Affective Reactivity in Agentic and Affiliative Extraversion

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Author's Declaration

This thesis is the result of the author's original research. It has been composed by the author and has not been previously submitted for examination which has led to the award of a degree.

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ABSTRACT

The affective-reactivity hypothesis holds that extraverts experience greater levels of positive affect in response to rewards than do introverts. This issue is complicated by the fact that extraversion is comprised of two major components of agency and affiliation. Agentic extraversion reflects social dominance, exhibitionism and achievement striving, whilst affiliative extraversion reflects being warm, affectionate, and valuing close relationships with others. Both components of extraversion have been found to be associated with particular forms of affective reactivity: agentic extraversion predicts positive activation in response to appetitive rewards, whilst affilaitve extraversion predicts warmth-affection in response to affiliative rewards.

The aim of this thesis was to test affective reactivity in agentic and affiliative extraversion. Additional issues such as the role of cognitive appraisals in affective reactivity, and whether individual differences in reward sensitivity are also observable in physiological markers of emotion were also examined. Affective-reactivity was tested in response to social behaviours, mental imagery and film clips. It was predicted that agentic extraversion would predict positive activation in response to appetitive situations and that affiliative extraversion would predict warmth-affection and pleasure in response to affiliative situations. There was no support for the predictions regarding agentic extraversion, and affiliative extraversion was only found to predict pleasure and warmth-affection following affiliative mental imagery. The relationships between affiliative extraversion and affect were also found to be mediated by cognitive appraisals, and there was some

evidence that affiliative extraversion is associated with zygomaticus activation in response to an affiliative film clip.

In sum, support for the affective reactivity hypothesis in agentic and affiliative extraversion was limited. Issues for future researchers to consider include how different experimental methods differentially induce emotion, and how agentic and affiliative extraversion should be conceptualised and measured.

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Introduction

1.1 Overview.

Positive affect – including pleasant moods and emotions - is an important component of subjective well-being, and is associated with a variety of important work, relationship and health outcomes (Diener, Suh, Lucas, & Smith, 1999; Lyubomirsky, King, & Diener, 2005). Individual differences in peoples' typical experience of positive affect reflect an aspect of temperament referred to as positive affectivity. Individuals who score highly on scales of positive affectivity experience positive moods and emotions - such as pleasure, joy and enthusiasm – more frequently than individuals who score low on these scales (Watson, 2002). Individual differences in positive affectivity are moderately hereditable and relatively stable over periods as long as ten years (Lykken & Tellegen, 1996; Tellegen et al., 1988; Watson & Walker, 1996).

Among the most consistent predictors of positive affectivity are personality traits, and in particular, extraversion (Lucas & Diener, 2008; Steel, Schmidt, & Shultz, 2008; Watson, 2000). This relationship is one of the most consistent in personality psychology, with some researchers going as far as to suggest that positive affectivity is the central feature of extraversion (Watson & Clark, 1997a). While the association between positive affectivity and extraversion is clear, the causes underlying this relationship are not. Of the various explanations offered, the affective-reactivity hypothesis (ARH) has received the most attention. The ARH

holds that extraversion reflects individual differences in the sensitivity to incentives, whereby extraverts are more sensitive to rewarding situations than are introverts (Smillie, 2013). In support of this hypothesis, extraverts have been reported to respond to rewarding events and stimuli with greater levels of positive affect than do introverts (R. J. Larsen & Ketelaar, 1989, 1991; Lucas & Baird, 2004; Rusting & Larsen, 1997; Smillie, Cooper, Wilt, & Revelle, 2012; Zelenski & Larsen, 1999a).

The close association between extraversion and positive affect is complicated by the fact that extraversion subsumes two major components of agency and affiliation (Depue & Collins, 1999). Furthermore, these components are associated with particular forms of affective reactivity on measures of positive activation and warmth-affection, respectively (Depue & Morrone-Strupinsky, 2005; Morrone-Strupinsky & Depue, 2004; Morrone-Strupinsky & Lane, 2007; Morrone, Depue, Scherer, & White, 2000).

The following review of the literature is designed to address several key issues. First, the nature and structure of positive affect is discussed and the merits of categorical and dimensional models are considered. The relationship between extraversion and positive affect is then described, as are potential instrumental and temperamental mechanisms that may cause extraverts to experience greater positive affect. The distinction between the agentic and affiliative extraversion is then made, and evidence that these traits are associated with specific forms of affective reactivity is reviewed.

1.2 The structure of positive affect

Before reviewing individual differences in positive affectivity, it is important to first consider what researchers mean in referring to positive affect. Research into the structure of affect has relied primarily on self-reports, where individuals rate how they feel in the moment, or have felt over a period of time. Subjective self-report measures are considered the clearest markers of individuals' affective states by several researchers, particularly in the absence of any objective physiological or behavioural indices that can reliably distinguish particular feelings of happiness, sadness, anger and the like (Barrett, 2004; Watson, 2000). The following review of affective structure is therefore based on the self-report literature.

1.2.1 Categorical models of positive affect

Early affect research focused on taxonomic models of discrete affective states, such as happiness, anger and fear. This approach is intuitively appealing and is supported by factor analyses of self-rated affect descriptors, which often yield a number of recognisable affective dimensions. These factors often resemble lists of basic emotions (Tellegen, Watson, & Clark, 1999; Watson & Clark, 1997b, 1999; Watson & Vaidya, 2003).

From such analyses, a number of self-report adjective scales have been developed to measure discrete affects (Gray & Watson, 2007; Lucas, Diener, & Larsen, 2009; Watson & Vaidya, 2003). These include the Positive and Negative Affect Schedule – Expanded (PANAS-X; Watson & Clark, 1999), the Differential

Emotions Scale (DES; Izard, Libero, Putnam, & Haynes, 1993), the Comprehensive Personality and Affect Scales (COPAS; Lubin & Whitlock, 2002), the Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1971) and the State-Trait Emotion Measure (STEM; Levine et al., 2011). Collectively, these questionnaires measure a wide range of positive affects, such as self-assurance in the PANAS-X (Watson & Clark, 1999), excitement in the COPAS (Lubin & Whitlock, 2002) and interest in the DES (Izard et al., 1993).

Although measures of discrete affects appear to be both valid and reliable (Gray & Watson, 2007; Watson & Clark, 1999; Watson & Vaidya, 2003), categorical models of affect have a number of limitations. First, the literature lacks a consensual taxonomy of how many discrete affects should be measured, which makes it impossible to determine how comprehensive a model is (Watson & Clark, 1997b). For example, the COPAS (Lubin & Whitlock, 2002) contains five positive affect scales (Contentment, Joy, Love, Vigor and Excitement), the PANAS-X (Watson & Clark, 1999) contains three (Joviality, Self-Assurance and Attentiveness), and the POMS (McNair et al., 1971) contains one (Vigor).

A second, more serious problem, is that measures of similarly valanced (pleasant or unpleasant) discrete affects are highly correlated (Watson & Clark, 1997b). For example, trait ratings of the PANAS-X Attentiveness, Joviality and Self-Assurance scales range from r = .48 to .59, while momentary affect ratings on these scales range between r = .50 to .65 (Watson, 2000). As these data are derived from between-person analyses, they may be contaminated by response biases such as acquiescence (Green, Goldman, & Salovey, 1993); more compelling evidence comes from within-person analyses, which are less susceptible to these sources of error

(Watson, 2000). The results of such analyses are consistent with between-person studies. For example Diener, Smith and Fujita (Diener, Smith, & Fujita, 1995) found that daily ratings of joy and love collected over 52 days correlated at .70, whilst Watson observed correlations ranging from .61 to .75 between momentary ratings of PANAS-X Joviality, Self-Assurance and Attentiveness (Watson, 2000). Such findings suggest that individuals who experience one form of positive affect over the course of 24 hours also tend to experience other forms of positive affect (Watson & Clark, 1997b).

1.2.2 Dimensional models of positive affect

The correlations between reports of same-valanced affect suggest that these states share a degree of non-specific, overlapping variance (Watson & Clark, 1992a). Several investigators have applied factor analysis to self-rated affect descriptors in order to identify the dimensions that underlie affective space. Such analyses typically yield one of two pairs of dimensions: Arousal-Stillness and Pleasure-Displeasure (Barrett & Russell, 1998; Yik, Russell, & Barrett, 1999) or Positive and Negative Activation (Watson & Tellegen, 1985b; Watson, Wiese, Vaidya, & Tellegen, 1999). The high poles of the Positive and Negative Activation factors consist of pleasant and unpleasant states respectively, and also contain a high activation component. The content of these dimensions are illustrated from the item content of the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988); the PA scale contains terms such as *active* and *enthusiastic* whilst the NA scale contains terms

such as *scared* and *afraid.* The low poles of PA and NA are defined by terms such as *sluggish* and *relaxed,* respectively (Watson & Tellegen, 1985a).

These two models (Arousal and Pleasure versus Positive and Negative Activation) are essentially rotational variants of one another; Arousal and Pleasure are typically identified in unrotated factor analyses of affect descriptors while PA and NA emerge from analyses with orthogonal (e.g. varimax) rotation (Watson & Clark, 1997b; Watson et al., 1999). These four dimensions can therefore be integrated into a circular structure, where PA and NA are positioned at 45 degrees to Arousal and Pleasure. The result is a circular arrangement of affect descriptors – or circumplex – whereby positively correlated terms are positioned closely on the circumference, negatively correlated terms are positioned at opposite points and uncorrelated terms are positioned 90 degrees apart (R. J. Larsen & Diener, 1992; Russell, 1980; Yik, Russell, & Steiger, 2011).

Positive affect can therefore be conceptualised as broad dimensions of pleasant feelings that differ according to their level of arousal. The two positive dimensions most commonly reported in the literature – Positive Activation and Pleasure - therefore represent pleasant states that are more and less activated, respectively. The distinction between these aspects of positive affect is supported by previous findings that markers of pleasure (e.g. *happy, satisfied*) and positive activation (e.g. *proud, enthusiastic*) load onto separate factors (Matthews, Jones, & Chamberlain, 1990), and that these two dimensions fall approximately 45 degrees apart on the affective circumplex (Yik et al., 2011). The differences between these dimensions are important and non-negligible. These differences are illustrated by the fact that the dimensions exhibit separable patterns of diurnal variation. For example,

individuals' experiences of PA are typically low at the point of waking and rise throughout the morning, before reaching a plateau in the afternoon and declining in the evening as the individual prepares for sleep (Watson, 2000). These patterns have been recorded when individuals rate their momentary mood throughout the day using a variety of instruments, including the PANAS Positive Activation scale (Clark, Watson, & Leeka, 1989; Murray, Allen, & Trinder, 2002; Murray et al., 2009; Simpson et al., 2008; Watson, 2000; Watson et al., 1999) the Energetic Arousal scale from the Activation-Deactivation Adjective Checklist (Robert E. Thayer, 1987; R.E. Thayer, Takahashi, & Pauli, 1988) and other less-established measures of positive activation (Caminada & Debruijn, 1992; Owens et al., 2000).

Diurnal variation in pleasure follows a different pattern however. Egloff, Tausch, Kohlmann and Krohne (1995) asked participants to rate their moods three times a day for seven days. Participants rated how they felt throughout the morning at approximately 12 PM, how they felt during the afternoon at approximately 6PM and how they felt during the evening just before going to bed. Ratings were made on two adjective checklists: one measuring positive activation (*active, inspired, attentive* and *interested*) and one measuring pleasure (*balanced, content, at ease* and *happy*). While participants' ratings of positive activation rose through the day and fell in the evening, ratings of pleasure showed a linear increase throughout the day and evening.

Similar findings are reported by Caminada and Debruijin (1992). Participants made momentary ratings of their current mood six times a day, for three days. Participants' mood was measured with two scales designed to tap the high-activation and low-activation aspects of positive affect. Consistent with the literature, positive

activation showed a quadratic distribution over the day. Ratings of pleasure also rose throughout the morning and afternoon, although these scores did not fall in the evening as positive activation did. Further, when markers of arousal (*active, alert, clear headed, resolute* and *eager)* were included as a covariate, the diurnal variation in positive activation scores was no longer quadratic. It appears then that the decline in positive activation scores in the evening is driven largely by a fall in arousal.

In sum, measures of positive affect can be reduced to a smaller number of affective dimensions. The most commonly reported of these are pleasure and positive activation, which are broad dimensions of positive affect that differ by level of activation. The differences between pleasure and positive activation are nontrivial, and each dimension appears to capture different aspects of individuals' functioning. Therefore, neither dimension can therefore wholly account for positive affective experiences.

1.2.3 Limitations of dimensional models

Dimensional models account for large amounts of variance in self-reported affect, though neither pleasure nor positive activation can wholly capture the vicissitudes of positive affect. Although measures of self-reports share a significant proportion of overlapping variance, they nonetheless contain a portion of unique variance. As an example of how important this unique variance can be, Watson and Clark (Watson & Clark, 1992b) reported substantial correlations between Positive Activation and both Extraversion (*r*s ranging from .48 to .64) and Conscientiousness (*r*s ranging from .25 to .49). While both Extraversion and Conscientiousness are both

related to the higher order dimension of positive activation, they are clearly distinguishable at the lower order affect level; Extraversion was associated with PANAS-X Joviality and Self-Assurance, while Conscientiousness was associated with PANAS-X Attentiveness.

Examining specific affects also helps to clarify the nature of certain psychopathologies. For example, while positive affect has been negatively associated with depression (Watson & Nargon-Gainey, 2010), it may be possible to identify more specific affective experiences that are characteristic of these conditions. There is some evidence, for example, that depression is associated specifically with lower scores of pride over amusement or joy (Gruber, Oveis, Keltner, & Johnson, 2011), while others have demonstrated that individuals at risk of mania are characterised more by higher scores on pride and joy than by compassion or love (Gruber & Johnson, 2009).

1.3 Temporal stability in trait positive affect

There are differences in the frequency and intensity with which individuals experience positive affect (Lykken & Tellegen, 1996; Meehl, 1975; Watson, 2000, 2002). These differences are moderately hereditable (Jang & Livesley, 1996; Jang, McCrae, Angleitner, Reimann, & Livesley, 1998; Lucas & Diener, 2008; Lykken & Tellegen, 1996; Tellegen et al., 1988), and show relative stability in adulthood. Watson and colleagues (Vaidya, Gray, Haig, & Watson, 2002; Watson & Clark, 1999) for example have calculated two month test-retest stabilities for the PANAS-X general Positive Activation, Joviality, Self-Assurance and Attentiveness scales in

three undergraduate samples. The resulting coefficients ranged from .55 (Joviality) to .70 (Positive Activation), suggesting that positive affects are highly stable over relatively short periods of time. Trait positive affect is also moderately stable over periods of several years, although less so than when shorter time periods are considered (Watson, 2000). As evidence of this, Watson and Walker (1996) and Vaidya et al., (Vaidya et al., 2002) calculated PANAS-X retest coefficients for time periods ranging from approximately 2.5 to 6 years. Izard et al., (1993) similarly report three-year stability coefficients of .59 and .52 for the DES Interest and Enjoyment scales respectively.

