

Clarifying the Relation Between Extraversion and Positive Affect

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Abstract

This article clarifies two sources of ambiguity surrounding the relation between extraversion and positive affect. First, positive affect is defined differently across major models of the structure of affect. Second, no previous research has examined potentially diverging associations of lower-order aspects of extraversion (i.e., assertiveness and enthusiasm) with positive affect. Australian (Study 1: $N = 437$, 78% female, $M_{\text{age}} = 20.41$) and American (Study 2: $N = 262$, 39% female, $M_{\text{age}} = 33.86$) participants completed multiple measures of extraversion and positive affect. Correlations were employed to examine relations among these measures. In both studies, extraversion was most clearly associated with positive affect as conceptualized within a major factor model of affect—specifically, as *positive activation* (Watson & Tellegen, 1985)—rather than the valence-based conceptualization of positive affect provided by a circumplex model of affect (Russell, 1980). This was also the case for the assertiveness and enthusiasm aspects of extraversion. Our findings clarify the nature of the positive affective component of extraversion, which is best described in terms of both positive valence and high activation.

The association of trait extraversion with positive affect has been widely described as one of the “most robust” findings in the personality literature (e.g., Lucas & Baird, 2004, p. 473; Smillie, Cooper, Wilt, & Revelle, 2012, p. 306). However, the meaning of *positive affect* varies considerably depending on one’s preferred framework for describing the structure of affective space (Barrett & Russell, 1998). Descriptions of the relation between extraversion and positive affect are therefore ambiguous, and yet surprisingly few studies have sought to clarify this ambiguity. A further issue concerns the fact that lower-level subfactors or *aspects* of extraversion, described as “agentic extraversion” or “assertiveness” and “affiliative extraversion” or “enthusiasm” (Depue, 2006; DeYoung, 2013; DeYoung, Quilty, & Peterson, 2007), have been theorized to relate to affective processes in different ways. The implications of this distinction for the widely noted relation between extraversion and positive affect do not seem to have been examined. In this article, we attempt to fill these gaps in the literature by examining how broad domain-level measures of extraversion, as well as lower-level aspects of extraversion, relate to multiple conceptualizations of positive affect.

Models of the Structure of Affective Space

According to proponents of circumplex models of affect (e.g., Russell, 1980; Yik, Russell, & Steiger, 2011), relations among affective variables can be represented in terms of a circular structure. Highly related variables lie closely together around

the circumference of the circumplex, unrelated variables differ by 90 degrees, and variables that are inversely related differ by 180 degrees. Circumplex models of affect also identify two primary axes: an activation dimension ranging from 90 degrees (e.g., *aroused, intense*) to 270 degrees (e.g., *quiet, still*), and a valence dimension ranging from 0 degrees (e.g., *happy, pleased*) to 180 degrees (e.g., *unhappy, troubled*). Within this framework, all values to the right of the vertical axis (activation) reflect some degree of positive affect, and constructs that are good indicators of positive affect are distributed around the high pole of the valence dimension, along the arc ranging from “deactivated positive affect” (315 degrees; e.g., *relaxed, at-ease*) up to “activated positive affect” (45 degrees; e.g., *energetic, enthusiastic*; Barrett & Russell, 1998; Larsen & Diener, 1992; Yik et al., 2011). Those who adopt this circumplex view of affect are therefore likely to conceptualize positive affect in terms of this 315–45-degree arc (see Figure 1a).

The major alternative to the circumplex framework is the factor model of affect proposed by Watson, Tellegen, and colleagues (Watson & Tellegen, 1985; Watson, Clark, & Tellegen, 1988). This model recognizes the circumplex as a valid, but simplified, description of the relation among positive and negative affect factors that can be more thoroughly and precisely

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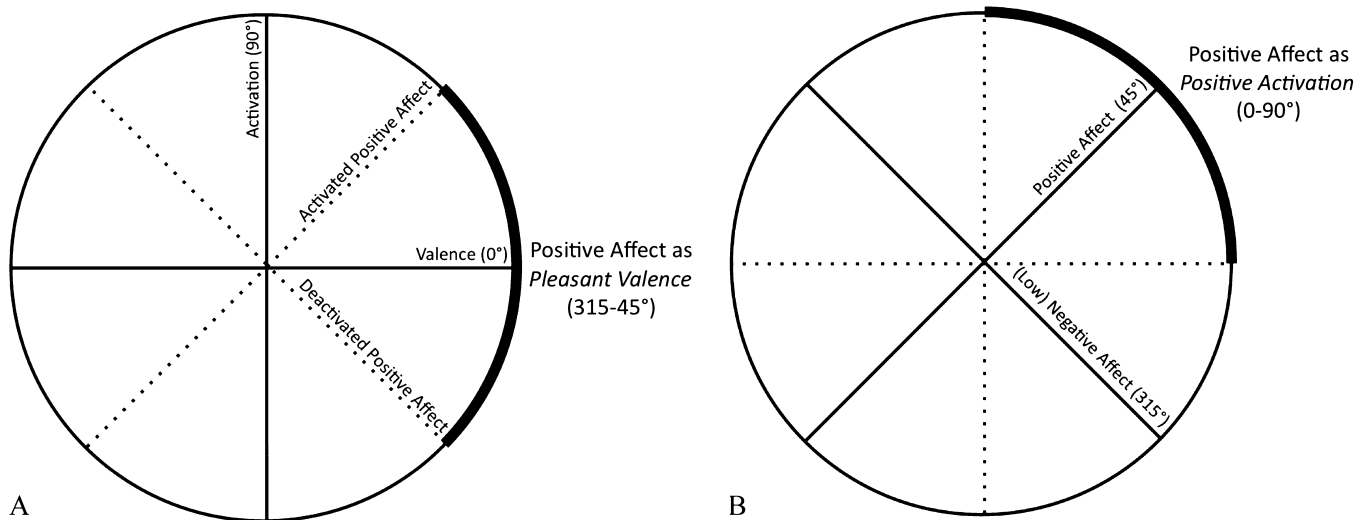


