they were provided with instructions for the experience sampling portion of the study and were trained to operate the Palm Pilots. Daily ratings were completed in a similar fashion to Study 1. Ratings were made on the Palm Pilots for 10 consecutive days at five fixed times each day (9 a.m., Noon, 3 p.m., 6 p.m., and 9 p.m.). About 76% of reports (2,344 out of a possible 3,100 reports) were completed.

Measures

Trait extraversion: In Study 1, trait extraversion was assessed with a traditional Big Five adjective scale (Goldberg, 1992). We selected adjectives that could be used easily to describe behavior and did not overlap with the affective terms. Four adjectives were used to assess trait extraversion: energetic, assertive, adventurous, and talkative ($\alpha = .72$), and participants made ratings on a 7-point scale indicating how well the item well the item described them (1 = “not at all” to 7 = “very well”). In Study 2, trait extraversion was measured using the NEO-FFI ($\alpha = .73$; Costa & McCrae, 1992b), and participants made ratings on a 5-point scale (1 = “strongly disagree” to 5 = “strongly agree”).

Trait positive affect: In both Study 1 and Study 2, trait PA was assessed with the PA scale of the PANAS (Watson et al., 1988). The PANAS is a reliable and valid tool designed to obtain measurements of PA and negative affect that are independent from each other. Positive affect was assessed with the terms: *active, alert, attentive, determined, enthusiastic, excited, inspired, interested, proud, and strong* ($\alpha = .85$ and $.84$, for Studies 1 and 2, respectively). *Participants were asked to rate the extent to which they felt each emotion in the past few weeks* on a 5-point scale (1 = “very slightly or not at all” to 5 = “extremely”) (Study 1), or in the past year, on a 7-point scale ((1 = “very slightly or not at all” to 5 = “extremely”) (Study 2).

Enacted extraversion: Whereas trait scales asked participants to describe themselves in general, state scales asked participants to describe themselves over the previous hour (e.g., “During the previous hour, how talkative were you?”). To minimize participant fatigue in the ESM studies, we used shortened extraversion measures. Short measures have been successfully used to measure both personality traits and states (Gosling, Rentfrow, &

Swann, 2003). In Study 1, enacted extraversion was assessed with the same four adjectives as were used for trait extraversion ($\alpha = .74$), and participants made ratings on a 7-point scale (1 = “not at all” to 7 = “very”). In Study 2, the method was identical, but we used a different set of adjectives: quiet, bold, and energetic ($\alpha = .58$), and participants made ratings on a 6-point scale (1 = “not at all” to 6 = “very”). State extraversion ratings were aggregated for each individual separately to create enacted extraversion.

Experienced positive affect: As we were assessing experienced PA repeatedly, in both Studies 1 and 2 we used a short version of the PANAS; truncated PANAS scales have been shown to be reliable and valid measures (Watson et al., 1988). In Study 1, experienced PA was measured with four PANAS items (excited, enthusiastic, proud, and alert; $\alpha = .80$) and participants were asked to respond to them in the context of the last hour (e.g., “During the previous hour, how excited were you?”) and made ratings on a 7-point scale (1 = “not at all” to 7 = “very”). In Study 2, the method was similar, but experienced PA for the previous half hour was assessed with six PANAS-X (Watson & Clark, 1994) items: joyful, pleased, interested, calm, and happy ($\alpha = .84$), and made ratings on a 5 point scale (1 = “not at all” to 5 = “extremely”). State PA ratings were aggregated for each individual separately to create experienced PA.

Study 1 and 2 Results

Descriptive Statistics: Means and standard deviations for trait extraversion, trait PA, aggregate enacted extraversion, and aggregated experienced PA are reported in Table 1. Trait means were higher than enacted and experienced means for extraversion and PA in both studies. One possible explanation for this finding is that the bias to respond in socially desirable ways is diminished in more immediate ratings of states compared to general trait ratings.

Between-person variations were substantial (ranging from $SD = 0.44$ to $SD = 0.92$), which allows for covariation among measures. Not only did individuals differ from each other (between-person variation), they differed substantially from themselves across time (within-person variation). The typical within-person variation for state extraversion and state PA was high across Studies 1 and 2, and was comparable to that of previous studies (e.g., Fleeson, 2001). For state extraversion, within-person standard deviations were 1.16 (Study 1) and 1.18 (Study 2), and for state PA, standard deviations were 1.13 and 0.74, respectively, for the two studies. Large within-person standard deviations indicate that the typical individual varies a lot on both extraversion and PA, and may be momentarily described using most parts of the scale.

Relations among Measures

Between-person relationships: Table 1 shows positive and significant correlations between trait extraversion, trait PA, enacted extraversion, and experienced PA.