These data have been collected from undergraduates and young adults mostly in their twenties. The age of participants is significant as personality continues to develop throughout this period of life, before becoming relatively more stable after age 30 (Terracciano, McCrae, & Costa, 2010). It may therefore be expected that levels of positive affect would also show greater levels of temporal stability in relatively older adults (Watson, 2002). In samples of middle aged and older adults for example, the stability coefficient of the NEO-PI-R Positive Emotions scale has been reported to be as high as .72 for time periods as long as nine years (Costa, Herbst, McCrae, & Siegler, 2000; Terracciano, Costa, & McCrae, 2006).

1.4 Personality, extraversion and positive affect

Personality traits are defined as stable patterns of behaviour, affect and cognition (McCrae & Costa, 1995; Wilt & Revelle, 2009). These traits are most commonly identified from factor analyses of questionnaire items, where individuals rate the behaviour and experiences of either themselves or another person. The

existence of a trait is inferred from patterns of covariation between individuals' responses to these questions, and are considered to reflect some internal, intrinsic qualities of persons (Matthews, Deary, & Whiteman, 2009; Tellegen, 1991). In this sense, researchers often use the term "personality trait" to refer to both the descriptive phenotypic content of a personality trait and the organismic structure that is presumed to cause the observed pattern of covariation and determine an individual's position along the trait dimension (McCrae & Costa, 1995).

Personality traits differ in the scope of their content and can be organised hierarchically. At the bottom of the hierarchy are narrowly defined traits – or facets - that refer to specific patterns of behaviour, affect or cognition such as assertiveness, modesty and self-consciousness (Costa & McCrae, 1995; Jang et al., 1998). At the top of the hierarchy are broad, superordinate traits, the existence of which is inferred from covariation among several of the narrower, more specific traits (Goldberg, 1993; Watson & Clark, 1997a).

While there is no consensus on how many of the narrow traits are needed to comprise a comprehensive model of personality, researchers have converged on the conclusion that there exist a relatively small number of three, five or six higher-order personality traits (P. T. Barrett, Petrides, Eysenck, & Eysenck, 1998; Lee & Ashton, 2004; McCrae & Costa, 1997; Tellegen & Waller, 2008; Zuckerman, 2002). One such personality trait is extraversion, which is represented in all modern taxonomies of personality. Watson & Clark (1997a) reviewed various theorists' models of extraversion and identified four lower-order traits that are consistent across them: Affiliation (reflecting warmth, friendliness and gregariousness), Ascendance (reflecting assertiveness, exhibitionism and social dominance), Energy (reflecting

vigor, liveliness and activity levels) and Positive Affectivity (reflecting positive emotions, enthusiasm and optimism). Venturesomeness (reflecting excitement seeking, boldness and adventurousness) and Ambition (reflecting ambitiousness, persistence and perfectionism) are less commonly recognized facets of extraversion, being represented in some models but not others.

Extraversion is ubiquitous in personality psychology, although the label given to this dimension does differ across researchers. For example, extraversion has also been termed Positive Emotionality (Tellegen & Walker, 2008), and Surgency (Goldberg, 1990). These differences in terminology likely reflect differences in how researchers weigh the importance of particular lower-order facets (Depue & Collins, 1999). For example extraverts have variously been defined by their sociability (McCrae & Costa, 1987), levels of positive affect (Watson & Clark, 1997a) and sensitivity to reward (Lucas, Diener, Grob, Suh, & Shao, 2000).

Extraversion is typically measured through self-report questionnaires, where individuals are asked to indicate the extent to which a number of statements accurately describe their typical behaviour, cognitions and affect. Several such measures have been developed, and some of the most common measures include the extraversion scales of the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1995), the Eysenck Personality Questionnaire-Revised (EPQ-R; Eysenck, Eysenck, & Barrett, 1985), and the Big Five Aspect Scales (BFAS; DeYoung, Quilty, & Peterson, 2007). These measures differ in their item content and the number of subscales contained within each. For example, NEO-PI-R Extraversion consists of six subscales (Warmth, Gregariousness, Assertiveness, Activity, Excitement-Seeking, and Positive Emotions), BFAS Extraversion consists of two

(Enthusiasm and Assertiveness), whilst EPQ-R Extraversion contains no such subscales. Despite these differences, measures of extraversion taken from different personality inventories are highly correlated (Gow, Whiteman, Pattie, & Deary, 2005), which supports the view that these various measures tap a common underling dimension of personality.

Extraverts consistently report greater levels of positive affect than do introverts (Wilt & Revelle, 2008). One of the most consistent findings in personality psychology for example is that there is a moderate to large size positive correlation between extraversion and trait positive affect (Costa & McCrae, 1980; DeNeve & Cooper, 1998; Lucas & Diener, 2008; McCrae & Costa, 1991; Watson, 2000; Watson et al., 1999). Large to moderately sized positive correlations have been reported between extraversion and trait measures of specific positive affects, including the Joviality, Self-Assurance and Attentiveness scales of the PANAS-X (Watson, 2000), and the Interest and Enjoyment scales of the DES (Izard et al., 1993). Smillie, DeYoung and Hall (2014) have also demonstrated that EPQ-R and BFAS Extraversion are both associated with trait measures of several broad dimensions of positive affect, including arousal (*aroused, intense, hyper-activated, wakeful; r* = .43 and .45), positive activation (*proud, enthusiastic, energetic, excited;* r = .56 and .65) and pleasure (*happy, content, satisfied, pleased; r* = .35 and .43). On the other hand, neither measure of extraversion was found to be associated with unactivated positive affect (*relaxed, at ease, placid, calm; r* = .07 and .08). Therefore, the relationship between extraversion and positive affect appears to be stronger for positive activation than for either arousal or pleasure.

The previous data are based on trait measures of affect, where individuals rate how they typically feel, in general. Extraversion is also positively associated with state positive affect, where individuals rate how they feel in the moment. This relationship may be weaker than that observed between extraversion and trait positive affect however. In a meta-analysis of previous literature for example, Lucas and Fujita (2000) arrived at an average correlation of r = .38 between extraversion and trait positive affect, and r = .15 betweeen extraversion and state positive affect. This latter finding was only based on two studies however.

These researchers also found that the relationship between extraversion and positive affect is smaller when researchers aggregate multiple daily or momentary reports, compared with taking single global ratings of trait affect (Lucas & Fujita, 2000). The finding that extraversion is weakly related to an individual's affective state at any one point in time is consistent with the view that personality traits are most helpful in predicting dispositional patterns of affect, and are relatively poor predictors of how an individual will feel at any one point in time (Diener, 1996). On the other hand, Steel Schmidt and Shultz (2008) conducted a separate meta-analysis of a larger literature base, examining the relationship between various measures of extraversion and positive affect. Here, the average correlations between personality and positive affect ranged from .25 to .44, regardless of whether trait or momentary measures of positive affect were recorded.

These meta-analyses have also shown that the relationship between positive affect and extraversion differs according to the different personality questionnaires used in studies. For example both Lucas and Fujita (2000) and Steel et al., (2008) found that the relationship between trait positive affect and extraversion is smaller

when the EPI is used to measure personality (average *r*s = .23 and .25) than when either the EPQ (average *r* = .36 and .35) or various NEO inventories (average *r* = .35 and .44) are used.

It may be that the observed correlations between extraversion and positive affect primarily reflect common method variance rather than the true underlying relationship between these constructs. For example these relationships may be due to criterion contamination, which refers to a form of common method variance where two variables share a degree of overlapping content, which makes some degree of association between them inevitable (Steel et al., 2008). This is potentially problematic as several measures of extraversion contain subscales reflecting positive affectivity, such as the Positive Emotions scale of NEO-PI-R Extraversion (Costa & McCrae, 1995), the Enthusiasm scale from BFAS Extraversion (DeYoung et al., 2007), the Liveliness scale from HEXACO Extraversion (Lee & Ashton, 2004), and the Wellbeing Scale of MPQ Positive Emotionality (Tellegen & Waller, 2008). Therefore, any relationship between extraversion and positive affect may be driven primarily by shared item content between measures. Steel et al., have offered two defenses to this critique. First, these researchers point out that personality structure and measurement is derived primarily from factor analysis, whereby variables that correlate highly are identified and organised under shared factor dimensions atheoretically. The reason why positive affectivity is included in measures of extraversion then is because individual differences in positive affect are highly associated with non-affective facets such as gregariousness and assertiveness. These researchers have also examined the extent to which NEO facets of Warmth, Gregariousness, Assertiveness, Activity and Excitement Seeking predict various

forms of trait positive affect after controlling for the Positive Emotions facet of extraversion – effectively eliminating possible criterion contamination. In this analysis, the R^2 value only dropped from .50 before controlling for Positive Emotions to .44 after controlling for Positive Emotions. Moreover, some measures of extraversion contain minimal item content that directly taps positive affectivity. EPQ-R Extraversion (Eysenck et al., 1985) for example is a unidimensional scale made up of 23 items, only one of which directly refers to positive affect ("Would you call yourself happy-go-lucky?"). Nonetheless, this measure of extraversion has also been found to be positively associated with positive affect (Steel et al., 2008).

An additional source of potential shared method bias comes from collecting self-reports of both personality and affect. As McCrae and Costa (1991) state, the relationships between personality and affect may be "artifactual, attributable to shared method variance in self-reported personality scales and self-reported well-being" (p. 230). This can be tested by examining the pattern of correlations observed in samples with other-other or self-other ratings (Steel et al., 2008). Watson, Brock and Wiese (2000) compared self-self and other-other ratings of extraversion and PANAS Positive Activation scales in three samples of married couples, dating couples and friends. Across the three samples, the average correlation between self-rated extraversion and positive affect was .52, whilst the average correlation between other-rated extraversion and positive affect was .59. McCrae and Costa (1991) similarly compared married couples' self-self and self-other ratings, with the latter yielding a positive relationship between positive affect and extraversion (*r*s = .14 and .14) – although this was substantially smaller than that observed in the self-self ratings (*r*s = .32 and .24).

In sum, the relationship between extraversion and positive affect appears to be robust. Extraversion and positive affect consistently correlate across various measures of both constructs, although the relationship may not hold for low-activation forms of positive affect, and extraversion may be more strongly associated with trait positive affect than with state positive affect. Furthermore, these relationships cannot be attributed to common method variance and therefore seem to reflect a genuine positive association between the two constructs.

Although the data reviewed are correlational, a central assumption of personality trait research is the causal primacy of traits (Matthews et al., 2009). In other words, extraversion is considered to cause individual differences in positive affect. On their own however, personality traits lack explanatory power and do not shed light on the underlying processes that cause extraversion and positive affect to be related (Diener, 1996).

The possible explanations for the relationship between extraversion and positive affect can be classified as being either instrumental or temperamental (McCrae & Costa, 1991; Wilt & Revelle, 2009). Instrumental explanations suggest that personality traits have an indirect effect, in that they predispose individuals to behave in ways that are conducive to positive affect. For example it may be that traits such as affiliation and ambition motivate extraverts to spend more time with others or to work harder to achieve their goals compared to introverts, which in turn causes extraverts to experience greater levels of positive affect (Watson & Clark, 1997a). Some evidence for this hypothesis has been reported. For example extraversion has been found to predict positive life events (Magnus, Diener, Fujita, & Pavot, 1993), and some experience sampling studies have revealed that extraverts spend more time

in certain social situations than do introverts (Diener, Larsen, & Emmons, 1984; Emmons, Diener, & Larsen, 1986; Lucas, Le, & Dyrenforth, 2008) – although this finding has not always been replicated (Pavot, Diener, & Fujita, 1990). Additionally, there is some evidence to suggest that the relationship between extraversion and positive affect is mediated by extraverted behaviours (Wilt, Noftle, Fleeson, & Spain, 2012). Individuals' behaviours vary significantly moment to moment, including levels of extraverted behaviour. Both introverted and extraverted individuals regularly display high and low levels of extraverted behaviours over relatively short time periods (Fleeson & Gallagher, 2009), and extraverted behaviours (e.g. acting bold, assertive and talkative) are positively associated with positive affect for both introverts and extraverts alike (Fleeson, Malanos, & Achille, 2002). Measures of trait extraversion reflect the frequency with which individuals show these behaviours however, whereby extraverts enact extraverted behavior more frequently than do introverts. As a consequence therefore, extraverts spend more time behaving in ways that produce positive affect, which in turn produces differences in tonic levels of positive affect between introverts and extraverts (Fleeson & Gallagher, 2009; Fleeson et al., 2002).

Temperamental explanations hold that personality traits have a direct effect on affect, such that there is some intrinsic difference between extraverts and introverts that lead the former to experience more happiness than the latter. One general temperamental explanation is the affect-threshold model, according to which extraverts require less pleasant stimulation to experience positive affect than do introverts. There are at least two forms of affect-threshold explanations: the affect-level model (Gross, Sutton, & Ketelaar, 1998) and the affect-reactivity model

(Zelenski & Larsen, 1999b). According to the affect-level model, extraverts experience higher levels of tonic positive affect at baseline, and therefore predicts that extraverts will experience more positive affect in negative, neutral and positive situations compared with introverts (Wilt & Revelle, 2009). Evidence for this model has been mixed to date. Whilst some researchers have found a relationship between extraversion and baseline positive affect during experiments (Smillie et al., 2012) other researchers have not (Gross et al., 1998). Additionally, in an experiencing sampling study, Johnson, Miller, Lynam and South (2012) report that extraversion is not related to averaged momentary positive affect recorded at random points over a one week period.

A central feature of the affect-reactivity model on the other hand is that extraverts and introverts experience similar levels of tonic positive affect, but that extraverts respond to rewarding situations with greater levels of positive affect than introverts (Wilt & Revelle, 2009). This model draws from Reinforcement Sensitivity Theory (RST; Corr, 2008) - a neuropsychological model of personality in which a discrete number of behavioural systems underlie major personality dimensions. In this model, extraversion is considered to reflect individual differences in the sensitivity of the Behavioural Activation System (BAS), a neuropsychological system that – in the most recent incarnation of RST – mediates responses to both conditioned and unconditioned stimuli (Corr, 2008). Depue (2006) and colleagues (Depue & Collins, 1999; Depue & Morrone-Strupinsky, 2005) have similarly proposed that personality traits – including extraversion - reflect emotional-motivational systems that are sensitive to forms of stimuli associated with positive and negative reinforcement. Therefore, the central tenant of the affective-reactivity

hypothesis is that extraverts experience greater levels of positive affect following rewarding situations than do introverts, on account of extraverts' greater sensitivity to rewards (Smillie et al., 2012).

The affective-reactivity hypothesis has most commonly been tested by collecting individuals' reports of positive affect before and after a positive emotion induction. A summary of previous experimental investigations into affective reactivity in extraversion is provided in Table 1.