Figure 1 The circumplex model of affect (A) conceptualizes positive affect purely in terms of valence (i.e., pleasant valence). Indicators of positive affect therefore fall along the arc between 315 degrees and 45 degrees in affective space. The factor model of affect (B) conceptualizes positive affect as a combination of valence and activation (i.e., positive activation). Indicators of positive affect therefore fall along the arc between 0 degrees and 90 degrees in affective space. The figure is partly based on Barrett and Russell's (1998, Figure 3) representation of diverging conceptualizations of positive affect.

modeled as a hierarchy, with more specific affect factors located below two major affective dimensions (Tellegen, Watson, & Clark, 1999). When reduced to the affective circumplex, this model suggests that the two major dimensions of importance should be rotated 45 degrees from valence and activation (see Figure 1b). This rotation results in a “Positive Affect” dimension with the high pole at 45 degrees (e.g., *energetic, enthusiastic*) and the low pole at 225 degrees (e.g., *gloomy, sluggish*), and a “Negative Affect” dimension stretching between 135 degrees (e.g., *tense, anxious*) and 315 degrees (e.g., *relaxed, at-ease*). Those who adopt this factor model of affect are therefore likely to interpret positive affect in terms of the 0–90-degree arc depicted in Figure 1b.

Our primary aim in this article is not to debate the relative merits of these different approaches to describing affect. Our main concern is the fact that the factor approach conceptualizes positive affect as a combination of valence and activation (i.e., *positive activation*), whereas the circumplex approach conceptualizes positive affect purely in terms of valence (i.e., *pleasant valence*). The divergence between these views is especially pronounced when one considers constructs located at 315 degrees in affective space. Proponents of the circumplex model view these as part of positive affect (Barrett & Russell, 1998; Russell, 1980), and proponents of the factor model regard these as part of (low) negative affect (Tellegen et al., 1999; Watson & Tellegen, 1985). Similarly, constructs located at 90 degrees are included in positive affect according to factor model, but they fall outside of it according to circumplex model. Statements concerning relations between extraversion and positive affect are therefore ambiguous and may lead to quite different interpretations depending on one's preferred model of affect.

Extraversion and Positive Affect

The Big Five domains of personality (John, Naumann, & Soto, 2008) describe the major empirical dimensions of covariation among all personality traits, including trait affect. As noted above, numerous studies have suggested that positive affect forms a part of the extraversion domain. Because of this, efforts to understand the relation between extraversion and positive affect may at first appear somewhat circular. However, it is important to note that emotion words were excluded from the studies that originally established the Big Five (Waller, 1999), even though later studies showed that they fit within the same structure, and that including them does not alter this structure (Markon, Krueger, & Watson, 2005; Saucier, 1997). Furthermore, the inclusion of emotion words within measures of extraversion does not influence the relation between extraversion and positive affect (Lucas & Fujita, 2000; Lucas, Le, & Dyrenforth, 2008). It is therefore meaningful to ask precisely in which sense extraversion relates to positive affect. In this article, we ask whether this association is best described from the perspective of circumplex models of affect (in which case the extraversion domain would subsume pleasant valence) or from the perspective of the factor model of affect (in which case the extraversion domain would subsume positive activation).

In perhaps the first study to examine the ambiguity surrounding the relation between extraversion and positive affect, Lucas and Fujita (2000) contrasted multiple measures of each construct across four empirical studies and a meta-analysis. Their general conclusion was that different measures of extraversion and positive affect—reflecting somewhat varying conceptualizations of these two constructs—did not substantially

Table 1 Typical Affect Items Used to Examine the Relation Between Extraversion and Positive Affect

Example Study and Scale Label	Scale Items	Angular Location*
Lucas & Fujita (2000)		
Positive affect	<i>interested, excited, strong, enthusiastic, proud, alert, inspired, determined, attentive, active</i>	45°
Pleasantness	<i>happy, joyful, pleasant, content, energetic, excited</i>	0–30°
Joy	<i>joy, euphoria, contentment</i>	0–30°
McNiel et al. (2010)		
Pleasant affect	<i>happy, pleased, content, satisfied</i>	0°
Positive affect	<i>excited, peppy, elated, enthusiastic</i>	45°
Activated affect	<i>aroused, alert, hyperactivated, stimulated</i>	90°

Note. *Approximate, estimated from appendices contained within Rafaeli and Revelle (2006) and Yik et al. (2011).

influence the relation between them. At a first reading, this might imply that the relation between extraversion and positive affect holds for both the circumplex and factor model perspectives. However, the positive affect scales employed by Lucas and Fujita (2000) tended to cluster around a somewhat narrow 0–60-degree arc of affective space (see Table 1 for examples). Critically, much of this segment of affective space captures the *convergence* between the circumplex and factor model conceptualizations of positive affect (see Figure 1). These data therefore cannot determine whether extraversion is more clearly related to one conceptualization of positive affect than the other. To answer this question, we would also need to examine the association of extraversion with affect measures that lie at 90 and 315 degrees, which represent the key points of *divergence* between these two conceptualizations of positive affect.