Within-person relationships: Our hypothesis that aggregate state PA and aggregate state extraversion mediate the relationships between trait PA and trait extraversion rests on the assumption that state PA and state extraversion covary within individuals. To test whether state PA covaried with state extraversion, we conducted within-person multilevel model (MLM) analyses predicting state PA from state extraversion independently for each study. Within-person MLM analyses are equivalent to analyzing each participant individually to obtain an association between the independent variables and dependent variables for each individual, and then conducting a meta-analysis on those results to find the typical individual's association (b coefficient). For each analysis, state extraversion was centered around each individual's mean (group-mean centered); therefore, the b coefficient represents

the amount of change in PA associated with a 1-unit change in state extraversion. We allowed intercepts and slopes to vary across individuals in each analysis. In Study 1, when state extraversion was entered as a predictor of state PA, we found a significant and rather large association between the two variables ($b = .67, p < .001$). For Study 2, our results were similar, although not as large ($b = .21, p < .001$). Relationships between state extraversion and state PA varied across individuals in Study 1 ($SD = .13, p < .01$) and Study 2 ($SD = .13, p < .001$).

These results indicate that the variables do covary within people -- individuals' state PA increases as their state extraversion increases. Covariation between states and the finding that (Fleeson et al., 2002; McNiel & Fleeson, 2006) extraversion states cause PA states represent two conditions necessary to support the hypothesized *causal* role of aggregate extraversion states in mediating the relation between trait extraversion and trait PA. However, these dynamic within-person relations are not necessary to test the hypothesis that the relation between trait E and trait PA can be partially accounted for by enacted extraversion. The mediation model described below is strictly focused on between-persons effects.

Test of the Dynamic Mediation Model: The dynamic mediation model was tested with three hierarchical multiple regressions. We relied upon the test of joint significance to examine evidence of mediation. As stated by MacKinnon, Lockwood, Hoffman, West, and Sheets (2002), the test of joint significance simultaneously tests whether the independent variable is related to the intervening variable and whether the intervening variable is related to the dependent variable when controlling for the effect of the independent variable. If both relationships are found to be statistically significant, then there is evidence for mediation. This method is preferred when sample sizes are small to moderate (Fritz & MacKinnon, 2007), which is the case in our studies.

Figures 1b and 1c show the results for Studies 1 and 2. Numbers are unstandardized regression coefficients. The first regression predicted enacted extraversion from trait extraversion (this test is analogous to the zero-order correlation reported above). In both studies, individuals with higher levels of trait extraversion enacted more extraverted states during the course of the study, supporting Hypothesis 2.

Hypothesis 3 derived from our dynamic model is that extraverted states account for at least part of the relationship between trait extraversion and PA experienced in daily life. The second regression tested this requirement by predicting experienced PA from trait extraversion and enacted extraversion simultaneously. In both studies, enacted extraversion significantly and strongly predicted experienced PA, controlling for trait extraversion. Importantly, in both studies, trait extraversion no longer predicted experienced PA. Enacted extraversion fully mediated the path from trait extraversion to experienced PA. Extraverts experienced more PA in daily life relative to introverts entirely due to their heightened levels of extraverted states.

The fourth dynamic hypothesis is that experienced PA should predict trait PA when controlling for trait and enacted extraversion. The last regression tested this hypothesis by predicting trait PA from all three of trait extraversion, enacted extraversion, and experienced PA. In Study 1, none of the predictors of trait PA were significant. Thus, the results for Study 1 do not support the fourth hypothesis. In Study 2, experienced PA did not predict trait PA, but trait extraversion and aggregate extraversion did. Thus, the effect of trait extraversion on trait PA was partially mediated by enacted extraversion. The results from Study 2 suggest that part of the reason extraverts feel more PA in general is due to their heightened levels of extraverted states.

Studies 1 and 2 both showed that acting extraverted is one reason why extraverts experience more PA than introverts in their daily lives and Study 2 showed that acting extraverted is one reason that extraverts are happier than introverts in general. These results suggest that trait introverts may experience high levels of PA if they simply act extraverted in their daily lives. Therefore, it is possible that our dynamic model may be more supported than fixed models when experienced PA is the relevant outcome. The results when trait PA is the outcome, however, are more ambiguous. Although Study 2 supported our hypotheses that fixed and dynamic models are compatible in explaining the trait extraversion – trait PA relationship, Study 1 did not find any significant predictors of trait PA. However, the pattern and magnitude of zero-order correlations between constructs are very similar across Studies 1 and 2 (see Table 1), suggesting that the lack of significant results in Study 1 may have been due to its having lower power ($n = 44$) relative to Study 2 ($n = 62$). We address this possibility and other limitations of the first two studies in Studies 3 and 4.