Table 1

Previous investigations of the affective-reactivity hypothesis

			Baseline		Appetitive		Non-appetitive			
Study	N	Extraversion measure	PA	Pleasure	PA	Pleasure	PA	Pleasure	Mood induction	Sample affect items
Smillie et al (2012)										
S1	129	10 item IPIP & EPQ-R	IPIP: r = .29, p < .001 EPQ-R: r = .10, *ns*				β = .06, *ns* β = .11, *ns*		Guided imagery with accompanying music, e.g. meeting a friend for coffee	interested, enthusiastic, alert, active
S2	252	EPI	r = .20, p = .001				β = .16, *ns*		Film clip of a children's birthday party	delighted, happy, pleased, satisfied
S3	97	EPQ-R	r = .27, p < .001		β = .27, p = .003				Gain-approach go/no go task	interested, enthusiastic, alert, active
S4	107	EPQ-R	r = .10, *ns*	r = .23, p = .02	β = .34, p = .006	β = .04, *ns*	β = .16, *ns*	β = -.11, *ns*	Guided imagery with accompanying music, e.g. winning the lottery vs. lying on a tropical beach	alert, vigorous vs cheerful, happy

Study	N	Extraversion measure	Baseline		Appetitive		Non-appetitive		Mood induction	Sample affect items
			PA	Pleasure	PA	Pleasure	PA	Pleasure		
S5	104	EPQ-R	r = .04, *ns*	r = .08, *ns*	β = .38, p = .02	β < ± .07, *ns*	β = .03, *ns*	β < ± .07, *ns*	Film clips: James Bond chase scene vs children's birthday party	alert, vigorous vs cheerful, happy
Lucas & Baird (2004)										
S1	143	10 item IPIP			r = .17, *ns*	r = .06, *ns*			Velten procedure followed by two imagery vignettes (winning lottery and going on holiday)	Pleasant, positive, good vs awake, alert, wakeful
S2	113	10 item IPIP					r = -.03 *ns*	r = .08 *ns*	Comedy film	Pleasant, positive, good vs awake, alert, wakeful
S3	98	10 item IPIP					r = .25 *ns*	r = .21 *ns*	Comedy film	Pleasant, positive, good vs awake, alert, wakeful
S4	109	24 item IPIP					r = -.14 *ns*	r = -.06 *ns*	Comedy film	Pleasant, positive, good vs awake, alert, wakeful
S5	144	10 item IPIP							Comedy film	Pleasant, happy vs excited, energetic
S6	144	60 item IPIP	r = .13, *ns*	r = .29, p < .01			r = .23, p < .01	r = .24, p < .01	Comedy film	Pleasant, positive, good vs awake, alert, wakeful

Study	N	Extraversion measure	Baseline		Appetitive		Non-appetitive		Mood induction	Sample affect items
			PA	Pleasure	PA	Pleasure	PA	Pleasure		
Gross et al., (1998)	156	EPI	r = .15, *ns*				r = .28, p < .01		Comedy film	Elated, enthusiastic, euphoric, excited
Rusting & Larsen (1998)	150	EPQ					β = .25, p < .01		Imagery vignettes (winning lottery and going on holiday)	interested, enthusiastic, alert, active
Larsen & Ketelaar (1991)	359	EPQ					r = .32, p < .01		Imagery vignettes (winning lottery and going on holiday)	Enthusiastic, peppy, excited, elated
Ng & Diener (2009)	236	20 Item IPIP						r = .19, p < .05	Positive feedback on anagram task performance	Contentment, enthusiasm, happiness, pleasure, pride
Gomez et al., (2000)	98	EPI	N/A		β = .27, p < .01				Gain-approach go/no go task	interested, enthusiastic, alert, active
Smillie et al (2013) S1	131	BFAS Assertiveness (BFAS-A) BFAS Enthusiasm (BFAS-E)	BFAS-A: r = .31, p < .001 BFAS-E r = .N/A, *ns*	BFAS-A: r = .24, p = .007 BFAS-E r = .26, p = .002	BFAS-A: β = .33, p = .006 BFAS-E: β = .36, p = .001	BFAS-A: β = .02, *ns* BFAS-E: β = .19, p = .11	BFAS-A: β = .21, p = .11 BFAS-E: β = .14, p = .27	BFAS-A: β = .08, *ns* BFAS-E: β = .17, p = .12	Film clips: James Bond chase scene vs children's birthday party	alert, vigorous vs pleased, happy

Study	N	Extraversion measure	Baseline		Appetitive		Non-appetitive		Mood induction	Sample affect items
			PA	Pleasure	PA	Pleasure	PA	Pleasure		
S2	97	BFAS Assertiveness (BFAS-A) BFAS Enthusiasm (BFAS-E)	BFAS-A: r = .26, p = .011 BFAS-E r = .48, p < .001	BFAS-A: r = .08, p = .43 BFAS-E r = .43, p < .001			BFAS-A: β < .10 *ns* BFAS-E: β < .10, *ns*		Imagery vignettes (e.g. meeting a friend, relaxing on a beach) with accompanying music	Enthusiastic, attentive, elated vs happy, secure, content
Stafford et al (2010)	86	EPQ-BV	Effect of extraversion but no effect size reported				Effect of extraversion but no effect size reported		Music	interested, enthusiastic, alert, active
Zelenski et al (2012)										
S1	117	Goldberg's Mini Markers					*B* N/A, *ns*		Acting in an extraverted manner	Interested, active, strong
S2	127	Goldberg's Mini Markers					n^2 = .007, *ns*		Acting in an extraverted manner	Interested, active, strong
McNeil & Fleeson (2006)	45	Self-ratings on *talkative, assertive, energetic* and *silent*					*b* =.21, *ns*		Acting in an extraverted manner	Interested, strong, alert, active
McNeil et al (2010)	96						*ns*	*ns*	Acting in an extraverted manner	Happy, content, pleased, satisfied vs excited, peppy, elated, enthusiastic
Fleeson et al (2002)	47						*ns*		Acting in an extraverted manner	interested, enthusiastic, alert, active

Study	N	Extraversion measure	Baseline		Appetitive		Non-appetitive		Mood induction	Sample affect items
			PA	Pleasure	PA	Pleasure	PA	Pleasure		
Zelenski et al (2013)										
S1	113	Goldberg's Mini Markers					ΔR^2 = .03, *ns*	ΔR^2 = .02, *ns*	Acting in an extraverted manner	Excited, interested, strong vs happy, pleased
S2	127	Goldberg's Mini Markers					n^2 = .01, *ns*	n^2 = .01, *ns*	Acting in an extraverted manner	Excited, interested, strong vs happy, pleased
S3	96	Goldberg's Mini Markers					n^2 = .04, *ns*	n^2 = .03, *ns*	Acting in an extraverted manner	Excited, interested, strong vs happy, pleased
S4	159	Goldberg's Mini Markers					ΔR^2 = .01, *ns*	ΔR^2 = .01, *ns*	Acting in an extraverted manner	Excited, interested, strong vs happy, pleased
Carver & White (1994)	90	EPQ Short Form		*r* = .29, *p* < .01		*r* = .16, *ns*			False positive feedback on pattern recognition test and receipt of credits	Happiness

A range of experimental methods has been employed by researchers to induce positive affect in emotional reactivity experiments. These can be roughly be categorised as involving perception, imagination or action (Bradley & Lang, 2007). Perceptual methods typically involve exposing participants to pleasant stimuli such as pictures of puppies (Zelenski & Larsen, 1999b), videos of standup comedians (Gross et al., 1998) or music (Stafford, Ng, Moore, & Bard, 2010). The results of such experiments have been mixed, with some studies finding support for the affective reactivity model (Gross et al., 1998; Lucas & Baird, 2004; Smillie et al., 2012; Smillie, Geaney, Wilt, Cooper, & Revelle, 2013; Zelenski & Larsen, 1999a) and others not (Lucas & Baird, 2004; Smillie et al., 2012).

In imagery tasks, participants are asked to imagine themselves in positive scenarios. For example Larsen and Ketelaar (1991) and Rusting and Larsen (1997) found that extraverts report greater levels of positive affect after imagining themselves lying on the beach and winning the lottery than do introverts. Other researchers have combined guided imagery with other emotion induction methods such as listening to music (Smillie et al., 2012) or completing a Velten mood induction (Lucas & Baird, 2004). The results of these studies have also been mixed, with researchers reporting evidence to support (Smillie et al., 2012) and dispute (Lucas & Baird, 2004) the affective reactivity hypothesis.

Finally, researchers have tested affective reactivity by asking participants to participate in tasks designed to induce positive affect. For example Gomez, Cooper and Gomez (2000) and Smillie et al., (2012) both describe how extraverts report greater positive affect after participating in a go/ no-go task with monetary rewards than do introverts. Extraverts have also been found to report greater positive affect

following positive feedback on their performance on intelligence and anagram solving tasks (Carver & White, 1994; R. J. Larsen & Ketelaar, 1989; Nq & Diener, 2009). Other researchers have examined whether extraversion moderates the relationship between social behaviour and positive affect. Several researchers have examined this issue by experimentally manipulating social behaviours in group discussion tasks by randomly assigning participants to either behave in an extraverted (e.g. *bold, talkative, energetic, active, assertive,* and *adventurous*) or introverted manner (e.g. *reserved, quiet, lethargic, passive, compliant,* and *unadventurous*). Such extraverted behaviour causes increases in positive affect, though this is not moderated by trait extraversion (Fleeson et al., 2002; McNeil & Fleeson, 2006; McNeil, Lowman, & Fleeson, 2010; Zelenski, Santoro, & Whelan, 2012).

The above review of the literature indicates that while there is some evidence to support the affective-reactivity model, the data are inconsistent. Lucas and Baird (2004) arrived at a similar conclusion following a meta-analysis of both published and unpublished affective reactivity studies. These researchers found that the average correlations between extraversion and neutral, moderately pleasant and pleasant experimental condition were .15, .14 and .23 respectively. While the size of the correlation between extraversion and positive affect is greater in the positive than the neutral condition, the size of this difference is small. Lucas and Baird also found evidence of a file-drawer effect, whereby significant results in support of the affective-reactivity hypothesis were more likely to be published than non-significant results that do not; within the non-published data the correlations between

extraversion and positive affect did not differ between the neutral and positive conditions.

In response to the mixed results reported to date, Smillie et al (2012) have proposed a revision to the affective reactivity hypothesis. In this revised model, it is predicted that extraverts will only show greater positive affective reactivity to appetitive scenarios, i.e. "during actual or simulated pursuit of reward or desirable goals" (p. 307), but not to simply pleasant scenarios that don't involve goal pursuit. Also, under this revision, extraverts are also only expected to show greater reactivity on high-activation measures of positive affect – such as the Positive Activation scale of the PANAS (Watson et al., 1988) – and not on low activation measures of pleasure.

These revisions are based on recent neurobehavioural data on the nature of reward and the RST literature. Reward is not a unitary construct and can be parsed into at least two processes of anticipation and consummation (Berridge & Robinson, 2003). The anticipatory phase is regulated by a mesolimbic dopaminergic behavioural system that is sensitive to distal appetitive stimuli, and guides behaviour toward these (Alcaro, Huber, & Panksepp, 2007; Depue & Collins, 1999). This behavioural system may also become active before appetitive stimuli have been detected or cognitively represented by the organism, whereupon it encourages general exploratory and foraging behaviour (Alcaro & Panksepp, 2011). This system has variously been labelled the SEEKING system (Alcaro & Panksepp, 2011) and, in RST, the behavioural activation system (Corr, 2008). The particular affective experience associated with this phase is a blend of affective (elation, euphoria) and motivational (wanting, potency) feelings (Depue & Collins, 1999; Depue &

Morrone-Strupinsky, 2005), as characterised by the positive activation axis of the affective circumplex (Knutson & Greer, 2008; Watson et al., 1999). This high activation state of pre-goal attainment positive affect is distinct from the lower activation feelings of pleasure that accompany the attainment of goals (Smillie, 2013).

The consummatory phase of goal acquisition is engaged when organisms come into close proximity with appetitive stimuli, and is regulated largely by endogenous opioids and a distributed network of subcortical regions (Barbado & Cador, 2007). While the anticipation of reward is associated with changes in both affective arousal and valence, the consummation of reward is associated more with changes in valence than arousal (Knutson & Greer, 2008).

There is good neurobehavioural evidence in support of a two-phase model of reward and positive affect. For example, Depue and Collins (1999) review evidence to suggests that anticipatory approach behaviour, and positive incentive motivation, is regulated by the ventral tegmental area dopamine (DA) projective system. For example, DA agonists and antagonists in the ventral tegmental area or nucleus accumbens of rats and monkeys either facilitate or impair, respectively, a range of approach behaviours (Depue & Collins, 1999). These deficits appear to be limited to incentive motivation and the anticipatory phase of reward, as consummatory behaviours are retained under DA antagonists (Ikemoto & Panksepp, 1996). Pecina, Cagniard, Berridge, Altridge and Zhuang (2003) have also demonstrated how genetically engineered hyperdopaminergic mice show stronger approach behaviours than do control mice. Specifically, these researchers found that hyperdopaminergic mice were quicker to move from a starting box to a reward (cereal), made fewer

pauses on route and retraced their steps less often than did controls. Hyperdopaminergic mutant mice also ate 21% more chow pellets and drank 15% more water than controls during the 4-week study period. Pecina et al. (2003) further compared hyperdopaminergic and control mice's affective responses to sweet sucrose solutions; positive affective reactions included tongue protrusions and paw licking while negative affective reactions included head shakes and forearm flails. On these measures, there was no evidence that sweet rewards had any greater hedonic impact on hyperdopaminergic mice than controls; while hyperdopaminergic mice show greater "wanting" for reward, they do not appear to "like" sweet rewards more than wild-type mice.

The reverse dissociation has also been demonstrated behaviorally in animals and humans, whereby greater "liking" occurs in the absence of greater "wanting". This has most clearly been demonstrated in studies of eating behaviour (Barbano & Cador, 2007). Yeomans and Gray (2002) for example, describe how opioid antagonists (e.g. naltrexone) reduce food intake in humans, which may be because they reduce the pleasantness of food. Yeoman and Gray's review of the literature offers a number of important points in favour of this hypothesis. First, opioid antagonists do not impact on self-rated hunger prior to eating, which suggests that these drugs do not act on the motivation to eat. Second, reduced food intake does not appear to be a by-product of opioid antagonist induced nausea. Third, opioid antagonists do reduce the rated pleasantness of sucrose solutions, sweetened milk and actual food, relative to placebo. These findings cannot be explained by sensory deficits, as opioid antagonists have no effect on individuals' ratings of the sweetness or bitterness of sucrose or quinine solutions.

Evidence from imaging studies in humans also suggests that the anticipation and consumption of rewards are also processed in separate brain regions. For example in monetary incentive tasks, the anticipation of reward has been found to be associated with nucleus accumbens, anterior insula and ventral striatum activity, while the receipt of monetary rewards is associated with activation of the mesial prefrontal cortex (Knutson, Fong, Bennett, Adams, & Hommer, 2003; Knutson & Greer, 2008; Wu, Samanez-Larkin, Katovich, & Knutson, 2014).