It is interesting to compare correlational studies of extraversion and positive affect with recent experiments concerning the affective consequences of “enacted extraversion” (e.g., McNiel, Lowman, & Fleeson, 2010; Zelenski et al., 2013). In this research, individuals are instructed to behave in a bolder and more talkative way (vs. a shyer or more reserved way) during a structured interaction. Such studies consistently find that people report higher momentary positive affect after acting extraverted (for a review, see Smillie, 2013b). McNiel et al. (2010) examined the generality of this effect by examining three different state affect measures termed *pleasant*, *positive*, and *activated*. These scales appear to offer good coverage of positive affect as defined within the factor model (i.e., 0–90 degrees; see Table 1). McNiel and colleagues found that the impact of enacted extraversion was fairly similar for all three scales, but it was strongest for the scale located (approximately) at 45 degrees (effect sizes: $d = .63$ for pleasant affect [0 degrees], $d = .85$ for positive affect [45 degrees], and $d = .65$ for activated affect [90 degrees]). Enacted extraversion therefore clearly influences the factor model conceptualization of positive affect. However, this study did not include an affect measure located at 315 degrees. As a result, it is not possible from these data to fully evaluate the impact of enacted extraversion on positive affect as defined within the circumplex tradition.

To our knowledge, only one study has examined the relation between extraversion and positive affect using measures that

provide full coverage of both circumplex and factor perspectives. Yik and Russell (2001) found significant positive associations between extraversion and four bipolar measures falling within the 0–90 degree quadrant of affective space. These were “pleasant” versus “unpleasant” (approximately 0 degrees), “activated pleasant” versus “unactivated unpleasant” affect (approximately 45 degrees), “activated” versus “deactivated” (approximately 90 degrees), and “energy” versus “tiredness” (approximately 60 degrees). Importantly, however, extraversion was not associated with two bipolar measures falling within the 270–0-degree quadrant of affective space: “calmness” versus “tension” and “unactivated pleasant” versus “activated unpleasant” (both lying around 315 degrees). This suggests that extraversion has a robust and unique association with positive affect when viewed from the factor model perspective. From the circumplex perspective, however, extraversion is related to some positively valenced constructs but not others (i.e., those that are low in activation), as well as to pure activation (which is not part of positive affect in circumplex models).

Yik and Russell’s (2001) findings are echoed by recent tests of the so-called affective reactivity hypothesis (Smillie et al., 2012; Smillie, Geaney, Wilt, Cooper, & Revelle, 2013). These studies have shown that extraverts are susceptible to experimental inductions of activated positive states, which are described by the factor model conceptualization of positive affect. Conversely, extraversion appears unrelated to induced states described by the positive-valence, low-activation quadrant of the affective circumplex. Caution is warranted in comparing these findings directly with those reported by Yik and Russell (2001), as susceptibility to a certain state may not necessarily equate to chronic experience of that state. For example, a person who is sensitive to threats and anxiety-inducing stimuli may typically avoid coming into contact with such stimuli and therefore not generally experience high levels of anxiety (Carver & White, 1994, p. 321).

Lower-Level Aspects of Extraversion and Positive Affect

A further gap in this literature with implications for understanding extraversion’s relation to positive affect concerns

distinctions that have been made between lower-level aspects of extraversion. Perhaps the most influential of these distinctions is between *agentic extraversion*, reflecting agency, dominance, and ambition, and *affiliative extraversion*, reflecting interpersonal warmth and expressiveness and enjoyment of social relationships (Depue & Collins, 1999; Depue & Morrone-Strupinsky, 2005; Watson & Clark, 1997). This distinction has been supported by genetic and phenotypic factor analyses indicating the presence of two correlated but separable factors within the various facets of extraversion (DeYoung et al., 2007; Jang, Livesley, Angleitner, Reimann, & Vernon, 2002). The *assertiveness* factor is equivalent to agentic extraversion. The *enthusiasm* factor resembles Depue's concept of affiliative extraversion, but it better clarifies the distinction between affiliative tendencies related to extraversion and those related to agreeableness (DeYoung, Weisberg, Quilty, & Peterson, 2013). Whereas enthusiasm appears to reflect the degree to which social interactions are experienced as pleasurable, agreeableness subsumes tendencies toward empathy and sympathy that facilitate affiliation.

Assertiveness or agentic extraversion and enthusiasm or affiliative extraversion are thought to relate somewhat differently to affective experience, by virtue of their differential relations to separable components of reward-related neurobiological processes (for a recent overview of reward-processing accounts of extraversion, see Smillie, 2013a). Assertiveness is thought to reflect variation in *incentive or appetitive processes*, concerned with the motivation to seek and approach reward. In contrast, enthusiasm is thought to reflect variation in *consummatory or hedonic processes*, concerned with the conclusion of reward pursuit and the enjoyment of rewards (Depue, 2006; DeYoung et al., 2013). More recently, it has been proposed that, although assertiveness exclusively reflects variation in incentive reward sensitivity, enthusiasm reflects variation in sensitivity to both consummatory *and* incentive reward (DeYoung, 2013). Assertiveness should, therefore, be associated with more activated forms of positive affect (i.e., as conceptualized in the factor model approach), whereas enthusiasm may be related both to activated positive affect and to less activated forms of positive affect (i.e., as conceptualized within the circumplex approach).

Surprisingly, it does not appear that any published study has examined the associations between agentic and affiliative extraversion and different measures of chronic affect. The one exception that we are aware of is by Watson and Clark (1997), who only reported that the two aspects of extraversion were more strongly associated with their positive affect scale (45 degrees in affect space) than they were with each other. This implies that agentic extraversion will be maximally correlated with measures of positive affect that fall above 45 degrees in circumplex terms, whereas affiliative extraversion should be maximally correlated with measures of positive affect that fall below 45 degrees.