Study 3 and 4: ESM in Structured Laboratory Situations

It may be that the results obtained in Studies 1 and 2 were due to at least one characteristic intrinsic to traditional ESM designs: participants were reporting on their state extraversion and state PA in their natural settings, and thus different participants presumably experienced different situational contexts. As a result, between-person differences in aggregate enacted extraversion and experienced PA are likely confounded with between-person differences in situational contexts. Thus, for Studies 3 and 4 we brought participants into the lab to engage in a standardized set of activities.

Study 3 and 4 Methods

Participants: In Study 3, 48 undergraduate students attending Wake Forest University enrolled in a larger study. Two participants provided fewer than six valid reports and so were excluded from all analyses. Participants were compensated up to \$90.

In Study 4, participants were 97 undergraduate students from the Integrating Process and Structure in Personality project (IPSP). The IPSP project is a large-scale behavioral study, designed to assess a large number of behaviors of a large number of individuals in a variety of naturalistic situations and activities. Two participants provided fewer than six valid reports so they were excluded from all analyses. Participants were compensated up to \$210.

Procedures: In both Studies 3 and 4, all participants were asked to attend ten 50-minute sessions over the course of 10 weeks in groups of three or four. Each session consisted of one or two activities such as playing a game or debating a social issue. Because a goal of these studies was to assess naturally occurring behavior, the set of activities was designed to (a) be reasonably representative of situations encountered in real life; (b) be unstructured enough to allow for a wide range of behaviors from the individuals; and (c) provide a variety of settings and tasks relevant to each level of each of the Big Five states. During the sessions, participants made self-ratings of enacted extraversion and experienced PA twice: after 20 minutes and again after 40 minutes, participants rated themselves during the preceding 20 minutes. In Study 3, the response rate was 93% and in Study 4, the response rate was 89%, both of which are higher than typically obtained for ESM in natural settings.

Measures

Trait extraversion: In Study 3, trait extraversion was assessed with the items talkative, assertive, shy, bold, and energetic ($\alpha = .76$), and participants made ratings on a 7-point scale (1 = “not at all”, 4 = “somewhat”, and 7 = “very”). In Study 4, the items used to assess trait extraversion were talkative, assertive, adventurous, and energetic ($\alpha = .61$), and participants made ratings on a 7-point scale (1 = “not at all”, to 7 = “very well”).

Trait positive affect: In both studies, trait PA was assessed with the full 10-item PANAS (Watson et al., 1988) with the instructions specifying how the respondent has felt during the last year on a 7-point scale (1 = “very slightly or not at all” to 7 = “extremely”). Reliabilities were high (Study 3, $\alpha = .79$; Study 4, $\alpha = .83$).

Enacted extraversion: For both Studies 3 and 4, participants rated their own personality states with traditional adjective-based Big Five scales (Goldberg, 1992), as in Studies 1 and 2, with the exception that participants described their behavior during the previous half of each session (e.g. “During the last 20 minutes, I was...”). Participants responded on a 7-point scale (1 = “not at all”, to 7 = “very”). In Study 3, enacted extraversion was assessed with the same adjectives used to describe trait extraversion ($\alpha = .83$). In Study 4, enacted extraversion was assessed with four bipolar items on a 7-point scale (silent-talkative, unenergetic-energetic, unassertive-assertive, and timid-bold; $\alpha = .78$).

Experienced positive affect: In Study 3, experienced PA was measured with two positive PANAS items (excited, enthusiastic; $\alpha = .91$). Participants responded on a 7-point scale (1 = “not at all”, to 7 = “extremely”). In Study 4, experienced PA was measured by three PANAS-X items (enthusiastic, excited, happy; $\alpha = .91$) on a 7-point scale (1 = “very slightly or not at all” to 7 = “extremely”).

Study 3 and 4 Results

Descriptive Statistics: Means and standard deviations for trait extraversion, trait PA, aggregate enacted, and aggregated experienced PA are reported in table 2. As in Studies 1 and 2, trait means were higher than aggregated means for extraversion and PA.

Relations among Measures

Between-person relationships: Table 2 shows correlations between trait extraversion, trait PA, enacted extraversion, and experienced PA. Correlations among reports were similar to the correlations reported in Studies 1 and 2 with the exception that trait PA was not significantly related to experienced PA ($r = .18, p = .15$) in Study 3. We believe this is a result of low power in Study 3; however, this result suggests that experienced PA may not mediate the relationship between trait extraversion and trait PA in Study 3.