Some evidence also suggests that the distinction between anticipatory and consummatory reward phases may also hold at the level of subjective affective experience in humans. For example, Gard, Kring, Gard, Horan and Green (2007) asked participants with and without schizophrenia or schizoaffective disorder to record their daily activities, activities that they were looking forward to and the enjoyment that they derived, or expected to derive, from each. These authors report that individuals with schizophrenia or schizoaffective disorder did not differ from controls in their rated pleasure during current activities, or from their anticipated pleasure from future non-goal directed activities. On the other hand, participants with schizophrenia or schizoaffective disorder did report lower anticipated enjoyment of future goal-directed activities. A similar two-phase model of affective experience has also recently been shown to apply to anhedonia in depression (Sherdell, Waugh, & Gotlib, 2012).

In sum, it appears as though reward can be parsed into two constituent anticipatory and consummatory processes, of which only the former is regulated by the BAS. If extraversion reflects variation in BAS sensitivity, then it follows that extraverts will only show greater affective-reactivity to appetitive scenarios that

involve the anticipation of reward or active goal pursuit. Moreover, these patterns of affective reactivity should be limited to the high-activation positive affects that accompany the anticipatory phase of reward and should not apply to lower activation states of pleasure, which accompany the consumption of reward (Smillie et al., 2012). The nature and content of emotion induction procedures, and the affect measures employed by researchers may therefore account for the inconsistent findings in the affective reactivity literature to date.

Smillie et al., (2012) and Smillie et al., (2013) tested the revised affective-reactivity hypothesis in a number of experiments, using both appetitive and pleasant emotion induction methods and measures of both positive-activation and pleasure. The results clearly supported the revised hypothesis: extraversion was consistently associated with greater positive affective-reactivity, but only in response to appetitive emotion inductions and on measures of positive activation; extraversion did not predict pleasant affect in response to either appetitive or pleasant scenarios. Lucas and Baird (2004) also provide some evidence for the revised model: across six experiments extraverts showed greater affective-reactivity in three, and only on measures of high-activation positive affect. Additionally, in their meta-analysis of the previous literature, these authors found that the evidence for the affective-reactivity hypothesis is greater in those studies where researchers employed measures of positive activation. On the other hand, these findings are not entirely consistent with Smillie et al.'s revisions: two of the studies where Lucas and Baird found evidence for extraverts' greater affective reactivity used pleasant emotion induction methods with no clear appetitive content (e.g. comedy films and cartoons).

These data are consistent with the view that extraversion reflects individual differences in the sensitivity of the anticipatory phase of reward. To test the revised ARH fully however, it would be necessary to test the effect of extraversion on individuals' responses to a task that reliably dissects the anticipatory and consummatory phases of reward. The Monetary Incentive Delay task is one such paradigm. In each trial of this task participants are presented with a cue stimulus that indicates whether they stand to win (gain condition) or lose (loss condition) a variable sum of money. Following the cue, there is a pause before a target stimulus appears for a fixed period of time. Participants are asked to respond to the target with a button press before the stimulus disappears. If participants respond to the target in time, they either win (gain condition) or retain (loss condition) the amount of money shown at the cue. If participants do not respond to the target on time then they lose (loss condition) or do not win (gain condition) shown during the cue. Following participants' responses to the cue a final stimulus is presented informing participants of the trial outcome (win or loss). A major advantage of this task is that the anticipation (the period between the presentation of the cue and target) and consumption (presentation of the outcome) processes of reward are temporally separated (Knutson & Greer, 2008).

Wu et al., (2014) collected functional magnetic resonance images (fMRI) as participants completed the MID task, and found that Positive Arousal (a factor analytically derived composite of NEO-FFI Extraversion, high arousal positive affect from the Affect Valuation Index and Carver and White's BAS scales) was positively associated with left NAcc activation during the anticipation phase of trials where participants stood to win relatively large sums of money ($5). Positive Arousal was

not associated with NAcc activation during relatively small gain ($0.05) or loss conditions. While these data support Smillie et al.'s (Smillie et al., 2012; Smillie et al., 2013) revised ARH hypothesis, although they are limited in that Wu et al., did not investigate the relationship between Positive Arousal and activation of brain regions association with reward consumption (e.g. mesial prefrontal cortex (Knutson et al., 2003; Knutson & Greer, 2008)) in the goal acquisition phase of the MID. According to the revised ARH, extraversion should not moderate activation of these regions during goal acquisition.

1.5 Further revisions to the affective reactivity hypothesis: distinguishing between agentic and affiliative extraversion

Extraversion is comprised of two major components of agency and affiliation (Depue & Collins, 1999; Depue & Morrone-Strupinsky, 2005): Agency reflects social dominance, assertiveness, exhibitionism, ambitiousness and an enjoyment of leadership roles and hard work. Affiliation on the other hand reflects being warm and affectionate, valuing close interpersonal relationships, sociability and a tendency to turn to others for help (Morrone et al., 2000; Tellegen & Waller, 2008). The low poles of agency and affiliation reflect submissiveness and social indifference, respectively (Tellegen & Waller, 2008).

Separable dimensions of agency and affiliation are clearly identifiable in several measures of extraversion (Depue & Collins, 1999; Watson & Clark, 1997a). For example, agency and affiliation are recognisable as Assertiveness and Warmth in the NEO-PI-R (Costa & McCrae, 1995); Social Boldness and Sociability in the

HEXACO Personality Inventory (Lee & Ashton, 2004) and Assertiveness and Enthusiasm in the Big Five Aspects Scales (DeYoung et al., 2007).

The distinction between the agentic and affiliative components is also clearly represented in the Multidimensional Personality Questionnaire (MPQ), which consists of 11 factor-analytically derived scales measuring specific traits, e.g. Well-Being, Social Closeness, Social Potency and Achievement. While the MPQ was not originally intended to measure any higher order dimensions of personality, these primary scales nevertheless load onto a smaller number of factors (Patrick, Curtin, & Tellegen, 2002; Tellegen & Waller, 2008). Most commonly reported is the three factor model, consisting of Positive Emotionality (PEM), Negative Emotionality (NEM) and Constraint (CON; (Donnellan, Hopwood, & Wright, in press; Krueger, 2000; Patrick et al., 2002; Tellegen & Waller, 2008). PEM can readily be identified as a measure of extraversion, and consists of four lower order traits: Positive Emotionality (reflecting positive affectivity, optimism and enjoying life), Social Closeness (reflect warmth, affection and sociability), Social Potency (reflecting persuasiveness, assertiveness and exhibitionism) and Achievement (reflecting persistence, striving and ambition). As with extraversion, PEM is conceptually related to an underlying motivational system that mediates approach behaviour and positive affect (Patrick et al., 2002); empirically, PEM and NEO-PI extraversion correlate at $r = .60$ (A.T. Church, 1994).

In an alternative model of the MPQ, PEM splits into two separate factors of Agentic Positive Emotionality (PEM-A) and Communal Positive Emotionality (PEM-C) (Tellegen & Waller, 2008). PEM-A is defined by high loadings of Social Potency and Achievement while PEM-C is defined by a high loading of Social

Closeness. Wellbeing loads strongly onto PEM-A and PEM-C, suggesting that positive affect is a component of both. Church and Burke (1994) have also reported the superiority of a four factor MPQ structure over a three factor one – although these researchers also found that Wellbeing did not load onto PEM-A and that Social Potency loaded onto both PEM-A and PEM-C.

Furthermore, Watson and Clark (1997a) have demonstrated that the Social Potency, Social Closeness and Achievement scales correlate more strongly with the MPQ Wellbeing measure of positive affectivity (*r*s range between .22 to .37, mean = .32) than they do with one another (*r*s range between .00 and .31, mean = .16). In a separate sample, these researchers further showed that the correlations between the Social Potency, Social Closeness and Achievement scales become low and non-significant when trait PANAS Positive Activation scores are partialled out. It therefore appears that agentic and affiliative extraversion are independent phenotypes that correlate because of a shared association with trait positive affect.

A bipartite model of extraversion is also clearly evident from DeYoung, Quilty and Peterson's (2007) investigations of the hierarchical structure of personality traits. These researchers conducted factor analyses of the facet scales from the NEO-PI-R and AB5C-IPIP, finding that the facet measures for each of the Big Five bifurcate into two separable factors. These results are consistent with studies showing that two genetic factors are needed to account for the covariation among NEO-PI-R trait facets (Jang, Livesley, Angleitner, Riemann, & Vernon, 2002). In extraversion these factors were labeled Assertiveness (which reflects agency, leadership and social dominance) and Enthusiasm (which reflects sociability, friendliness, and frequent positive emotions). These factors are similar to agentic and

affiliative extraversion and the Assertiveness and Enthusiasm scales of the Big Five Aspect Scales (BFAS; (DeYoung et al., 2007) are highly correlated with the MPQ Social Potency (r = .75) and Social Closeness (r = .64) scales, respectively (DeYoung, Weisberg, Quilty, & Peterson, 2013).

Subsequent factor analyses of multiple measures of extraversion and BAS sensitivity– including the NEO-PI-R, Zuckerman-Kuhlman Personality Questionnaire, MPQ and Carver and White's BIS/BAS scales – have also identified separable dimensions of agency and affiliation (Quilty, DeYoung, Oakman, & Bagby, 2014; Wacker, Mueller, Hennig, & Stemmler, 2012b).

Genetics studies further provide evidence of the separability of the agentic and affiliative components of extraversion. For example, while there is a moderate genetic contribution to variance in Social Closeness, Social Potency and Achievement scores, only Social Closeness appears to be influenced by a shared familial environment (Tellegen et al., 1988). Moreover, these lower-order traits show divergent genetic relationships at a molecular level. Wacker, Mueller, Hennig and Stemmler (2012a) derived factor scores of agency and affiliation from a factor analysis of several extraversion facet measures and found that only agentic extraversion was associated with the Val158Met polymorphism in the catechol-O-methyltransferase (COMT) gene.

In sum therefore, a sizable body of evidence supports the view that extraversion is comprised of two separable factors of agency and affiliation.

1.6 Affective reactivity in agentic and affiliative extraversion

Depue (2006) and colleagues (Depue & Collins, 1999; Depue & Morrone-Strupinsky, 2005) have argued that agentic and affiliative extraversion represent two emotional-motivational systems that guide goal directed behaviour toward particular classes of stimuli. Specifically, agentic extraversion is considered to reflect the sensitivity of a motivational approach system that regulates approach behaviour and positive incentive motivation. Affiliative extraversion on the other hand is considered to reflect the sensitivity of a motivational system that regulates affiliative behaviour. Agentic and affiliative extraversion are further associated with states of positive-activation and warmth-affection, respectively (Morrone-Strupinsky & Depue, 2004; Morrone et al., 2000).

Several studies have provided support for the proposal that agentic extraversion is associated with positive activation. For example, Morrone et al. (2000) found that MPQ Social Potency and Achievement scores were positively associated with reports of positive activation following an appetitive film clip (*r*s = .27 and .30, respectively). Subsequent researchers have also demonstrated a positive relationship between agentic extraversion and reports of positive activation in response to appetitive film clips (Morrone-Strupinsky & Depue, 2004; Smillie et al., 2012) and images of food and sexual stimuli (Morrone-Strupinsky & Lane, 2007). In three of the samples that demonstrate this relationship, affiliative extraversion (MPQ Social Closeness) was not associated with positive activation however (Morrone-Strupinsky & Depue, 2004; Morrone-Strupinsky & Lane, 2007; Morrone et al., 2000).

Smillie and colleagues (2013) have also reported that agentic extraversion (BFAS Assertiveness) is positively associated with positive activation – but not

pleasure - following an appetitive mood induction. Additionally, agentic extraversion was associated with neither positive activation nor pleasure following a merely pleasant mood induction. On the other hand, these researchers did find that affiliative extraversion (BFAS Enthusiasm) also predicted positive activation following an appetitive emotion induction.

There is also some evidence that affiliative extraversion is associated with affective-reactivity on measures of warmth-affection. In two separate female samples, MPQ Social Closeness has been found to be positively associated with self-reported warmth-affection in response to film clips showing affiliative family interactions (Depue & Morrone-Strupinsky, 2005; Morrone-Strupinsky & Depue, 2004). Crucially, these researchers did not find any relationship between warmth-affection and either MPQ Social Potency or Achievement.

On the other hand, the relationship between Social Closeness and warmth-affection was not replicated when picture stimuli were used, in a mixed sample of males and females. (Morrone-Strupinsky & Lane, 2007). The discrepancy in these results may be due to the use of pictures rather than film clips, or it may be attributable to the mixed sex sample. The relationship between MPQ Social Closeness and warmth-affection reactivity has yet to be demonstrated in males.

1.7 Summary and aims of the current research

Researchers have consistently demonstrated that there exists a positive relationship between extraversion and positive affect. One explanation for this relationship is the affective reactivity hypothesis. According to this view, extraverts are more sensitive to rewards than are introverts, and as a result, extraverts

experience more positive affect following rewarding situations than do introverts. Evidence for the affective reactivity hypothesis in extraversion has been mixed to date. In response to these inconsistent findings, Smillie et al (2012) have proposed a revised version of the affective reactivity hypothesis. Under this new model, extraversion is only expected to moderate high activation positive affects elicited by appetitive scenarios. This revised hypothesis has been useful for making sense of the inconsistent findings reported in the literature, though the issue of affective reactivity is further complicated by the fact that extraversion subsumes two major components of agency and affiliation. Additionally, these components are associated with particular forms of affective reactivity: agentic extraversion is associated with positive activation following appetitive stimuli, while affiliative extraversion is associated with warmth-affection following affiliative stimuli.

Only a small number of studies have tested affective reactivity in agentic and affiliative extraversion (Depue & Morrone-Strupinsky, 2005; Morrone-Strupinsky & Depue, 2004; Morrone-Strupinsky & Lane, 2007; Morrone et al., 2000; Smillie et al., 2013). These studies are similar in that they each test individuals' self-reported affective states in response to visual stimuli (e.g. films or pictures) presented in a laboratory setting. The aim of the current research is to further test affective reactivity in agentic and affiliative extraversion with a variety of methods.

In the first study, agentic and affiliative reactivity to naturally occurring social interactions that occur outside of the laboratory are tested with an experience sampling design. This is followed up in the second study by experimentally manipulating social behaviour in group discussion tasks conducted in a laboratory setting. The third study tests agentic and affiliative reactivity with a different

emotion induction paradigm – guided visual imagery. This study also examines the role that cognitive appraisals may play in mediating the relationship between personality and affective reactivity. The fourth study employs previously-validated film clips to induce states of positive activation and warmth-affection, and adds to the previous literature by also including psychophysiological measures of emotional states.

Chapter 2

Testing agentic and affiliative affective reactivity to naturally occurring dominant and communal social interactions

2.1 Introduction

Research examining differential patterns of agentic and affiliative affective reactivity has to date been limited to laboratory-based experiments where states of positive activation or warmth-affection have been induced by asking participants to look at pictures (Morrone-Strupinsky & Lane, 2007) watch film clips (Morrone-Strupinsky & Depue, 2004; Morrone et al., 2000) or complete mental imagery tasks (Smillie et al., 2013). It is not clear whether similar patterns of affective reactivity are also observable in naturally occurring emotional experiences that occur outside of controlled laboratory conditions. This is an important issue, as data derived from experience sampling studies conducted outside of the laboratory have produced mixed results for the affective-reactivity hypothesis in extraversion (Coté & Moskowitz, 1998; Fleeson et al., 2002; Lucas et al., 2008).