As noted above, studies examining the relation between extraversion and experimentally induced affective states are

also potentially noteworthy. Several such studies have shown that assertiveness or agentic extraversion is associated with induced activated positive affect (Morrone, Depue, Scherer, & White, 2000; Morrone-Strupinsky & Depue, 2004; Morrone-Strupinsky & Lane, 2007; Smillie et al., 2013). Evidence concerning enthusiasm or affiliative extraversion and induced affective states is considerably more mixed: It has been associated with induced *low*-activation (but not high-activation) positive states (Morrone-Strupinsky & Depue, 2004), induced *high*-activation (but not low-activation) positive states (Smillie et al., 2013), and neither high- nor low-activation positive states (Morrone-Strupinsky & Lane, 2007).

Given the surprising paucity of basic descriptive data on this topic, in this article we compare assertiveness and enthusiasm (in addition to broader domain-level measures of extraversion) in terms of their relations with a broad range of positively valenced affect constructs.

Summary and Aims

Although the relation between extraversion and positive affect is regularly described as one of the most robust associations in the personality literature, there are notable ambiguities that remain to be clarified. First, the factor and circumplex models of affect offer somewhat diverging conceptualizations of positive affect. To our knowledge, only one published study (Yik & Russell, 2001) has systematically compared measures of these different chronic positive affect constructs in relation to extraverted personality. The first aim of this research is to attempt to replicate this finding, namely, that extraversion is related only to conceptualizations of positive affect that fall between 0 and 90 degrees in affective space. A further ambiguity concerns the possibility that different aspects of extraversion may diverge in their associations with positive affective constructs. Although agentic extraversion has been theoretically linked to more activated positive affective experience and affiliative extraversion to more deactivated positive affective experience, these postulates appear never to have been empirically tested. The second aim of this research is to fill this gap in the literature by examining the associations of assertiveness and enthusiasm with multiple conceptualizations of positive affect.

STUDY I

Method

Participants. Two samples were recruited from universities in Melbourne, Australia. The first consisted of 269 students (aged 18–44, $M = 20.14$, $SD = 3.87$; 77% female) at the University of Melbourne, and the second consisted of 168 students (aged 18–50, $M = 23.08$, $SD = 8.25$; 82% female) at Monash University. Both samples were recruited via first-year psychology research participation schemes. Because these samples were very similar demographically and yielded substantively

identical findings, they were combined in order to provide more accurate parameter estimates (total $N = 437$).

Measures

Trait Extraversion. Extraversion was measured using the relevant scale from the Big Five Aspect Scales (BFAS; DeYoung et al., 2007), an instrument composed of items drawn from the International Personality Item Pool (IPIP; Goldberg, 1999). The domain-level Extraversion scale consists of 20 trait descriptors (e.g., “warm up quickly to others”) on which participants rate themselves using a 5-point Likert scale; it demonstrated high internal consistency in this study ($\alpha = .89$). This scale is also divided into two separate “aspect” scales of 10 items each, Assertiveness ($\alpha = .85$) and Enthusiasm ($\alpha = .88$).

For comparative purposes, we also included the measure of extraversion provided in the Eysenck Personality Questionnaire Revised (EPQ-R; Eysenck, Eysenck, & Barrett, 1985). This measure is the product of a research tradition largely separate from that associated with the Big Five and the IPIP. It is therefore of interest to examine the extent to which findings using the BFAS generalize to those using the EPQ-R. The EPQ-R Extraversion scale consists of 23 questions (e.g., “Do you like going out a lot?”), to which individuals respond using a yes/no format, and it demonstrated high internal consistency ($\alpha = .88$).

Finally, although they were not the primary focus of this research, we included the Neuroticism scales from the BFAS ($\alpha = .91$) and EPQ-R ($\alpha = .86$). Neuroticism often shows a negative correlation with extraversion (e.g., DeYoung et al., 2007) and correlates strongly with negative affect (Watson & Clark, 1992), the low end of which lies at 315 degrees according to the factor model, and at 0 degrees according to the circumplex perspective (see Figure 1). The relation between extraversion and measures of positive affect may therefore be influenced by neuroticism. To evaluate this possibility, we examined the effect of statistically controlling for neuroticism on key analyses.

Trait Positive Affect. To provide comprehensive assessment of multiple aspects of positive affect according to both

circumplex and factor models, we selected 16 items to provide four monopolar measures of the affective dimensions depicted in Figure 1. Item selection was informed by descriptions of the angular locations for a wide range of affect terms contained within the appendices of Rafaeli and Revelle (2006) and Yik et al. (2011). The items were *relaxed, at-ease, placid, calm* (315 degrees, $\alpha = .70$); *happy, content, satisfied, pleased* (0 degrees; $\alpha = .85$); *proud, enthusiastic, energetic, excited* (45 degrees; $\alpha = .76$); and *aroused, intense, hyper-activated, wakeful* (90 degrees; $\alpha = .44$).¹ Participants indicated for each of these adjectives the extent to which it described how they feel “in general” using a 4-point Likert scale.

Procedure. All questionnaires were computer administered using the program Inquisit by Millisecond Software™. Questionnaires were presented in a pseudo-randomized order to minimize carryover effects. Participants were tested in a laboratory divided into segregated cubicles enabling up to eight participants to be tested at one time. Additional questionnaires included in the test battery were unrelated to the aims of this research.