Within-person relationships: If aggregate state extraversion and aggregate state PA mediate the relationships between trait extraversion and trait PA, then state extraversion should predict state PA. As in Studies 1 and 2, we tested this assumption using within-person variation MLM analyses, with intercepts and slopes allowed to vary across individuals. We found large associations between state extraversion and state PA when state extraversion was entered as a predictor of state PA (Study 3: $b = .76, p < .001$; Study 4: $b = .76, p < .001$), similar to study 1 ($b = .67, p < .001$). Again, the strength of these relationships varied across individuals in both studies (Study 3: $SD = .28, p < .01$; Study 4: $SD = .25, p < .001$).

Tests of the Dynamic Mediation Model: Results of the regressions are presented for Studies 3 and 4 in Figures 1d and 1e. Numbers are unstandardized regression coefficients. Study 3 replicated the findings of Study 1 – Full mediation was found for the extraversion to experienced PA relationship, but trait PA was not significantly related to any predictors. Study 4 found support for both types of mediation. Trait extraversion was associated to both experienced PA and trait PA through enacted extraversion (supporting our dynamic model), and the relationship between trait extraversion and trait PA remained significant after accounting for aggregate states (suggesting that our dynamic model is compatible with fixed models).

Study 5: Meta-analysis of Studies 1–4

Each of the studies presented above found full mediation of the trait extraversion – experienced PA relationship. In support of Hypotheses 2 and 3: 1) trait extraversion was related to enacted extraversion, and 2) enacted extraversion was related to experienced PA when controlling for trait extraversion. Furthermore, the relationship between trait extraversion and experienced PA dissipated when taking into account enacted extraversion. These findings together suggest that the reason extraverts were happier over the duration of our studies was entirely due to their increased levels of enacted extraversion.

There was partial support for our fourth hypothesis, that enacted extraversion and experienced PA would partially mediate the relationship between trait extraversion and trait PA. Studies with relatively high power (Studies 2 and 4) found support for partial mediation whereas studies with relatively low power (Studies 1 and 3) did not. However, the pattern and magnitudes of zero-order correlations between constructs are remarkably similar across studies (see Table 1), suggesting that our inconsistent support of hypothesis 4 may be due to low power in two studies.

Inconsistencies in results due to lack of sufficient power is typical in research involving primary studies (Hunter & Schmidt, 2004). Each primary study taken alone results in a single estimate of the true relationship between variables in the population, and these estimates vary between studies due to sampling error. Therefore, even when variables are truly related at the population level, some studies achieve statistically significant estimates of the relationships between variables whereas other studies fail to achieve statistically significant estimates (Cumming, 2008). Resolving inconsistencies was previously done only via vote-counting or a qualitative narrative synthesis of results. Vote-counting is simply a tallying of studies supporting each competing hypothesis. Our results, however, are a good example of why vote-counting does not work, as the tally stands even (2 to 2) for hypothesis 4. Therefore, in order to resolve the inconsistencies among the findings, we conducted a meta-analysis of the previous four studies.

Study 5 Method—There are six sets of correlations included in the meta-analysis, one for each arrow in our mediation model. Table 3 presents each individual correlation and the 95% confidence interval for the population correlations. It is important to note that the empirical studies found different magnitude correlations for each of the six paths; the meta-analysis serves the purpose of determining the average correlation for each path in the mediation model as well as determining whether correlations particular to each study were significantly different from the average correlation. Another advantage of meta-analysis is that it allows for correction of measurement error in the predictor and criterion variables.

Procedure: We conducted two meta-analyses for each of the six paths in our mediation model. The meta-analyses differed in the correction procedures employed. In the first meta-analysis, we used the Hunter and Schmidt (2004) method to correct for sampling error; the second meta-analysis used the Hunter and Schmidt method to correct for sampling error as well as measurement error. Each meta-analysis was conducted on four correlations with a total *N* of 249. Table 4 shows summary statistics for each path in our mediation model for each meta-analysis.

To assess whether the reported correlations were drawn from the same population (in which case further moderator analysis would be unnecessary), we relied on Hunter and Schmidt's (2004) 75% rule-of-thumb as well as a chi-square test for heterogeneity. In both sets of meta-analyses, artifacts accounted for more than 75% of the variance for each correlation, with the exception of the path from enacted extraversion to experienced PA. The chi-square test for heterogeneity in correlations was not significant at the $\alpha = .05$ level in any case.

These tests together provide evidence that all of the correlations were drawn from the same population, suggesting that the true correlation for each study is given by the mean ρ statistic. The results for the two meta-analyses yielded the same results with regard to hypothesis tests, so we refer to meta-analysis results generally below (Figure 1f shows the mediation model correcting for sampling error).