In order to test affective reactivity outside of the laboratory, it is first necessary to identify naturally occurring events that are likely to elicit states of positive affect. Social interaction is generally associated with positive affect; naturalistic experience sampling studies show a positive relationship between positive affect and recent social activities (Watson, 2000; Watson, Clark, McIntyre, & Hamaker, 1992), whilst controlled laboratory-based studies have shown that social interaction increases positive affect (Vittengl & Holt, 2000).

Affective-reactivity to social interactions in extraversion

If the affective-reactivity hypothesis is correct, then it would follow that the positive affective consequences of social interaction would be moderated by extraversion; extraverts would be predicted to report greater levels of positive affect following social interactions than introverts. Several investigators have tested this prediction, and the results to date have been mixed. In experience sampling research, where participants report their affective states in relation to naturally occurring social interactions, some researchers have found support for the affective-reactivity hypothesis. For example, Emmons, Diener and Larsen (1986) found that extraversion was positively associated with positive affect experienced in social situations of the individual's choosing; on the other hand, extraversion was not associated with positive affect experienced in social situations that were imposed on the individual. Lucas, Le and Dyrenforth (2008) similarly examined the relationship between positive affect and various forms of social activities, finding that extraverts reported greater levels of positive affect when spending time with friends or family. This moderation effect was small however, and extraversion was not found to moderate positive affect when people spent time with romantic partners, at parties or bars, or leading or helping others. In a further experience sampling study, Fleeson, Malanos and Achille (2002) found a positive relationship between everyday extraverted social behaviour and positive affect, but further found this to be negatively moderated by trait extraversion; introverts experienced greater levels of positive affect following

these behaviours than did extraverts. Therefore, whilst researchers have demonstrated a general positive association between positive affect and social behavior, the data from experiencing sampling studies do not conclusively show whether this relationship is moderated by trait extraversion.

While naturalistic studies have provided mixed evidence for the affective-reactivity hypothesis, experimental research has consistently found no evidence that extraversion moderates the relationship between social interactions and positive affect. Several researchers have examined this issue by experimentally manipulating social behaviours in group discussion tasks by assigning participants to either behave in an extraverted (e.g. *bold, talkative, energetic, active, assertive,* and *adventurous*) or introverted manner (e.g. *reserved, quiet, lethargic, passive, compliant,* and *unadventurous*). Behaving in such an extraverted manner causes general increases in arousal, pleasantness and, in particular, positive activation (McNeil et al., 2010), though none of these affective consequences are moderated by trait extraversion (Fleeson et al., 2002; McNeil & Fleeson, 2006; McNeil et al., 2010; Zelenski et al., 2012; Zelenski, Whelan, Nealis, Besner, & Santoro, 2013). In contrast to the modest findings from experience sampling research then, the experimental data has consistently shown no support for the affective-reactivity hypothesis; extraverted behaviour appears to cause elevated moods equally in both extraverts and introverts alike.

Agentic and communal social behaviours and specific forms of positive affect

A consideration of the nature of interpersonal behaviour may provide further resolution to the relationships between social interactions, affect and personality.

Interpersonal behaviour is underpinned by two major dimensions of agency and communion; the former represents dominance, control and power, while the latter represents friendliness, love and affiliation (Gurtman, 2009). The low poles of these dimensions are submissiveness and hostility, respectively. While agency and communion, as identified in the interpersonal literature, are conceptually similar to agentic and affiliative extraversion, they were developed independently (Tellegen & Waller, 2008).

Agency and communion are psychometrically orthogonal dimensions that intersect at 90° and define a Cartesian space where both interpersonal traits and states can be represented as a blend of each (Gurtman, 2009; Wiggins, Trapnell, & Phillips, 1988). Interpersonal behaviours are ordered around each dimension to form a circumplex, where each behaviour can be classified as differing combinations of high and low agency and communion (Moskowitz, 1994).

Agentic and communal behaviour appear to be associated with separable forms of positive affect that differ by the level of activation. Dominant behaviours have been found to be associated with high activation positive affect whether recorded in naturalistic experience sampling or an experimentally manipulated environment (McNeil et al., 2010; Timmermans, Mechelen, & Kuppens, 2010). For example, McNeil et al., (2010) found that experimentally manipulating "extraverted" behaviour produces general increases in arousal, pleasantness and in particular positive activation. This is significant because the adjectives McNeil et al. chose as markers of extraverted behaviour (*bold, spontaneous, assertive, talkative*) reflect the agentic component of extraversion (Saucier, 1992). Communal behaviours on the

other hand are associated with lower-activation states of positive affect (Timmermans et al., 2010).

Some researchers have considered whether the affective consequences of agentic and communal social behaviours are moderated by personality traits. Individuals who score highly on IAS-R Warm-Agreeableness and NEO-FFI Extraversion for example report greater levels of pleasant affect after displaying communal – but not agentic – social behaviours. On the other hand, personality traits have not been found to moderate the relationship between dominant behaviour and positive affect (Coté & Moskowitz, 1998; Moskowitz & Coté, 1995). To date, there is no research testing whether the relationship between dominant behaviour and positive activation is moderated by agentic extraversion, or whether the relationship between communal behaviour and warmth-affection is moderated by affiliative extraversion.

Aims and hypotheses

Social interactions are naturally occurring events that are associated with positive affect. In particular, agentic and communal social behaviours are associated with states of high and low activation positive affect, respectively. Examining these behaviours therefore presents an opportunity to test agentic and affiliative reactivity outside of the laboratory.

The aim of this study is to test the hypothesis that agentic and affiliative extraversion moderate individuals' experiences of positive activation and warmth-affection, respectively. Specifically, the aim is to test affective reactivity to dominant and communal social behaviours. An experience sampling design was selected as the

optimal method for doing so. The primary advantage of this design is the high ecological validity that comes with sampling naturally occurring events as they occur outside of the laboratory. This has the potential to add considerable value to the existing literature, which is presently limited to laboratory studies where individuals are presented with stimuli in order to induce states of positive activation and warmth-affection.

It is predicted that (1) dominant behaviour will be associated with positive activation and this relationship will be moderated by agentic extraversion, and (2) communal behaviour will be associated with warmth-affection and this relationship will be moderated by affiliative extraversion. Finally, while neither Morrone-Strupinsky and Depue (2004) nor Smillie et al. (2013) found a relationship between affiliative extraversion and pleasure, Moskowitz and Cote's (1995) findings regarding IAS-R warmth-agreeableness led to the third prediction that, (3) communal behaviour will be associated with pleasure and this relationship will be moderated by affiliative extraversion.

2.2. Method

Participants

Participants were recruited from the undergraduate and postgraduate communities at the University of Strathclyde as well as from the wider Glasgow community. 152 participants completed the initial personality assessment, but only 112 participants returned a social interaction questionnaire. Of the 112 individuals who completed the full study, 83 were female and the mean age was 26.96 years (S.D. = 9.12).

Materials

Personality measures

Agentic and affiliative extraversion were measured with the Multidimensional Personality Questionnaire Brief Form (MPQ-BF Patrick et al., 2002). Affiliative extraversion was measured with the MPQ-BF Social Closeness scale, which measures the extent to which individuals are warm and affectionate, value close relationships and turn to others for support (α = .81 in the present sample). Agentic extraversion was measured using the MPQ-BF Social Potency and Achievement scales. Social Potency measures the extent to which individuals are forceful and decisive, enjoy adopting leadership roles, influencing others and being the center of attention (α = .78); Achievement measures the extent to which individuals are ambitious, hardworking, persistent and perfectionistic (α = .81). These brief scales are highly correlated with the full MPQ (Patrick et al., 2002).

Moreover, the MPQ Social Potency, Achievement and Social Closeness scales show excellent convergent validity with other measures of agentic and affiliative extraversion (DeYoung et al., 2013), load onto a single higher order factor of extraversion (Tellegen & Waller, 2008), and have been employed as measures of agentic and affiliative extraversion in previous investigations of affective reactivity (Morrone-Strupinsky & Depue, 2004; Morrone et al., 2000).

Dominant and communal behaviour

Participants rated their behaviour in a social interaction by completing two scales developed by Moskowitz (1994) to measure dominant and communal interpersonal behaviours. Each scale consists of 12 items describing a particular behaviour and participants are asked to select the behaviours in which they engaged during the interaction. Examples of dominant behaviours include "I got immediately to the point" and "I asked for a volunteer"; examples of communal behaviours include "I exchanged pleasantries" and "I smiled and laughed with other(s)". Previous research has demonstrated the validity of these scales (DeYoung et al., 2013; Moskowitz, 1994; Moskowitz, Pinard, & Zuroff, 2001; Moskowitz, Suh, & Desaulniers, 1994). Responses on each scale were summed to create scores for dominance and communion. Internal consistencies of the dominant and communal behaviour scales in this sample were .63 and .71, respectively.

Affect measures

Positive activation was measured with the 10 item PANAS Positive Activation scale (e.g. excited, enthusiastic, and active; Watson et al., 1988). The validity of this scale as a measure of high activation positive affect is supported by circumplex analyses which demonstrate that PANAS positive activation scores are positioned approximately 45° to arousal and pleasure (Yik et al., 2011).

Existing affect measures were reviewed to find an appropriate multi-item measure of warmth-affection. The closest scale identified was Diener, Smith and Fujita's (1995) Love scale, which consists of for adjectives (*love, affection, caring* and *fondness*), to which we added *warm* to maximise the comparability to Morrone-Strupinsky and Depue's (2004) "*warmth-affection"* measure. Pleasure was measured with four items (*pleased, happy, satisfied* and *content*) taken from Yik, Russell and Steiger (2011).

Participants were asked to rate each adjective on a five point Likert scale to indicate how they felt. Internal reliabilities for these scales ranged from .83 to .85 in the neutral setting ratings and from .81 to .90 in the ratings made following a social interaction.

Procedure

Ethical approval for this study was obtained from the University of Strathclyde's School of Psychological Sciences and Health Ethics Committee.

There were two parts to the study. In the first part of the study, participants completed the MPQ-BF scales alongside the positive activation, warmth affection and pleasure measures to indicate how they feel "*right now, that is at the present moment."* The first part took place in the presence of a researcher, either at the participant's university or workplace. For the second part of the study, participants were supplied with a social interaction questionnaire containing the dominant and communal behaviour scales and the three affect measures. The researcher explained that participants were to complete this questionnaire within 20 minutes of a social interaction that occurred in their own time, to indicate how they behaved during that

interaction and how they felt immediately following the interaction. To ensure a wide distribution of both dominant and communal behaviour, each participant was randomly assigned to rate either a work-related interaction or an interaction with a friend or romantic partner. The participants were also given a stamped and addressed envelope, and asked to return the completed form either by post or in person. 60 forms were returned from participants rating an interaction with a friend or romantic partner and 52 forms were returned from participants rating a work related interaction. The participants were given either a £5 shopping voucher or course credit for taking part.

Missing data

Some participants did not fully complete the questionnaire measures, which led to some missing values among the data. Between 0 to 11.6% of values were missing across each variable, and Little's MCAR test revealed that these data were missing completely at random, $\chi^2(126) = 123.352$, $p = .550$. Following the advice of Tabachnik and Fidell (2007) and Howell (2007), missing values were replaced with multiple imputation, with five imputations. The results of the regression analyses conducted with the multiple imputation data were similar to those obtained when the original data with missing values were used. The original data with pairwise deletion of missing values is therefore presented to ease the interpretation and reporting of the results.

Statistical analyses

The predicted relationships between social behaviour, affect and personality traits were tested through a series of nine hierarchical multiple regressions. In the first step of each regression, two dichotomous variables representing the situation (whether the rated social interaction was with a friend/ romantic partner or work related) and the participants' gender were entered. The exact output of this step varied slightly across regressions of the same outcome variable due to missing values. In the second step, mean centered personality and behaviour scores were entered. The product of these mean-centered scores was then entered as the third step to test the proposed interactions between behaviour and personality in predicting affect (Keith, 2006). The variables entered in steps two and three were varied to test whether dominant or communal behaviour were predictive of positive activation, warmth-affection or pleasure, and if these relationships were moderated by agentic or affiliative extraversion.

Screening for outliers and influential cases.

The data were screened for outliers by calculating z-scores. Outlier scores were defined as any value with a z-score greater than 3.29 (Field, 2009). Outlier scores were then replaced with three times the standard deviation plus the mean (Field, 2009).

Several indices were used to screen for influential cases. First, cases with standard deviations greater than 2 or less than -2 were identified. Cook's distance, average leverage, Mahalanobis distance and DFBeta statistics were then produced for these cases. Cases were suspected of having an undue influence over the model if i) the Cook's distance was greater than 1, ii) the centered leverage value was three

times greater than the average leverage, iii) the Mahalonobis distance was greater than 15, or iv) the DFBeta was greater than 1.

Checking the assumptions of the model.

The data were screened for multicollinearity in a number of ways. Multicollinearity was suspected if: i) IVs correlated ≥ .90, ii) a VIF value was greater than 10, iii) mean VIF was substantially greater than 1.00, iv) a tolerance value was less than .10, v) more than one predictor's variance loads substantially onto a small eigenvalue (Field, 2009).

The Durbin-Watson test was used to check the assumption that the residuals in the model were independent. Test statistics less than 1 or greater than 3 were considered to be problematic.

To assess the assumptions of linearity and homoscedasticity, the standardised values of the dependent variable predicted by the model were plotted against the standardised residuals in a scatterplot graph. If the points appeared to be randomly and evenly spread out then it was accepted that the assumptions had been met (Field, 2009). The assumption of homoscedasticity was found to be violated in some regressions, which can occur when some variables in the regression model are skewed (Tabachnick & Fidell, 2007). Therefore, when the assumption of homoscedasticity was found to be violated, the distribution of each variable in the model was examined and those that were found to be skewed were transformed. The dependent variable was also transformed, which can also help to correct

heteroscedasticity (Tabachnick & Fidell, 2007). Some regression models did not meet the assumption of homoscedasticity after applying these transformations. In these cases, the regressions were repeated with bootstrapping, which are robust to violations of homoscedasticity (Field, 2013). The results of each analysis were comparable when the original data was used, compared to the transformed data or bootstrapped analyses. The original data is therefore presented throughout to aid the interpretation and presentation of the results.

To test the normality of residuals, both the histogram and normal probability plots were inspected visually.

2.3 Results

The data were converted to z-scores and inspected for any potential outliers. No such values were observed. Descriptive statistics and correlations between measures of personality and positive affects recorded during the initial personality assessment (neutral setting) are presented in Table 1. Social Closeness scores were significantly skewed, zSkewness = -4.04. These data were therefore subjected to a log transformation before running the correlation analyses.

Table 2

Means, Standard Deviations and Correlations Between Measures of Personality and Positive Affects Recorded in a Neutral Setting

	2.	3.	4.	5.	6.	Mean (SD)
1. Social Closeness	**.40*** **	.07	.16	.06	**.29** **	8.65 (2.88)
2. Social Potency		.12	.10	**.24***	**.26** **	6.19 (3.53)
3. Achievement			-.03	**.22***	.09	7.46 (3.28)
4. Warmth-affection				**.41*** **	**.51*** **	15.51 (4.69)
5. Positive-activation					**.56*** **	32.02 (6.09)
6. Pleasure						13.62 (2.79)

*$p < .05$, ** $p < .01$ *** $p < .001$

While Social Closeness and Social Potency were moderately inter-correlated, Achievement was not related to either. Both Social Closeness and Social Potency were modestly correlated with feelings of pleasure, and Social Potency and Achievement were further associated with feelings of positive activation.