Results

Preliminary Statistics. Our two broad measures of extraversion were highly intercorrelated ($r = .74, p < .001$), as were our measures of neuroticism ($r = .78, p < .001$). The two aspects of extraversion—assertiveness and enthusiasm—were moderately intercorrelated ($r = .46, p < .001$). As anticipated, all measures of extraversion were negatively related to the two measures of neuroticism (all $ps < .001$), with enthusiasm showing the highest correlations ($rs = -.33$ and $-.37$). Correlations among the four measures of positive affect are shown in Table 2. Consistent with the circumplex structure depicted in Figure 1, the sizes of these correlations are proportional to the distance between each pair of affective variables on the circumplex. The sizes of each correlation between constructs that putatively differ by 45 degrees are all exactly as expected (i.e., on the main diagonal, all $rs \sim .50$), although remaining correlations are slightly larger than expected, probably due to acquiescence bias and evaluative consistency bias or *halo*.

Table 2 Study 1: Correlations Among Affect Measures and Between Domain-Level Extraversion Scales and Affect Measures

Angular Location and Sample Items	315°	0°	45°	90°	EPQ-R Extraversion	BFAS Extraversion
315° <i>relaxed, at-ease</i>	—				.07 [−.02, .16] −.02 [−.07, .11]	.08 [−.01, .16] −.09 [−.17, −.01]
0° <i>happy, pleased</i>	.53	—			.35 [.27, .43] .27 [.20, .34]	.43 [.35, .50] .31 [.23, .39]
45° <i>excited, energetic</i>	.29	.58	—		.56 [.49, .62] .52 [.45, .59]	.65 [.59, .70] .61 [.55, .67]
90° <i>intense, aroused</i>	.03	.25	.54	—	.43 [.35, .50] .41 [.33, .49]	.45 [.37, .52] .45 [.37, .52]

Note. EPQ-R = Eysenck Personality Questionnaire Revised; BFAS = Big Five Aspect Scales. Correlations $\geq .25$ are shown in boldface; 95% confidence interval values are presented in brackets; values in italics show partial correlations when controlling for EPQ-R/BFAS neuroticism.

Main Analyses. Table 2 shows the associations between each of our broader (domain-level) measures of extraversion and the four measures of positive affect. Below each set of correlations, partial correlations are presented in italics to evaluate the impact that neuroticism has on these associations. All correlations exceeding .25 are presented in boldface, and confidence intervals for all correlations are given in brackets. In line with previous research, both extraversion scales were strongly associated with constructs ranging from 0 to 90 degrees in affect space. The relation between extraversion and positive affect was consistently strongest for our scale composed of items located at 45 degrees in affect space, where the factor model of affect suggests the primary positive affect dimension is located. In contrast, neither measure of extraversion was related to our measure located at 315 degrees in affect space, which proponents of the circumplex model typically refer to as unactivated or deactivated positive affect. Confidence intervals for the correlations between extraversion and 315-degree affect consistently spanned zero and did not overlap with confidence limits on any other correlation. Controlling for neuroticism had minimal impact on these associations.

Table 3 shows the associations between each of our narrow (aspect-level) measures of extraversion and the four measures of positive affect. Again, correlations exceeding .30 are presented in boldface, confidence intervals for all correlations are given in brackets, and partial correlations (controlling for neuroticism) are shown in italics. Given the moderate overlap between the two extraversion subscales, we also examined the impact that controlling for assertiveness has on the relation between enthusiasm and positive affect, and vice versa. As was the case for the domain-level measures of extraversion, assertiveness and enthusiasm were largely unrelated to our affect measure located at 315 degrees. Instead, enthusiasm was strongly associated with measures located at 0, 45, and 90 degrees, whereas assertiveness was strongly associated with measures located at 45 and 90 degrees. When examining the unique associations that each aspect of extraversion has with the affect measures, we observe an interesting double-dissociation. Specifically, when variation in enthusiasm is statistically controlled, assertiveness is related to high levels of

activation (90 degrees) but is unrelated to pleasant valence (0 degrees). Conversely, when variation in assertiveness is statistically controlled, enthusiasm is related to high levels of pleasant valence (0 degrees) but not to activation (90 degrees). Both assertiveness and enthusiasm were largely uncorrelated with 315-degree affect.

STUDY 2

A limitation of Study 1 is its reliance on psychology undergraduates. Like most such cohorts, this comprised relatively young individuals, the majority of whom were female, and concerns might therefore be raised about the generality of our findings. To address this shortcoming, we recruited a second sample using Amazon's Mechanical Turk (MTurk; www.MTurk.com), an online data collection tool that has been extensively used in social science. An advantage of MTurk is that typical samples of participants ("workers") are significantly more diverse than university samples in terms of age, ethnicity, and other demographics (Buhrmester, Kwang, & Gosling, 2011). Replication of our Study 1 findings using an online sample of MTurk workers would demonstrate that our results are robust and generalizable.

Method

Participants. An initial sample of participants consisted of 270 American MTurk workers and was reduced to a final N of 262 (aged 18–70, $M = 33.86$, $SD = 11.78$; 39% female) following data quality checks (described below). All participants were paid US\$1 for their time ($M = 7.65$ min), equating to approximately \$8 per hour—close to the U.S. minimum wage.