Study 5 Results—Returning to our hypotheses, the meta-analysis confirmed that enacted extraversion mediated the relationship between trait extraversion and experienced PA (hypotheses 1 and 2). The average correlation between trait extraversion and enacted extraversion was significant, and the average partial correlation between enacted extraversion and experienced PA was significant after accounting for trait extraversion. The main purpose of the meta-analysis, however, was to determine whether enacted extraversion and experienced PA mediated the relationship between trait extraversion and trait PA (hypothesis 4). The results were affirmative, as trait PA was uniquely predicted by both trait extraversion and experienced PA, as indicated by significant average partial correlations in Table 4. Thus, results from the meta-analysis support co-existence of the fixed and dynamic explanations of the trait extraversion – trait PA relationship. The direct relationship between trait extraversion and trait PA (above and beyond the effects of enacted extraversion and experienced PA) supports fixed models whereas the significant paths from trait extraversion through enacted extraversion and experienced PA to trait PA (above and beyond the effects of trait extraversion) supports our dynamic model.

Study 6: ESM in Daily Life with Time-Frame Matching for Positive Affect

Studies 1–5 provided strong evidence that enacted extraversion fully mediated the relationship between trait extraversion and experienced PA. Studies 1–5 also provided solid but inconsistent evidence that enacted extraversion partially mediated the relationship between trait extraversion and trait PA. The weaker mediation to trait PA than to experienced PA may have been due to a time-frame discrepancy between the trait PA measure and the enacted extraversion. Trait PA was measured at the beginning of each study, before the ESM portion of the study, and the instructions directed participants to rate their affect during the prior year or past few weeks, as is typical in measures of PA. Thus, the PA on which participants reported in the trait measures already occurred prior to the extraverted states, and thus could not have been influenced by the extraverted states that came later. Only the two more powerful studies were able to detect the lingering relationship.

We hypothesized that a corrected time frame on the trait PA measure would lead to strong evidence for strong mediation. Study 6 tested this idea by assessing trait PA at the end of the study, after the enacted extraversion, and by instructing participants to report their PA during the previous 10 days, rather than during the entire previous year.

In addition, Study 6 improved the measurement of extraversion and PA. Studies 1–4 were limited to a small number of items per variable; Study 6 used 15 items to measure extraversion and 10 items to measure PA, at both the trait and state levels.

Study 6 Method—Study 6 combined two samples that were part of other studies conducted for other purposes. Both studies had the essential components to test our hypotheses and the relevant methods were identical except for slight variations in item order and response scale, so the two samples were combined into one study. Methods are similar to studies 1 and 2; only unique features are described.

Participants: 91 undergraduates completed the study in partial fulfillment of the requirements of an introductory psychology course. Four participants provided fewer than 10 reports, and two participants did not complete the initial or final questionnaire, so they were excluded from all analyses, leaving a total of 85 participants.

Procedures and Materials: Participants completed ratings of personality states and PA on Palm Pilots for 10 consecutive days five times per day (Noon, 3 p.m., 6 p.m., 9 p.m., and Midnight). Participants completed about 74.5% of reports (3165 out of 4250 possible reports); 605 of these were excluded from analysis because they failed to meet strict inclusion criteria, for a final completion rate of 60%.

Fifteen adjectives were used to assess extraversion, three for each of five subcomponents (sociability, dominance, spontaneity, talkativeness, and boldness; three additional extraversion items assessing energy were not included in the analyses to reduce overlap with PA). Reliabilities for extraversion (trait $\alpha = .90$; state $\alpha = .89$) and for PA (trait $\alpha = .88$ and state $\alpha = .93$) were high.

Study 6 Results

Bivariate Correlations: Table 5 shows positive and significant correlations between trait extraversion, trait PA, aggregate enacted extraversion, and aggregate experienced PA.

Test of the Dynamic Mediation Model: Figure 1f shows the unstandardized beta weight results of hierarchical multiple regressions testing the dynamic mediation model. First, individuals with higher levels of trait extraversion acted more extraverted during the course of the study. Second, enacted extraversion significantly and strongly predicted experienced PA, controlling for trait extraversion, meaning that individuals who acted more extraverted also experienced more PA. Furthermore, trait extraversion no longer predicted experienced PA; enacted extraversion fully mediated the path from trait extraversion to experienced PA. Finally, enacted PA significantly predicted trait PA, demonstrating that enacted extraversion mediates the relationship between trait extraversion and trait PA. Trait extraversion no longer had a significant prediction to trait PA, although there was a trend. Thus, matching the time frame of the trait PA to the enacted extraversion states revealed strong evidence for mediation using the criteria of the test of joint significance (MacKinnon et al., 2002)