Descriptive statistics and correlations between measures of personality, social behaviour and positive affects following a social interaction are presented in Table 3. Pleasure scores were significantly skewed (zSkewness = - 4.30) and were therefore submitted to a log transformation before these analyses were run.

Table 3

Means, Standard Deviations and Correlations Between Measures of Personality, Social Behaviour and Positive Affect Reported Following a Social Interaction

	2.	3.	4.	5.	6.	7.	8.	Mean (SD)
1. Social Closeness	**.40***	.07	-.04	.13	**.26****	.12	.08	8.65 (2.88)
2. Social Potency		.12	**.21***	-.11	.12	.08	-.05	6.19 (3.53)
3. Achievement			.10	-.09	.06	.13	.08	7.46 (3.28)
4. Dominant Behaviour				.07	-.13	.09	-.11	5.62 (2.15)
5. Communal Behaviour					**.41*****	**.26****	**.39*****	6.72 (2.73)
6. Warmth-Affection						**.34*****	**.69*****	14.64 (5.56)
7. Positive Activation							**.53*****	30.58 (6.66)
8. Pleasure								14.19 (3.56)

*$p < .05$, ** $p < .01$ *** $p < .001$

Social Closeness was positively associated with feelings of warmth-affection following a social interaction, although there were no other personality-affect correlations. As predicted, communal behaviour was associated with warmth-affection although dominant behaviour was not significantly correlated with any positive affect.

Affiliative extraversion and affective reactivity to communal social behaviour

The first hierarchical multiple regression tested the hypothesis that communal behaviour would predict warmth-affection and that this relationship would be moderated by Social Closeness. The model is shown below in Table 4.

Table 4

Predicting Warmth-affection, Pleasure and Positive Activation Following a Social Interaction From Affiliative Extraversion and Communal Behaviour

	Warmth-affection			Pleasure			Positive Activation[1]		
	ΔR^2	β	t	ΔR^2	β	t	ΔR^2	β	t
Step 1:	.34***			.14**			.11*		
Condition		.55	6.37***		.22	2.21*		-.21	-2.10*
Sex		.14	1.65		-.03	-0.34		-.17	-1.72
Age		-.10	-1.12		-.25	-2.57*		-.25	-2.46*
Step 2:	.16***			.15***			.07*		
Condition		.51	6.74***		.20	2.17*		-.23	-2.35*
Sex		.15	2.09*		-.02	-.17		-.16	-1.68
Age		-.03	-0.40		-.19	-2.10*		-.21	-2.09*
Social Closeness		.19	2.46*		.07	0.80		.12	1.25
Communal behaviour		.34	4.50***		.37	4.12***		.21	2.12*
Step 3:	.00			.01			.01		
Condition		.51	6.60***		.21	2.31*		-.22	-2.20*
Sex		.16	2.07*		-.03	-0.32		-.17	-1.78
Age		-.03	-0.40		-.19	-2.06*		-.21	-2.06*
Social Closeness		.19	2.40*		.05	0.52		.10	1.02
Communal Behaviour		.34	4.38***		.35	3.79***		.19	1.82
Social Closeness X Communal Behaviour		.01	0.11		-.11	-1.11		-.09	-.82

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

The first step of the hierarchical multiple regression accounted for a significant proportion of variance in warmth-affection: $R^2 = .34$, F (3, 97) = 16.37, $p < 0.001$. The situation contributed significantly to prediction ($\beta = 0.55$, $p < 0.001$) - whereby participants reported greater levels of warmth-affection following an interaction with a friend or romantic partner than with a work colleague - but neither participants' gender nor age did. There was a significant change in prediction when centered scores for Social Closeness and communal behaviour scores were entered at Step 2 ($\Delta R^2 = .16$, $p < 0.001$), whereby the situation ($\beta = .51$, $p < 0.001$), participants'

[1] There was some indication of heteroscedasticity in this data, which could not be corrected through transformations. Repeating the analysis with bootstrapping produced slightly different results, where communal behaviour did not significantly predict positive activation in Step 2, $B = .53$, $p = .06$.

sex (whereby women reported greater levels of warmth-affection than did men; β = 0.15, p = .04), Social Closeness (β = .19, p = .016) and communal behaviour (β = .34, p < 0.001) were all significant predictors. In the final step, the interaction between social closeness and communal behaviour did not contribute significantly to prediction ΔR^2 = .00, p = .91.

To test the generality of these relationships, the above regression was repeated to assess whether Social Closeness and communal behaviour similarly predict feelings of pleasure following a social interaction. The output of this model is shown in Table 4. One potentially influential case was identified, although as this did not influence the results it was retained in the analyses.

The first step of the model accounted for a significant portion of variance in pleasure, R^2 =.14, F (3, 97) = 5.05, p = .003, whereby the situation (whereby pleasure scores were greater following an interaction with a friend or romantic partner than a work colleague; β =.22, p =.03) and participants' age (β = -.25, p =.012) contributed significantly to prediction, but participants' gender did not. Adding the Social Closeness and communal behaviour scores in Step 2 significantly increased prediction (ΔR^2 =.15, p < .001), whereby communal behaviour significantly contributed to prediction (β =.37, p < .001) but Social Closeness did not. There was no significant increase in prediction when the interaction between Social Closeness and communal behaviour was added in Step 3 (ΔR^2 =.01, p = .268).

The regression was also repeated to test whether there are any relationships between Social Closeness, communal behaviour and positive activation. The results of this analysis are also shown in Table 4. Post analysis screening revealed one

potentially influential case, although this did not affect the results and was therefore included in the analyses.

The first step of the model accounted for a significant portion of variance, R^2 = .11, F (3, 96) = 3.67, p = .015, whereby the situation (β = -.21, p = .038) and participants' age (β = -.25, p = .016) contributed significantly to prediction, but participants' gender did not. Adding centered Social Closeness and communal behaviour scores to the model in Step 2 produced a significant increase in prediction, whereby communal behaviour was a significant predictor of positive activation (β = .21, p = .037), but Social Closeness was not. There was no significant increase in prediction when the Social Closeness by communal behaviour interaction was added in Step 3, ΔR^2 = .01, p = .412.

Agentic extraversion and affective reactivity to affiliative social behaviour

The previous analyses show that affiliative extraversion does not moderate the relationship between communal behaviour and positive affect following a social interaction. The following analyses tested whether the relationships between communal behaviour and positive affect were moderated by agentic extraversion. The results of these analyses are shown in Table 5.

Table 5

Predicting Warmth-affection, Pleasure and Positive Activation Following a Social Interaction From Agentic Extraversion and Communal Behaviour

	Warmth-affection			Pleasure			Positive Activation		
	ΔR^2	β	t	ΔR^2	β	t	ΔR^2	β	t
Social potency									
Step 1:	.34***			.13**			.12**		
Condition		.54	6.26***		.21	2.10*		-.24	-2.36*
Sex		.14	1.59		-.04	-.41		-.19	-1.92
Age		-.10	-1.10		-.25	-2.54*		-.25	-2.44*
Step 2:	.15***			.15***			.07*		
Condition		.51	6.65***		.20	2.16*		-.25	-2.54*
Sex		.19	2.41*		-.02	-.26		-.16	-1.64
Age		-.02	-.23		-.20	-2.10*		-.20	-1.96
Social Potency		.13	1.72		-.03	-.35		.09	.89
Communal behaviour		.40	5.15***		.39	4.28***		.26	2.63*
Step 3:	.00			.00			.00		
Condition		.51	6.43***		.20	2.15*		-.25	-2.46*
Sex		.19	2.43*		-.02	-.27		-.16	-1.65
Age		-.03	-.34		-.19	-1.98		-.19	-1.81
Social Potency		.14	1.75		-.03	-.36		.08	.85
Communal Behaviour		.40	5.13***		.39	4.26***		.26	2.62**
Social Potency X Communal Behaviour		.04	.47		-.02	-.16		-.04	-.37
Achievement									
Step 1:	.34***			.14**			.12**		
Condition		.54	6.25***		.23	2.32*		-.23	-2.25*
Sex		.13	1.58		-.01	-.14		-.19	-1.90
Age		-.10	-1.13		-.25	-2.51*		-.26	-2.53*
Step 2:	.13***			.14***			.07*		
Condition		.52	6.62***		.21	2.33*		-.24	-2.46*
Sex		.16	2.03*		.00	.05		-.18	-1.92
Age		-.04	-.45		-.19	-2.01*		-.19	-1.93
Achievement		.02	.30		.04	.43		.14	1.45
Communal behaviour		.38	4.80***		.39	4.29***		.26	2.65**
Step 3:	.02			.00			.01		
Condition		.52	6.71***		.22	2.33*		-.24	-2.47*
Sex		.16	2.06*		.00	.05		-.18	-1.90
Age		-.03	-.43		-.19	-1.99*		-.20	-1.97
Achievement		.05	.66		.05	.52		.15	1.52
Communal Behaviour		.37	4.80***		.39	4.24***		.25	2.47*
Achievement X Communal Behaviour		.14	1.81		.05	.56		.08	.79

*$p < .05$. **$p \leq .01$ ***$p < .001$

As can be seen from Table 5, neither Social Potency nor Achievement moderated any of the relationships between communal behaviour and warmth-affection, pleasure or positive activation.

Agentic extraversion and affective reactivity to dominant social behaviour.

The next set of hierarchical multiple regression analyses tested the hypothesis that dominant behaviour would predict positive-activation and that this relationship would be moderated by Social Potency and Achievement. The full outputs of these models are shown in Table 6.

Table 6

Predicting Postiive Activation, Pleasure and Wamth-affection Following a Social Interaction From Agentic Extraversion and Dominant Behaviour

	Positive Activation			Pleasure			Warmth-affection		
	ΔR^2	β	t	ΔR^2	β	t	ΔR^2	β	t
Social potency									
Step 1:	.14**			.14**			.31***		
Condition		-.28	-2.83**		.17	1.71		.51	5.90***
Sex		-.12	-1.31		-.02	-0.26		.13	1.52
Age		-.30	-3.11**		-.30	-3.06**		-.11	-1.33
Step 2:	.02			.01			.01		
Condition		-.28	-2.82**		.17	1.76		.50	5.70***
Sex		-.10	-1.02		-.04	-0.40		.13	1.52
Age		-.32	-3.23**		-.30	-3.02**		-.10	-1.14
Social Potency		.04	0.45		-.09	-0.91		.08	0.91
Dominant behaviour		.12	1.20		-.03	-0.26		-.06	-0.66
Step 3:	.01			.00			.00		
Condition		-.30	-2.97**		.18	1.80		.50	5.64***
Sex		-.10	-1.02		-.04	-0.39		.13	1.51
Age		-.33	-3.28**		-.30	-3.00**		-.10	-1.13
Social Potency		.05	0.53		-.09	-0.95		.08	0.89
Dominant Behaviour		.13	1.28		-.03	-0.27		-.06	-0.66
Social Potency X Dominant Behaviour		-.11	-1.13		.05	0.49		.01	0.13
Achievement									
Step 1:	.14**			.14**			.31***		
Condition		-.27	-2.79**		.18	1.87		.51	5.78***
Sex		-.12	-1.29**		.00	0.02		.13	1.52
Age		-.31	-3.17**		-.29	-3.04**		-.12	-1.36
Step 2:	.02			.00			.00		
Condition		-.27	-2.80**		.18	1.80		.51	5.78***
Sex		-.12	-1.20		-.01	-0.05		.12	1.39
Age		-.31	-3.08**		-.28	-2.88**		-.11	-1.25
Achievement		.10	1.02		.01	0.07		.00	0.04
Dominant behaviour		.09	0.92		-.05	-0.48		-.05	-0.54
Step 3:	.00			.01			.02		
Condition		-.27	-2.77**		.18	1.80		.50	5.80***
Sex		-.12	-1.21		-.01	-0.10		.11	1.25
Age		-.31	-2.95**		-.27	-2.71**		-.09	-0.99
Achievement		.10	1.01		.00	0.00		-.01	-0.12
Dominant Behaviour		.09	0.83		-.06	-0.61		-.07	-0.80
Achievement X Dominant Behaviour		.02	0.21		.07	0.74		.13	1.53

*$p < .05$. **$p \leq .01$ ***$p < .001$

With regard to Social Potency, the situation and participants' age and gender were entered in the first step which accounted for a significant portion of variance in positive activation scores, R^2 = .14, F (3, 100) = 5.30, p = .002, whereby participants' age contributed significantly to prediction (β = -.30, p = .002), although gender and the situation did not. Adding Social Potency and dominant behaviour to the model in Step 2 did not significantly increase prediction (ΔR^2 =.02, p = .368), nor did adding a Social Potency X dominant behaviour interaction term in Step 3 (ΔR^2 =.01, p = .261).

A separate regression was conducted to examine whether Achievement scores moderated the relationship between dominant behaviour and positive activation. In this model, there was no significant increase in prediction at Step 2 when dominant behaviour and Achievement scores were added (ΔR^2 =.02, p = .315), nor was there any improvement when the Achievement X dominant behaviour interaction term was added in Step 3 of the model (ΔR^2 =.00, p = .838).

Additional regressions were conducted to test whether dominant behaviour predicts pleasure, and whether this relationship was moderated by either Achievement or Social Potency.

When the situation and participants' age and gender were entered in the first step, the model accounted for a significant portion of variance in pleasure scores (R^2 = .14, F (3, 101) = 5.29, p = .002), whereby participants' age was a significant predictor, (β = -.30, p = .003) the neither the situation nor participants' gender were. Social Potency and dominant behaviour scores were then entered in the second step of the model, followed by a cross-product interaction term of these two variables in

the third, but neither of these additional steps led to a significant increment in prediction: ΔR^2 =.01, p = .594 and ΔR^2 =.00, p = .628 respectively.

The above model was then repeated with Social Potency being replaced with Achievement. In this model, adding Achievement and dominant behaviour scores at Step 2 did not significantly add to prediction (ΔR^2 =.00, p = .893), nor did adding the interaction term of these variables at Step 3, ΔR^2 =.01, p > .459.

These regressions were then repeated to test whether Social Potency, Achievement and dominant behaviour – or any agentic extraversion X dominant behaviour interaction – predicted warmth-affection. In no case were any of these variables found to predict warmth-affection.

Affiliative extraversion and affective reactivity to dominant social behaviour

The previous analyses showed that agentic extraversion does not moderate the positive affective consequences of dominant social behaviour. Additional analyses were conducted to test whether affiliative extraversion moderates the relationships between dominant behaviour and positive affect. The results of these are shown in Table 7.