Measures

Trait Extraversion. Extraversion was first measured using the BFAS, which was described in Study 1. Internal consistency was very high for both the broad domain scale ($\alpha = .91$) and the two narrow aspect scales (Assertiveness, $\alpha = .90$; Enthusiasm, $\alpha = .89$). As for Study 1, we included a second

Table 3 Study 1: Correlations Between Aspects of Extraversion and Affect Measures

Angular Location and Sample Items	BFAS Assertiveness	BFAS Assertiveness (Partialing Enthusiasm)	BFAS Enthusiasm	BFAS Enthusiasm (Partialing Assertiveness)
315° <i>relaxed, at-ease</i>	-.02 [-.11, .07]	-.10 [-.19, -.01]	.15 [.08, .22]	.19 [.10, .28]
	-.14 [-.23, -.05]	-.24 [-.31, -.15]	-.01 [-.09, .09]	.06 [-.03, .15]
0° <i>happy, pleased</i>	.21 [.12, .30]	-.04 [-.13, .05]	.53 [.46, .58]	.50 [.42, .59]
	.11 [.02, .20]	-.09 [-.18, .01]	.44 [.36, .51]	.43 [.35, .50]
45° <i>excited, energetic</i>	.49 [.43, .55]	.31 [.23, .39]	.62 [.56, .67]	.51 [.44, .57]
	.46 [.39, .53]	.30 [.22, .38]	.57 [.51, .63]	.47 [.40, .54]
90° <i>intense, aroused</i>	.45 [.38, .52]	.36 [.28, .44]	.32 [.24, .40]	.14 [.05, .23]
	.44 [.36, .51]	.36 [.28, .44]	.31 [.23, .39]	.13 [.04, .22]

Note. BFAS = Big Five Aspect Scales. Correlations $\geq .25$ are shown in boldface; 95% confidence interval values are presented in brackets; values in italics show partial correlations when controlling for BFAS neuroticism.

measure of extraversion to allow comparison across different scales. This time, we used the corresponding scale from Saucier’s (1994) Mini-Markers (MM), which consists of eight adjectives (e.g., *talkative*, *bold*) to which individuals respond by indicating how accurately each term describes them (using a 9-point scale ranging from *extremely inaccurate* to *extremely accurate*; $\alpha = .89$). In line with Study 1, we also included the Neuroticism scales from the BFAS ($\alpha = .93$) and the MM ($\alpha = .87$) in order to examine the relation between extraversion and positive affect after controlling for neuroticism.

Trait Positive Affect. The same 16 items described in Study 1 were again used to provide four measures of the affective dimensions depicted in Figure 1. Internal consistency for these scales was generally acceptable, and very similar to that reported in Study 1 (315 degrees, $\alpha = .72$; 0 degrees; $\alpha = .90$; 45 degrees; $\alpha = .85$; 90 degrees; $\alpha = .57$).

Procedure and Data Quality Checks. Questionnaires were programmed using Qualtrics™ and administered using the MTurk Requestor interface. Although the quality of data collected via MTurk is reported to be at least as high as that collected using student samples (Buhrmester et al., 2011), we implemented three quality control initiatives. First, only workers with an MTurk approval rating exceeding 98% were recruited. Second, a “catch trial” was imbedded in one of the questionnaires and used to exclude participants. This consisted of an extra question within the BFAS instructing participants simply to respond “agree” to this item. Only eight participants failed to respond correctly to this item (resulting in a final *N* of 262, as noted above), suggesting that the vast majority were completing the questionnaires attentively. Finally, two questionnaire items were duplicated on separate pages to check for consistency of responding. Correlations between responses to these duplicated items were extremely high ($r_s > .80$, $p < .001$), again suggesting that the vast majority of participants were completing the questionnaires diligently.

Results

Preliminary Statistics. The domain-level measures of extraversion were very highly intercorrelated ($r = .84$, $p < .001$), as

were the measures of neuroticism ($r = .79$, $p < .001$), whereas assertiveness and enthusiasm were more moderately intercorrelated ($r = .57$, $p < .001$). As for Study 1, all measures of extraversion were negatively related to the two measures of neuroticism (all $p_s < .001$), with the strongest association being between BFAS extraversion and BFAS neuroticism ($r = -.48$, $p < .001$). Correlations among the four measures of positive affect (see Table 4) were generally consistent with the circumplex structure depicted in Figure 1. However, these correlations were all somewhat larger than expected, potentially indicating a stronger evaluative consistency bias in this sample.

Main Analyses. The associations that each extraversion scale had with our four measures of positive affect were highly similar to those reported in Study 1 (see Table 4). Both extraversion scales were strongly associated with constructs ranging from 0 to 90 degrees in affect space, and most strongly with our scale composed of items located at 45 degrees in affect space. When controlling for neuroticism, confidence limits on the correlations between extraversion and 315-degree affect spanned zero and did not overlap with confidence limits on any other correlation.

Table 5 shows associations that assertiveness and enthusiasm have with the four affect scales. As was the case for the domain-level measures of extraversion, assertiveness and enthusiasm were most strongly related to our affect measure located at 45 degrees. Enthusiasm was strongly associated with measures located at 0, 45, and 90 degrees, and uniquely related to measures located at 0 and 45 degrees when controlling for neuroticism and/or assertiveness. A modest association between enthusiasm and 315-degree affect disappeared when controlling for both neuroticism and assertiveness. This overall pattern of results is very similar to those obtained in Study 1. For assertiveness, our pattern of findings differs somewhat from those obtained in Study 1. First, assertiveness was moderately associated with measures located at 0 and 45 degrees, but more modestly associated with 90-degree affect. Second, assertiveness correlated modestly with measures located at 45 and 90 degrees when controlling for neuroticism, but it did not correlate with any affective measures when controlling for both neuroticism and enthusiasm.