General Discussion

The current research tested the mediation model that trait extraversion predicts trait PA partly through the enactment of extraverted states which lead to experienced PA states. Across the studies, we found unequivocal support that the relation between trait extraversion and aggregate experienced PA is explained by aggregate enacted extraversion. People who are higher on trait extraversion do indeed enact more extraverted states (Fleeson & Gallagher, 2009). Enacting more extraverted states is associated with greater levels of experienced PA, even while controlling for trait extraversion. Trait extraversion, however, loses its relationship to experienced PA when state extraversion is controlled. Thus, the relation between trait extraversion and the amount of PA that individuals actually experience in their everyday lives is fully explained by their tendency to enact extraverted states.

The central goal of the paper was to offer and test one explanation for the between-persons relationship between extraversion and PA. This between-persons relationship required the mediator to be between-person differences in frequency of enacting extraverted states, that is, the aggregated state data. This is a dynamic model because the aggregation was of momentary states – it represented how extraverted the individuals acted across actual moments in their lives, rather than their trait level of extraversion as traditionally conceived

and as assessed by questionnaires. What's interesting is that different extraverts, even extraverts with the same level of trait extraversion as assessed by questionnaires, enacted extraversion in their daily lives to different degrees. Importantly, it was this degree of enactment that accounted for their happiness, rather than their static trait level as represented traditionally in questionnaires.

The path from aggregate states to trait PA was significant in Studies 2 and 4 but not in Studies 1 and 3. We believe this was due to a time-frame mismatch: The trait PA instructions referred to the year prior to the enacted extraverted states. Thus, only the studies with high power were able to detect the weaker relationship. The results from the Study 5 meta-analysis supported this notion, as each path predicted in the model was positive and significant in the meta-analysis.

Most importantly, correcting the time frame in Study 6 revealed the supporting results, with strong and clear evidence for mediation. People higher on the trait of extraversion enact more extraverted states, increasing their experienced PA (McNiel, Lowman, & Fleeson, 2010) and ultimately their trait PA. Trait extraversion, however, loses most or all of its relationship to trait PA when state extraversion and experienced PA are controlled. An additional strength of this study is that measures of extraversion did not include items assessing "energy." Thus, this study ruled out the possibility that associations between extraversion and PA in the current studies and previous studies were due simply to item overlap. (Note also that McNiel et al. (2010) found that extraversion's effect on positive affect was stronger than its effect on activated affect.) The relationship of trait PA to extraversion is at least partially explained by the enactment of extraverted states.

Another possible reason that we achieved inconsistent results when predicting trait PA is based on the accessibility model of self-report (Robinson & Clore, 2002a, 2002b). This model states that people rely on episodic knowledge (knowledge about one's behavior and feelings over the specific time-frame) when they are asked to report their behavior and feelings over short time-frames (minutes to hours), whereas they rely on semantic knowledge (a set of beliefs about one's behavior and feelings that is independent of a specific time-frame) when asked to report about their behavior and feelings over longer time-frames. The accessibility model thus predicts that the shared variance between assessments based on the same periods of time will be inflated compared to the shared variance between assessments based on different periods of time.

Additionally, the inclusion of mostly positively keyed items to assess extraversion and PA may have inflated all of the observed correlations across studies. Future studies may build on the current results by controlling for method variance and including a higher proportion of negatively keyed extraversion and PA items. Nonetheless, the finding that trait extraversion leads to trait PA partly through extraversion and PA states suggests that our dynamic model, in adding a behavioral route to explain the association between the trait concepts, complements existing fixed models. In doing so, it also adds to our understanding of what is represented by an individual's standing on questionnaire measures of trait extraversion.

The common conception of trait questionnaires is that they assess one's stable dispositional characteristics (Costa & McCrae, 1992a; Goldberg, 1993). Our studies show that extraversion trait questionnaires are also highly reflective of one's enactment of extraverted states over the course of everyday life and that these enactments are relevant to extraverts' greater experience of PA. Perhaps the most exciting implication of these results is that people might be able to increase their overall levels of PA by self-regulation of their personality states (e.g., McNiel & Fleeson, 2006).