Table 7

Predicting Positive Activation, Pleasure and Warmth-affection Following a Social Interaction From Affiliative Extraversion and Dominant Behaviour

	Positive Activation			Pleasure			Warmth-affection		
	ΔR^2	β	*t*	ΔR^2	β	*t*	ΔR^2	β	*t*
Step 1:	.13**			.14**			.32***		
Condition		-.26	-2.67**		.17	1.76		.51	6.02***
Sex		-.10	-1.11		-.02	-.16		.13	.16
Age		-.30	-3.11**		-.30	-3.09**		-.12	-1.36
Step 2:	.05			.02			.06**		
Condition		-.28	-2.87**		.15	1.56		.48	5.83***
Sex		-.10	-1.07		-.04	-.38		.10	1.29
Age		-.31	-3.19**		-.28	-2.85		-.09	-1.05
Social Closeness		.18	1.95		.15	1.57		.25	3.08**
Dominant behaviour		.12	1.28		-.05	-.52		-.04	-.48
Step 3:	.02			.00			.00		
Condition		-.28	-2.92**		.15	1.55		.48	5.79***
Sex		-.11	-1.17		-.04	-.41		.10	1.25
Age		-.31	-3.20**		-.27	-2.83**		-.09	-1.04
Social Closeness		.17	1.86		.14	1.52		.25	3.04**
Dominant Behaviour		.08	.84		-.06	-.64		-.05	-.54
Social Closeness X Dominant Behaviour		.13	1.35		.05	.47		.02	.29

*$p < .05$. **$p \leq .01$ ***$p < .001$

As can be seen from Table 7, Social Closeness was not found to moderate the relationships between dominant behaviour and positive activation, pleasure, or warmth-affection.

2.4 Discussion

The aim of this study was to investigate agentic and affiliative affective-reactivity in response to naturally occurring social interactions. Specifically, the aim was to test the hypothesis that agentic and affiliative extraversion would moderate the affective consequences of dominant and communal social behaviours,

respectively. It was predicted that communal behaviour would be associated with warmth-affection and pleasure and that this association would be moderated by affiliative extraversion, whilst dominant behaviour would be associated with positive activation and that this relationship would be moderated by agentic extraversion.

Relationships between social behaviour, personality and affect

Communal behaviour was positively associated with warmth-affection, pleasure and positive activation. Social Closeness was not found to moderate any of the relationships between communal behaviour and positive affect however. Therefore, these data do not support the affective-reactivity hypothesis in affiliative extraversion; individuals appear to experience similar feelings of positive affect following communal behaviour regardless of how they score on affiliative extraversion. On the other hand, researchers have previously reported that the relationship between communal behaviour and pleasure are moderated by Extraversion, Agreeableness and IAS-R Warm-Agreeableness (Coté & Moskowitz, 1998; Moskowitz & Coté, 1995). There are two potential explanations for the discrepancy between the results of the present study and the results reported in these studies. First, each of Moskowitz and Coté's studies were based on multiple within-participant observations, whilst the present data was observed from only a single observation. It may be that personality traits are more predictive of the average relationship between individuals' social behaviours and feelings than they are of a single situation.

Counter to expectations, dominant behavior was not found to be associated with positive activation or any other form of positive affect. Furthermore, there were

no significant interactions between dominant behaviour and either Social Potency or Achievement in predicting positive affect. The finding that dominant behaviour was not associated with positive activation means that these data neither support nor refute the affective-reactivity hypothesis in agentic extraversion. Dominant behaviour has previously been reported to correlate positively with positive activation (Timmermans et al., 2010), although these findings were based on multiple observations while the present data are based on a single observation. A more intensive sampling strategy may therefore clarify the relationship between dominance and affect. Including measures of the motivations and goals may also help to clarify the relationship between dominant behaviour and affect. Interpersonal behaviours are motivated by a range of goals and desires (Horowitz et al., 2006), such as needs for power (Fodor, 2009), achievement (Conroy, Elliot & Thrash, 2009), belongingness (Leary & Kelly, 2009), and affiliation (Hill, 2009). It is these goals that give behaviour meaning rather than the behaviour itself (Horowitz et al., 2006), and affect serves as a signal as to how well the individual is working toward them (Carver, 2006). Therefore individuals' goals and their position in relation to them may be more approximate predictors of affect than interpersonal behaviour.

Alternate views on the relationships between social behaviour, personality and affect

While these data do not support the affective-reactivity hypothesis, they are in part consistent with the density distribution model of personality and the concept of state-trait isomorphisms (Fleeson, 2001; Fleeson et al., 2002). There are two central tenants to the density distribution model. The first is that personality states can be described in the same way as personality traits. The difference between

personality states and traits is that the former describes the individual's behaviour in the moment, while the latter describes individuals' typical patterns of behaviour (Wilt et al., 2012). With regard to extraversion for example, just as individuals show between-person variation in their trait levels of *boldness*, *assertiveness* and *talkativeness*, individuals also show within-person variation in these states from moment to moment. While trait extraversion predicts the frequency of extraverted behaviour in daily life, the within-person variation in personality states means that even introverts often display behaviours that are characteristic of extraverts (Fleeson & Gallagher, 2009). The second key principle of the density distribution model is state-trait isomorphism, whereby personality states are expected to share many of the properties and consequences of personality traits (Fleeson et al., 2002). As evidence of state-trait isomorphisms, experience sampling research has shown that within-person variation in extraverted behaviour covaries with within-person variation in positive affect, such that individuals report higher levels of positive affect when they behave in an extraverted manner (Ching et al., 2014; Fleeson et al., 2002; Wilt et al., 2012). Comparable findings have also been reported in experimental studies where individuals are instructed to behave in an extraverted way, which suggests that the direction of causation at least partly flows from state extraversion to positive affect (McNeil et al., 2010; Zelenski et al., 2012). Crucially, the weight of evidence shows that the relationship between state extraversion and positive affect is not moderated by trait extraversion. Similarly, in the current data, communal behaviour was positively associated with positive affects, although these relationships were not moderated by affiliative extraversion. Therefore, just as the affective consequences

of state extraversion are not moderated by trait extraversion, neither are the affective consequences of state affiliation moderated by affiliative extraversion.

While there was no evidence of greater affective reactivity to communal behaviour among affiliative extraverts, there was still a positive relationship between affiliative extraversion and warmth-affection following a social interaction to be explained. Rather than affiliative extraversion moderating the relationship between communal behaviour and warmth-affection (as would be predicted by the affective-reactivity view) it may be that affiliative behaviour mediates the relationship between affiliative extraversion and warmth-affection. This interpretation is consistent with instrumental models of personality and affect, which hold that extraverted behaviours mediate the relationship between trait extraversion and positive affect (Wilt et al., 2012). Support for this model has been found in experience sampling data from North American, Venezuelan, Philippian, Chinese and Japanese samples (Ching et al., 2014; Wilt et al., 2012). There was no evidence for such a mediation model in the present data however. Although warmth-affection was predicted by both Social Closeness and communal behaviour, the relationship between affiliative extraversion and communal behaviour only approached significance. Therefore, the communal behaviour of affiliative extraverts cannot account for their greater levels of warmth-affection in this sample. Previous researchers have found that affiliative extraversion is positively associated with retrospective measures of communal behaviour however (DeYoung et al., 2013). It may be that affiliative extraversion would predict communal behaviour in the present study had a more intensive sampling strategy been employed. Future research would

therefore benefit from increasing the number of behaviour and affect reports collected from participants.

While the relationships between personality and affect recorded here cannot be explained by either an affective-reactivity or an instrumental account, they are in part consistent with affective-level models. In contrast to affective-reactivity models, affect-level accounts describe how personality traits are associated with tonic levels of baseline affect (Gross et al., 1998). In the affective ratings recorded in a neutral, non-social setting for example, Social Closeness was positively associated with pleasure and warmth-affection, Social Potency with pleasure and positive activation and Achievement with positive activation. These correlations were modest in size and similar to the average correlation (r = .24) between extraversion and positive affect in neutral settings reported by Lucas and Baird (2004). In the affect ratings made after a social interaction on the other hand, there were no clear associations between agentic or affiliative extraversion and pleasure, there was no relationship between positive activation and Social Potency and the association between Achievement and positive activation was only evident in the multiple regression analysis. Furthermore, while Social Closeness and warmth-affection were positively correlated at both rating occasions, the relationship between the two was substantially larger following a social interaction, which suggests some form of affective reactivity to these situations. Averaging across multiple ratings of momentary affect would provide a better means of testing affect-level models in agentic and affiliative extraversion. Johnson, Miller, Lyman and South (2010) collected such ratings randomly over the course of a week, and found that neither the

agentic nor the affiliative NEO-PI-R facet of extraversion were associated with average positive affect.

Limitations of the current study

There are several limitations to the present research. First, participants only rated a single social interaction; a more intensive sampling procedure where participants rate multiple interactions for several days would have provided a more powerful test for the hypotheses. Additional ratings of non-social, neutral settings could also help to clarify whether an affect-level view of agentic and affiliative extraversion should be considered. Secondly, the data are limited to self-reports of affective experience and could therefore be supplemented by ambulatory measurements of physiological variables such as heart rate and blood pressure. Such measurements are already being included in experience sampling research (Ilies, Dimotakis, & Watson, 2010). Most importantly however, the data are correlational which makes any implied direction of effect tentative. For example it is not clear whether individuals act in affiliative ways because they feel warm, affectionate and pleasant or if individuals feel warm, affectionate and pleasant because they behave in affiliative ways. This lack of knowledge about the direction of causation is a common feature of experience sampling research (Lucas et al., 2008), although manipulating social behaviour experimentally (McNeil & Fleeson, 2006) will provide a stronger test for the implied direction of causation.

In conclusion, the results of this study do not provide any support for the affective-reactivity hypothesis in neither agentic nor affiliative extraversion following social interactions. Only communal behaviour was found to be associated

with positive affect, although the relationship between communal behaviour and positive affect was not moderated by affiliative extraversion. Future experience sampling research should employ a more intensive sampling strategy, and experimental work will be needed to test the direction of causation between behaviour and affect.

Chapter 3

Testing agentic and affiliative affective reactivity to experimentally manipulated dominant and communal social interactions

3.1 Introduction

The aim of Study 1 was to test affective and agentic affective reactivity in response to naturally occurring social interactions. It was predicted that communal behaviours would be associated with warmth-affection and pleasure, and that these relationships would be moderated by affiliative extraversion. It was further predicted that dominant behaviours would be associated with positive activation, and that this relationship would be moderated by agentic extraversion.

The results of Study 1 revealed that dominant behaviours were not associated with any form of positive affect, but that communal behaviours were associated with warmth-affection, pleasure and positive activation. Crucially, none of these behaviour-affect relationships were moderated by personality traits. Therefore, there was no evidence for affective reactivity in either agentic or affiliative extraversion.

The cross-sectional nature of the data collected in Study 1 limits the conclusions that can be drawn from these results. An underlying assumption in the interpretation of the findings was that social behaviours cause changes in affect. This direction of causality would be necessary to test individual differences in affective reactivity. On the other hand however, it could also be that positive affects cause increases in communal behaviours. As such, the ambiguity in the direction of

causality may have obscured any underlying individual differences in affective reactivity following social interactions.

It would be possible to address the limitations of Study 1 by manipulating communal and dominant social behaviours experimentally. Fleeson et al., (2002) introduced a novel means of doing so, whereby groups of two or three individuals are asked to complete simple discussion tasks. Prior to the task, one or two of the participants are secretly instructed to behave in either an extraverted (e.g. being *bold, talkative,* and *energetic*) or introverted (e.g. being *reserved, quiet* and *lethargic*) manner. The remaining control participant is given no such instructions, and is unaware that the other participant(s) have been asked to behave in a particular way. Following the discussion task, participants are typically asked to rate their own behaviour and affect during the preceding discussion, as well as the behaviour and affect of the other participants. Participants' reports of their own behavior during these tasks indicate that individuals generally adhere to these acting instructions well. Moreover, control participants who are naïve to the experimental manipulations also typically rate individuals who have been instructed to behave like extraverts as behaving more extraverted than those who have been asked to behave like introverts, and vice-versa (Fleeson et al., 2002; McNeil & Fleeson, 2006; McNeil et al., 2010; Zelenski et al., 2012; Zelenski et al., 2013). These researchers have also reported that the extent to which individuals adhere to either "act extraverted" or "act introverted" instructions is not moderated by trait levels of extraversion. Therefore, both introverts and extraverts appear to be capable to displaying both high and low levels of extraverted behaviour at will.

Several researchers have employed this method and demonstrated that behaving like an extravert causes increases in arousal, positive activation and pleasure (Fleeson et al., 2002; McNeil & Fleeson, 2006; McNeil et al., 2010; Zelenski et al., 2012; Zelenski et al., 2013). Moreover, these researchers have also shown that the relationship between extraverted behaviour and positive affect is not moderated by trait extraversion.

Aims and hypotheses

The aim of this study is to apply the experimental method described by Fleeson and colleagues (2002) to investigate agentic and affiliative affective reactivity to social interactions. This method improves on the design from Study 1 by manipulating dominant and communal social behaviours experimentally. Although this method is less ecologically valid than the experience sampling design reported in Study 1, manipulating social behaviours experimentally will allow for clearer inferences to be drawn regarding the effects of social behaviour on affect. As such, it will be possible to better determine the effects of social behaviours on positive affect, and to test whether these relationships are moderated by agentic or affiliative extraversion.

In order to manipulate dominant and communal social behaviours in the same manner as Fleeson and colleagues have manipulated general extraverted behaviour, it is first necessary to select adjectives descriptors of dominance and communion. The items from the Assured-dominant and Warm-agreeable scales of the Interpersonal Adjective Scales (IAS;Wiggins, 1995) were identified for this purpose. These scales are orthogonal measures of dominant and communal interpersonal traits, and are

closely related to the measures of dominant and communal behaviour used in Study 1 (Moskowitz, 1994; Wiggins et al., 1988). Moreover, there is substantial overlap between IAS Assured-dominant and Warm-Agreeableness and measures of agentic and affiliative extraversion, respectively (DeYoung et al., 2013; Tellegen & Waller, 2008).

As in Study 1, the hypothesis is that agentic and affiliative extraversion will moderate individuals' experiences of positive activation and warmth-affection, respectively. It is predicted that (1) dominant behaviour will be associated with positive activation and this relationship will be moderated by agentic extraversion, and (2) communal behaviour will be associated with warmth-affection and pleasure, and that these relationships will be moderated by affiliative extraversion.

3.2 Method

Participants

Participants were recruited from the undergraduate and postgraduate communities at the University of Strathclyde as well as from the wider Glasgow community. 66 participants (50 females) took part in the experiment. The mean age of participants was 21.62 years (SD = 4.40).

Materials

As in Study 1, agentic and affiliative extraversion was measured with the MPQ-BF Social Closeness, Social Potency and Achievement scales (Patrick et al.,

2002). The internal consistencies of these scales ranged from .83 to .85 in this sample.

Warmth-affection, positive activation and pleasure were measured using the same multiple adjective scales described in Study 1. The internal consistencies of these scales ranged from .78 to .94 in this sample.

Social behaviours were measured using a modified version of the Assured-dominant, Quiet-submissive, Warm-agreeable and Aloof-introverted scales of the Interpersonal Adjective Scales (IAS; Wiggins, 1995).