Table 4 Study 2: Correlations Among Affect Measures and Between Domain-Level Extraversion Scales and Affect Measures

Angular Location and Sample Items	315°	0°	45°	90°	MM Extraversion	BFAS Extraversion
315° <i>relaxed, at-ease</i>	—				.19 [.07, .30] .06 [−.04, .16]	.21 [.09, .31] −.06 [−.16, .04]
0° <i>happy, pleased</i>	.64	—			.41 [.31, .51] .32 [.21, .43]	.45 [.37, .53] .24 [.14, .33]
45° <i>excited, energetic</i>	.50	.77	—		.50 [.40, .59] .44 [.34, .53]	.50 [.40, .59] .36 [.25, .46]
90° <i>intense, aroused</i>	.35	.48	.67	—	.35 [.24, .45] .32 [.21, .41]	.32 [.21, .43] .26 [.14, .37]

Note. MM = Mini-Markers; BFAS = Big Five Aspect Scales. Correlations $\geq .25$ are shown in boldface; 95% confidence interval values are presented in brackets; values in italics show partial correlations when controlling for EPQ-R/BFAS neuroticism.

Table 5 Study 2: Correlations Between Aspects of Extraversion and Affect Measures

Angular Location and Sample Items	BFAS Assertiveness	BFAS Assertiveness (Partialing Enthusiasm)	BFAS Enthusiasm	BFAS Enthusiasm (Partialing Assertiveness)
315° <i>relaxed, at-ease</i>	.13 [.01, .25]	.01 [−.11, .13]	.24 [.12, .35]	.19 [.07, .30]
	−.12 [−.23, .01]	−.15 [−.26, −.03]	.20 [.08, .31]	.09 [−.03, .21]
0° <i>happy, pleased</i>	.30 [.20, .41]	.03 [−.09, .15]	.49 [.39, .58]	.50 [.40, .59]
	.08 [−.04, .20]	−.09 [−.20, .03]	.41 [.30, .51]	.34 [.23, .44]
45° <i>excited, energetic</i>	.36 [.26, .46]	.10 [−.02, .23]	.52 [.43, .60]	.51 [.41, .59]
	.22 [.10, .33]	.03 [−.09, .15]	.41 [.30, .51]	.36 [.25, .46]
90° <i>intense, aroused</i>	.25 [.13, .36]	.09 [−.03, .21]	.33 [.22, .43]	.14 [.02, .26]
	.18 [.06, .30]	.06 [−.06, .18]	.23 [.11, .34]	.21 [.09, .32]

Note. BFAS = Big Five Aspect Scales. Correlations $\geq .25$ are shown in boldface; 95% confidence intervals values are presented in brackets; values in italics show partial correlations when controlling for EPQ-R/BFAS neuroticism.

DISCUSSION

Extraversion is frequently described as having a strong association with positive affect. However, positive affect can be conceptualized in two different ways. Those who advocate the factor model of affect proposed by Watson, Tellegen, and colleagues define positive affect in terms of feelings that are both positively valenced and at least somewhat activated (i.e., positive activation). In contrast, proponents of the circumplex model of affect proposed by Russell, Barrett, and colleagues define positive affect in terms of feelings that are pleasant regardless of whether they are activated or deactivated (i.e., pleasant valence). Emotion researchers are well aware of the problem that varying definitions of positive affect may cause, and there has been much debate concerning the relative merits of the factor and circumplex perspectives (e.g., Barrett & Russell, 1998; Larsen & Diener, 1992; Tellegen et al., 1999). The purpose of this article was to clarify precisely in which sense one should interpret the robust relation that extraversion is said to have with positive affect.

Across two relatively large samples, we found that multiple measures of extraversion were most clearly related to positive affect as conceptualized within the factor model perspective (i.e., 0–90 degrees). Extraversion was consistently most strongly related to our measure located at 45 degrees in affect space—exactly where the primary positive affect dimension is located within the factor model. Conversely, extraversion showed weak to zero associations with our measure located at 315 degrees—which corresponds to deactivated or unactivated positive affect in the circumplex model, but to (low) negative affect in the factor model. This finding is consistent with recent studies showing that extraverts are more susceptible than introverts to experimental inductions of more activated positive affective states, but not to merely pleasantly valenced states (Smillie et al., 2012, 2013). Our results also complement studies of counterdispositional behavior, which show that the positive affective benefits of acting in an extraverted way apply especially to states characterized both by positive valence and activation (McNiel et al., 2010). Taken together, these earlier findings and ours make it clear that the extraversion domain

should not be associated with affective constructs located at 315 degrees because they differ by a 90-degree arc (i.e., they are orthogonal).

Although the broad extraversion domain appears to be orthogonal to affective constructs located at 315 degrees, the latter could nonetheless be related to one of the major subfactors of extraversion. However, our findings additionally demonstrated that the relations of lower-order aspects of extraversion to positive affect are also confined to the 0–90 degree arc of affective space. Assertiveness and enthusiasm showed converging relations with the affect scale located at 45 degrees, and diverging relations with the affect scales located at 0 and 90 degrees. For enthusiasm, this pattern of divergence was consistent across our two studies. Specifically, enthusiasm was uniquely associated with pure positive valence (0 degrees in affective space), which may fit well with the idea that affiliative components of extraversion are related to feelings of pleasure and satisfaction associated with the attainment of reward. For assertiveness, patterns of divergence were less consistent across studies. Specifically, in Study 1, assertiveness was uniquely associated with pure activation (90 degrees), which seems consistent with the theory that agentic components of extraversion are related to feelings of energy and vigor connected with sensitivity to incentive reward and drive to pursue rewards (Depue & Collins, 1999; DeYoung, 2013). However, in Study 2, after controlling for neuroticism and enthusiasm, assertiveness was no longer associated with any measure of affect. This may reflect the somewhat higher associations among these measures in Study 2 (i.e., in Study 1, the correlation between assertiveness and enthusiasm was $r = .46$, whereas in Study 2 it was $r = .57$). In both studies, enthusiasm was more strongly related to measures of affect, suggesting that the affective component of extraversion is primarily captured by enthusiasm.