However, it is possible that the results found at the aggregate level might not hold true within individuals. Although people who manifested more extraversion in their daily lives also felt a closely corresponding increase in positive affect, this may not mean that people were happier at those times that they acted more extraverted (Fleeson, 2007; Molenaar & Campbell, 2009). This possibility is why our supplementary within-person analyses, as well as several previous studies addressing the within-person relationship, were so important. Those analyses directly tested the within-person relationship and found that for the typical participant, when he or she manifested extraversion he or she also experienced more positive affect than when he or she (the same person) manifested less extraversion (b 's = .67, .21, .76, .76). The variance terms on these betas were small (averaging around .20), which meant that nearly everyone showed this pattern of greater PA when manifesting extraversion (Fleeson et al., 2002), although there are exceptions. Most importantly, four papers reporting experimental studies have shown that this within-person effect is a causal one, such that manipulating extraversion manifestation resulted in increased positive affect (e.g., McNiel & Fleeson, 2006; McNiel et al., 2010). These analyses provided replicated evidence that not only was the amount of everyday manifestation of extraversion more important to amount of experienced positive affect than was a person's trait level, but also that nearly all people experienced more positive affect on those occasions that they manifested increased extraversion.

Dynamic vs. Fixed Explanations

Our studies were not designed to directly pit dynamic models against fixed models; rather, our results suggest that a dynamic model offers an additional explanation for the relationship between trait extraversion and trait PA to that one offered by fixed models. However, over the course of each study, the path from trait extraversion to aggregate experienced PA was fully accounted for by extraverted behavior: extraverts' greater happiness relative to introverts for the duration of each study can be explained by their propensity to engage in extraverted states. This result suggests that one's average PA as experienced in daily life is not due only to constitutional features but primarily to dynamic enactment of extraversion states. If this is the case, it would be both logical and parsimonious to infer that average PA over longer periods of time would be determined by extraversion states aggregated over a similar amount of time.

Causal Direction

In our analyses, we assumed causal direction flows from extraversion to PA, which is the common direction of prediction in personality (Yik & Russell, 2002; Wakefield, 1989). It is reasonable to assume this direction of influence, as there is experimental evidence showing that extraverted states cause PA states (Fleeson et al., 2002; McNiel & Fleeson, 2006). However, it has also been proposed that causality may additionally flow from PA to extraversion (Izard, Libero, Putnam, & Haynes, 1993; Wilson & Gullone, 1999). In support of this model, there is some evidence that positive moods lead to prosocial, social, and leisure behavior (Gendolla, 2000); behaviors which could be conceptualized as having extraversion content. We encourage future research to continue investigating both causal directions. Finally, it should be noted that PA is not the only variant of happiness that might be examined. For some, contentment might be seen as a more valuable (and lasting) end state than a high arousal positive state like joy (Tamir, 2009). Furthermore, extraversion is not the only personality trait that might influence such variants of happiness (Watson & Clark, 1992) and anticipate that similar behavioral pathways may help to explain other trait-affect relationships.

Conclusion

Our goal in these studies was to examine a dynamic explanation for the well-established trait extraversion – trait PA relationship. Specifically, we hypothesized that one way trait extraversion leads to trait PA is through increasing the likelihood of extraverted states, which in turn lead to more PA states. We tested this model in five primary studies by obtaining ratings of trait extraversion, trait PA, and multiple ratings of state extraversion and state PA in both natural settings and laboratory environments. Across the first four studies, we found support for a dynamic model account of the relationship between trait extraversion and trait PA. Taking these results together with past studies showing that 1) state extraversion causes state PA (McNiel & Fleeson, 2006), 2) introverts can self-regulate extraverted states (Fleeson et al., 2002; Schutte et al., 2003), and 3) introverts regularly act highly extraverted (Fleeson, 2001; Heller et al., 2007), it becomes clear that introverts may be able to directly modify their overall levels of happiness simply by taking advantage of behaviors they already enact on a routine basis.

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a. Mediation Model

b. Study 1 Mediation Model

c. Study 2 Mediation Model

d. Study 3 Mediation Model

e. Study 4 Mediation Model

f. Study 6 Mediation Model

Figure 1.

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Means, Standard Deviations, and Zero-order Correlations among Trait Extraversion, Trait Positive Affect (PA), Aggregate Enacted Extraversion, and Aggregate Experienced Positive Affect for Studies 1 and 2

Table 1

Study 1					
Variable	M	SD	1	2	3
1. Trait Extraversion	4.81	0.92	1.00	---	---
2. Trait PA	5.37	0.74	.36*	1.00	---
3. Aggregate Enacted Extraversion	3.99	0.75	.38**	.33*	1.00
4. Aggregate Experienced PA	4.05	0.87	.23†	.40**	.80**

Study 2					
Variable			1	2	3
1. Trait Extraversion	3.65	0.44	1.00	---	---
2. Trait Positive Affect	3.62	0.62	.42**	1.00	---
3. Aggregate Enacted Extraversion	3.35	0.62	.29*	.28*	1.00
4. Aggregate Experienced PA	3.25	0.54	.19	.41***	.53***