Although our measure of affect located at 315 degrees in affect space was not substantially related to either broad or narrow measures of extraversion in either of our studies, these correlations occasionally approached or even exceeded $r = .20$. However, in almost all instances, these associations disappeared when controlling for neuroticism. This trend makes

sense from the perspective of the factor model of affect: Neuroticism tends to be strongly correlated with negative affect (the low end of which is located at 315 degrees), and it had a moderate negative association with extraversion in both of our studies. Therefore, there is a weak tendency for extraverted individuals to experience somewhat lower levels of negative affect simply because they typically score somewhat lower on neuroticism.

Overall, our findings show that, from the perspective of the factor model, the relation of extraversion to positive affect is straightforward; the former subsumes the latter in its entirety. From the perspective of the affective circumplex approach, however, the relation of extraversion to affect is somewhat messy. Extraversion is related to positive affect at 0 and 45 degrees but is unrelated to deactivated positive affect at 315 degrees. Furthermore, extraversion is additionally associated with pure activation at 90 degrees, which is conceptually separate from (indeed, orthogonal to) a valence-based operationalization of positive affect. The factor model of affect therefore provides a far more parsimonious means for describing the relation between extraversion and positive affect.

In descriptions of the relation between personality and affect, it is important to recall that trait affect is actually a component of personality: Personality refers to all coherent regularities in affect, motivation, cognition, and behavior (Wilt & Revelle, 2009), and the Big Five personality dimensions emerge from factor analyses that include measures of trait affect (e.g., Markon et al., 2005; Saucier, 1997).² Positive affect, in the factor model sense, can thus be considered a facet or subcomponent of the extraversion domain. In turn, efforts to explain the relation between extraversion and positive affect are attempts to understand why positive affect coheres so closely with the other salient components of extraversion, such as sociable and outgoing behavior. For instance, studies of enacted extraversion demonstrate that positive affect is a causal consequence of engaging in extravert-typical behavior (Smillie, 2013b). These explanatory endeavors depend critically on basic descriptive research such as we have reported here, which clearly shows that extraversion is, in part, the tendency to experience positive affect—as defined within the factor model of affect.

Circumplex Versus Factor Models of Affect

We suspect that it is not merely coincidental that the basic personality dimension of extraversion corresponds more parsimoniously to the factor model than to the circumplex model of positive affect. Although mathematically there are no preferred dimensions in a circumplex—such that the choice between 45-degree rotations of the two major axes is fundamentally arbitrary—from an empirical perspective, reasons exist to prefer the factor model.³ For instance, neurobiological research suggests that emotional valence and arousal are not causally independent. Instead, distinct subcortical brain systems are responsible for reactions to incentive and threat,

and their activation causes, respectively, aroused positive affect or aroused negative affect (Burgdorf & Panksepp, 2006; Gray & McNaughton, 2000; cf. Shiota, Neufeld, Yeung, Moser, & Perea, 2011). In turn, emotions described in terms of “deactivated positive affect”—or, in factor model terms, reduced negative affect (e.g., “contentment”; Fredrickson, Mancuso, Branigan, & Tugade, 2000)—likely reflect deactivation of threat-processing systems. The nonindependence of arousal and valence also appears to be reflected in ongoing emotional experience: Two recent studies found that subjective ratings of arousal typically increase with both positive and negative valence (Kron et al., 2013; Kuppens, Tuerlinckx, Russell, & Barrett, 2013). One of these studies provided direct evidence that the apparent independence of valence and arousal may be an artifact resulting from the standard bipolar valence scale ranging from pleasant to unpleasant (Kron et al., 2013). All of this research is difficult to reconcile with the circumplex representation of the structure of affect, but it is well accommodated by the factor model of affect.

CONCLUDING REMARKS

The relation between extraversion and positive affect is often described as one of the most robust findings in personality science. However, not all conceptualizations of positive affect are identical, and our results demonstrate that this association is only robust from the perspective of the factor model of affect proposed by Watson, Tellegen and colleagues. Specifically, the affective component of extraversion is best described in terms of a combination of valence and activation (i.e., positive activation). This was the case for multiple measures of extraversion, both broad (domain-level) and narrow (aspect-level) measures of this trait, and was consistently observed across two very different participant samples.

In order to illuminate the sources of personality through mechanistic theory, we must be able to integrate basic trait domains with the extensive literature that exists on the structure and mechanisms of emotion and individual differences in emotion. Clarifying exactly which types of affect are related to extraversion is a key component of this integration. The present studies provide such clarification and thereby serve to guide theory and research concerning the processes underlying basic personality traits.

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Notes

1. The low internal consistency for this pure arousal/activation measure may indicate that valence-free chronic states are more difficult for participants to introspect about. Indeed, recent findings by Kron, Goldstein, Lee, Gardhouse, and Anderson (2013) suggest that our ability to distinguish valence and arousal is somewhat limited. Despite relatively low internal consistency, however, this scale fell at the expected location in the circumplex, as reported below.
2. Because several BFAS enthusiasm items explicitly describe emotional experience (e.g., “Have a lot of fun,” “Am not a very enthusiastic person” [reversed]), we reanalyzed the data excluding five items from that scale. The pattern of results changed very little from those reported in our two studies. For instance, the largest change was a reduction in the correlation between enthusiasm and the 45-degree affect scale in Study 1, from .62 to .51. Clearly, our results cannot be explained by overlapping item content.
3. Remember, as well, that the factor model specifies that the circumplex is merely a reasonable simplification of a hierarchical structure (Tellegen et al., 1999).

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