† $p < .10$.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

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Table 2

Means, Standard Deviations, and Zero-Order Correlations among Trait Extraversion, Trait Positive Affect (PA), Aggregate Enacted Extraversion, and Aggregate Experienced PA for Studies 3 and 4

Study 3						
Variable	M	SD	1	2	3	4
1. Trait Extraversion	5.03	0.89	1.00	---	---	---
2. Trait Positive Affect	5.16	0.67	.41**	1.00	---	---
3. Aggregate Enacted Extraversion	4.30	0.65	.54**	.37**	1.00	---
4. Aggregate Experienced PA	3.11	0.89	.30*	.18	.52**	1.00
Study 4						
Variable			1	2	3	4
1. Trait Extraversion	4.76	0.90	1.00	---	---	---
2. Trait Positive Affect	5.02	0.81	.56**	1.00	---	---
3. Aggregate Enacted Extraversion	4.37	0.59	.40**	.45**	1.00	---
4. Aggregate Experienced PA	3.45	0.95	.39**	.40**	.70**	1.00

[†] $p < .10$.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

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Table 3
Correlations Between Constructs Corresponding to the Mediation Model Presented in Figure 1a.

Study	E_PA	E_e	e_pa	pa_PA	E_pa	e_PA
1	.29	.38***	.78***	.27	-.08	-.09
2	.34**	.29*	.50***	.27*	.04	-.04
3	.24	.54**	.43*	-.03	.02	.18
4	.40**	.40**	.59***	.04	.13	.17*

[†] p < .01.
* p < .05.
** p < .01.
*** p < .001.

Note. Column names represent paths in our mediation models, with traits denoted by capital letters (e.g., “E” is trait extraversion) and aggregate states denoted by lower case letters (e.g., “pa” = aggregated state positive affect). For example, the column “E_PA” represents partial correlations between trait extraversion and trait positive affect while controlling for aggregate state extraversion and aggregate state positive affect.

Meta-analytic results for the Focal Paths in the Mediation Model, Separated by Type of Meta-analysis

Table 4

Hunter-Schmidt Meta-Analysis Correcting for Sampling Error									
Path	mean _p	z	p _z	V _ρ	V _{error}	Chi _{square}	p _{chi-square}		
E_PA	.34	5.44	<.001	.0037	.013	1.16	.76		
E_e	.39	6.47	<.001	.0067	.011	2.33	.51		
e_pa	.57	9.88	<.001	.013	.006	7.02	.07		
pa_PA	.12	1.97	.02	.016	.016	4.16	.24		
E_pa	.05	.79	.22	.0057	.016	1.42	.70		
e_PA	.07	1.16	.12	.014	.016	3.44	.33		

Hunter-Schmidt Meta-Analysis Correcting for Sampling Error and Measurement Error									
Path	mean _p	z	p _z	V _ρ	V _{error}	Chi _{square}	p _{chi-square}		
E_PA	.44	7.21	<.001	.0037	.013	1.16	.76		
E_e	.55	9.33	<.001	.0067	.012	2.33	.51		
e_pa	.72	13.42	<.001	.013	.009	7.02	.07		
pa_PA	.15	2.33	.01	.016	.016	4.16	.24		
E_pa	.06	1.00	.15	.0057	.016	1.42	.70		
e_PA	.09	1.49	.07	.014	.016	3.44	.33		

Note. Column names represent paths in our mediation models, with traits denoted by capital letters (e.g., “E” is trait extraversion) and aggregate states denoted by lower case letters (e.g., “pa” = aggregated state positive affect). Meta-analyses were done for each set of correlations in our mediation model. Columns are: (1) the average correlation (mean ρ), (2) the associated z statistic from the normal distribution (z), (3) the p-value associated with the z statistic correlation (p_z), (4) the observed variance of the correlations in the population (V_{ρ}), (5) the amount of variance expected from artifacts alone (V_{error}), (6) the chi-square statistic testing for heterogeneity in correlations (χ^2_{square}), (7) the p-value associated with the chi-square statistic (p_{χ^2}). Variances are reported to two significant figures.

Table 5

Zero-order Correlations among Trait Extraversion, Trait Positive Affect, Aggregate Extraversion, and Aggregate Positive Affect for Study 6

Variable	1	2	3	4
1. Trait Extraversion	1.00	---	---	---
2. Trait Positive Affect	.30**	1.00	---	---
3. Aggregate Extraversion	.46***	.52***	1.00	---
4. Aggregate Positive Affect	.30**	.73***	.60***	1.00

[†]
 $p < .10$.

*
 $p < .05$.

**
 $p < .01$.

 $p < .001$.