These IAS scales were modified to create instructions for participants to behave in a communal, aloof, dominant or submissive manner. In each of these conditions, participants were presented with all eight adjectives from one of the IAS scales, and were instructed to "*act in the following ways as much as possible during the following task".* Participants in the act dominant and act submissive conditions were presented with the adjectives from the Assured-Dominant and Quiet-Submissive scales, respectively. Participants in the act communally and act aloof conditions were presented with the adjectives from the Warm-Agreeable and Aloof-Introverted scales, respectively.

Following each group discussion task, participants rated their own social behaviour and the behaviour of the other participants using the Assured-Dominant, Quiet-Submissive, Warm-Agreeable and Aloof-Introverted IAS scales. To do so, participants were instructed to indicate how well each of the adjectives described their own behaviour, and the behaviour of each of the other participants in the interaction. Participants made these ratings on an a Likert scale ranging from 1

(Extremely inaccurate) to 8 (Extremely accurate). The internal consistencies of these scales ranged from .84 to .98.

Procedure

Ethical approval for this study was obtained from the University of Strathclyde's School of Psychological Sciences and Health Ethics Committee.

The experiment consisted of three participants taking part in two group discussion tasks. In one task, participants were asked to plan a day out together, and in the other task, participants were asked to rank the importance of 10 items in the event of a plane crash.

In the day out task, one participant was asked to behave communally and the other aloofly. In the plane crash task, one participant was asked to behave dominantly, and the other submissively. A third participant served as a control in each task, and was given no instructions on how to behave. The order in which participants completed these tasks was randomised across experimental sessions. Participants were randomly allocated to each of the three experimental groups prior to the first task. It was important the control participant did not become aware that the other participants had received instructions on how to act, and so the participant in the control group for the first task was always allocated to the control group for the second task. The other participants were once again randomly assigned to either of the acting conditions during the second task.

Participants were first informed that they would be participating in two group discussion tasks, after which they would be asked to rate their own behaviour and feelings, and the behaviour and feelings of the other participants. Participants were

then issued with a letter – either A, B or C – which they were identified by throughout the experiment. This allowed participants to rate one another's behaviour and affect following each discussion task.

Participants were then directed to sit at separate tables and asked to complete the MPQ-BF scales. Prior to each group discussion task, each participant was issued with an instruction sheet that gave an overview of what they would be asked to do in the following task. Participants in the experimental groups were also shown a set of adjectives from the IAS scales, and were asked to act in these ways as much as possible in the following task. Prior to the day out task, participants in the act communally group were shown the adjectives from the IAS warm-agreeable scales, while participants in the act aloof condition were shown the aloof-introverted adjectives. Prior to the plane crash task, participants in the act dominant condition were shown the adjectives from the assured-dominant scale, and participants in the act submissive condition were shown the quiet-submissive adjectives.

Participants studied the instructions for a few minutes and were then brought together to complete the first discussion task. Each task lasted approximately 10 minutes. Afterwards, participants returned to their individual desks and completed the affect and IAS scales to rate their own behaviour and affect in the prior discussion, and the behaviour and affect of the other participants.

Finally, participants were issued with the instructions for the second task and the above procedure was repeated. Participants were then debriefed and given either a £5 shopping voucher or course credit for taking part. As participants in the control

condition were not formally asked about whether they had guessed that the others had been instructed to act in particular ways, it is not clear if they were aware that some participants' behaviour had been manipulated. On the other hand, control participants did not suggest that they were aware of the experimental manipulations when they were being debriefed.

Missing data

A small amount of data was missing due to incomplete responses on the questionnaire measures from participants. Less than 2% of values were missing on any one variable, and Little's MCAR test showed that these data were missing completely at random, χ^2 (11175) = .00, p = 1.000. Tabachnik and Fidell (2007) suggest that when less than 5% of data are missing, procedures for handling missing values produce similar results. Therefore, missing values were replaced with group means.

Statistical analyses

The hypotheses were tested in a series of moderated multiple regression analyses. For each task, two dummy variables were created to contrast the experimental and control conditions. One dummy variable compared the act dominantly and act submissively conditions to the control group, and the other compared the act communally and act aloof conditions group to the control group (Field, 2009).

Mean centered personality scores were entered in the first step of each regression, alongside the two dummy condition variables. In the second step, the

product of the personality scores and each dummy condition variable was entered to test for an interaction between personality and acting condition. Significant interactions were then followed up with simple slopes analyses, where analyses were conducted at low (one SD below the mean), mean and high (one SD above the mean) levels of the moderator variable.

Checking for outliers and influential cases

The data were screened for outliers by calculating z-scores. Outlier scores were defined as any value with a z-score greater than 3.29 (Field, 2009). Outlier scores were the replaced with three times the standard deviation plus the mean (Field, 2009).

Several indices were used to screen for influential cases. First, cases with standard deviations greater than 2 or less than -2 were identified. Cook's distance, average leverage, Mahalanobis distance and DFBeta statistics were then produced for these cases. Cases were suspected of having an undue influence over the model if i) the Cook's distance was greater than 1, ii) the centered leverage value was three times greater than the average leverage, iii) the Mahalonobis distance was greater than 15, or iv) the DFBeta was greater than 1.

Checking the assumptions of the models

The assumptions of the regression models were tested with the same procedures described in Study 1. Multicollinearity was suspected if: i) IVs correlated ≥ .90, ii) a VIF value was greater than 10, iii) mean VIF was substantially greater

than 1.00, iv) a tolerance value was less than .10, v) more than one predictor's variance loads substantially onto a small eigenvalue (Field, 2009).

The Durbin-Watson test was used to check the assumption that the residuals in the model were independent. Test statistics less than 1 or greater than 3 were considered to be problematic.

To assess the assumptions of linearity and homoscedasticity, the standardised values of the dependent variable predicted by the model were plotted against the standardised residuals in a scatterplot graph. If the points appeared to be randomly and evenly spread out then it was accepted that the assumptions had been met (Field, 2009). The assumption of homoscedasticity was found to be violated in several of the regressions. Heteroscedasticity can occur when some variables in the regression model are skewed (Tabachnick & Fidell, 2007). Therefore, when the assumption of homoscedasticity was found to be violated, the distribution of each variable in the model was examined and those that were found to be skewed were transformed. The dependent variable was also transformed, which can also help to correct heteroscedasticity (Tabachnick & Fidell, 2007). Some regression models did not meet the assumption of homoscedasticity after applying these transformations. In these cases, the regressions were repeated with bootstrapping, which are robust to violations of homoscedasticity (Field, 2013). The results of each analysis were comparable when the original data was used, compared to the transformed data or bootstrapped analyses. The original data is therefore presented throughout to aid the interpretation and presentation of the results.

To test the normality of residuals, both the histogram and normal probability plots were inspected visually.

These steps were carried out for each of the multiple regression analyses, although they are only referred to in the text when an assumption was violated.

3.3 Results

Social Closeness scores were significantly associated with Social Potency, *rho* = .28, *p* = .021, but not Achievement scores, *rho* = -.07, *p* = .576. Achievement scores were also not related to Social Potency scores, *rho* =.12, *p* = .334.

Descriptive statistics of participants' self-reported social behaviours and affect in each condition are provided in Table 8.

Table 8

Means (Standard Deviations) of Social Behaviour and Positive Affects in Each of the Acting Conditions

	Communal Behaviour	Aloof Behaviour	Dominant Behaviour	Submissive Behaviour	Positive Activation	Warmth-affection	Pleasure
Day Out Task: Communal behaviour manipulation							
Act communally	47.23 (9.78)	18.27 (8.02)	27.45 (13.02)	33.23 (16.30)	29.64 (9.66)	14.09 (5.31)	12.72 (4.07)
Act aloof	25.55 (11.62)	49.72 (9.63)	20.18 (9.73)	42.32 (12.30)	18.14 (5.37)	7.86 (2.73)	6.86 (3.01)
Control	35.23 (10.09)	19.22 (9.69)	34.09 (11.84)	28.18 (11.99)	26.29 (7.41)	10.71 (4.19)	11.43 (4.38)
Plane Crash Task: Dominant behaviour manipulation							
Act dominant	26.50 (11.90)	24.09 (9.60)	49.45 (7.37)	23.00 (11.10)	32.55 (5.90)	8.86 (3.78)	11.23 (3.57)
Act submissive	41.09 (12.17)	41.50 (11.62)	12.72 (4.82)	54.59 (8.75)	18.09 (4.73)	8.23 (2.96)	6.82 (2.95)
Control	34.95 (9.24)	17.95 (8.47)	35.62 (10.62)	27.43 (10.93)	27.32 (7.32)	9.82 (3.26)	11.82 (3.10)

Manipulation checks

The first set of analyses tested whether participants' social behaviours differed across the experimental conditions. Several moderated multiple regression models were run to predict social behaviour from the experimental conditions, trait agentic and affiliative extraversion, and any possible interaction between acting condition and trait agentic or affiliative extraversion.

Self-reported social behaviours following the communal behaviour manipulations

The first set of analyses examined participants' self-reported social behaviours following the act communally and act aloof instructions. The results of these are presented in Table 9.

Table 9

Predicting Communal and Dominant Behaviour from the Act Communally and Act Aloof Acting Conditions and Affiliative Extraversion

	Communal behaviour			Aloof behaviour		
	ΔR^2	β	*t*	ΔR^2	β	*t*
Step 1:	.43***			.74***		
Social Closeness		.07	.74		-.11	-1.73
Act communally		.40	3.60**		-.01	.94
Act aloof		-.35	-3.11**		.86	11.36***
Step 2:	.06*			.00		
Social Closeness		-.10	-.67		-.15	-1.32
Act Communally		.39	3.62**		00	-.01
Act Aloof		-.32	-2.99**		.86	11.16***
Social Closeness X Act Communally		.29	2.37*		.01	.10
Social Closeness X Act Aloof		.03	.26		.05	.49

*$p < .05$, ** $p < .01$ *** $p < .001$

The first step of the model accounted for a significant portion of variance in communal behaviour F (3, 62) = 15.68, $p < .001$, whereby participants in the act communally and act aloof conditions reported greater $\beta = .40$, $t = 3.60$, $p = .001$ and lesser $\beta = -.35$, $t = -3.11$, $p = .003$ levels of communal behaviour than those in the control condition, respectively. There was a significant increase in prediction when the two interaction terms were added in the second step $\Delta R^2 = .06$, $p = .046$, whereby the difference in communal behaviour scores between the act communally and control condition was moderated by Social Closeness. This interaction is shown in Figure 1.

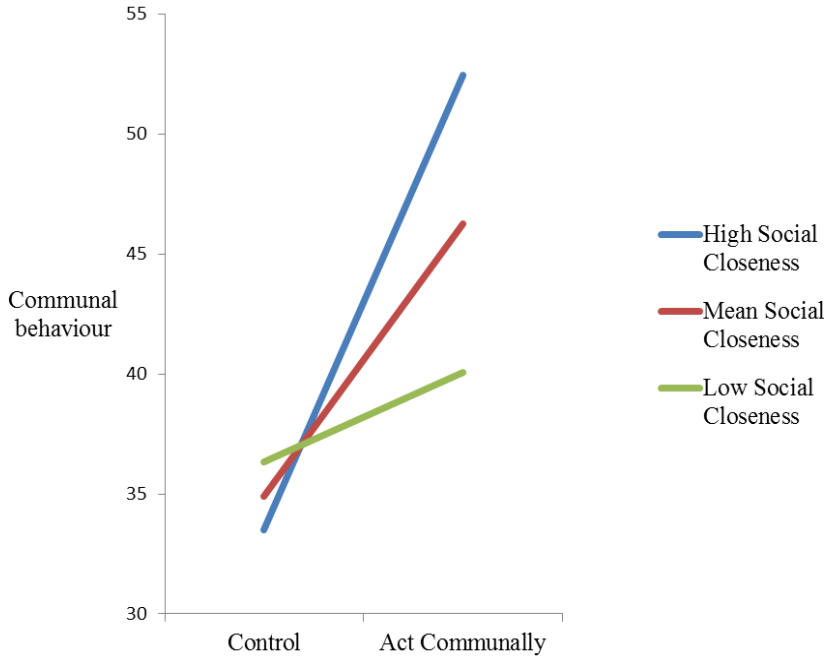

Figure 1. Levels of self-reported communal behaviour in the act communally and no-instruction control conditions, at high, moderate and low levels of Social Closeness

Analysis of simple slopes revealed that levels of communal behaviour were higher in the act communally than the control condition for participants with high, $\beta = .66$, $t = 4.20$, $p < .002$, and moderate, $\beta = .39$, $t = 3.62$, $p = .001$ scores on Social Closeness but not low scores, $\beta = .13$, $t = .83$, $p = .408$.

With regard to aloof behaviour, the first step of the model accounted also accounted for a significant portion of variance F (3, 62) = 58.89, $p < .001$, whereby participants in the act aloof condition reported greater levels of aloof behaviour than those in the control condition did, $\beta = .86$, $t = 11.36$, $p < .001$. There were no differences in ratings of aloof behaviour between participants in the control or act communally conditions however $\beta = -.01$, $t = -.07$, $p = .942$.

The next set of analyses tested whether the effect of communal acting condition on social behaviour was moderated by agentic extraversion. The results of these analyses are presented in Table 10.

Table 10

Predicting Communal and Dominant Behaviour from the Act Communally and Act Aloof Acting Conditions and Agentic Extraversion

	Communal behaviour			Aloof behaviour		
	ΔR^2	β	*t*	ΔR^2	β	*t*
Step 1:	.44***			.73***		
Social Potency		-.11	-1.11		-.06	-.85
Act communally		.42	3.85***		-.02	-.29
Act aloof		-.30	-2.59*		.86	10.79***
Step 2:	.00			.00		
Social Potency		-.15	-.73		-.12	-.82
Act Communally		.44	3.75***		-.01	-.16
Act Aloof		-.29	-2.37*		.86	10.42***
Social Potency X Act Communally		.06	.41		.05	.43
Social Potency X Act Aloof		.00	.03		.05	.44
Achievement						
Step 1:	.43***			.73***		
Achievement		-.01	-.05		.05	.78
Act communally		.42	3.75***		-.03	-.32
Act aloof		-.34	-2.98**		.83	10.74***
Step 2:	.00			.03*		
Achievement		-.06	-.31		.08	.67
Act Communally		.42	3.69***		-.04	-.59
Act Aloof		-.34	-2.91**		.80	10.69***
Achievement X Act Communally		.04	.28		-.14	-1.50
Achievement X Act Aloof		.05	.33		.11	1.09

*$p < .05$, ** $p < .01$ *** $p < .001$

As can be seen from Table 10, neither Social Potency nor Achievement was found to moderate the effect of acting condition on either self-reported communal or aloof behaviours.

Naïve observers' ratings of participants' social behaviour and affect following the communal behaviour manipulations

The previous analyses were based on self-reports of behaviour. It may be that these ratings primarily reflect demand characteristics placed on participants who had been instructed to behave in particular ways. Another method of checking the effects of the acting conditions is to examine control participants' ratings of participants in each of the experimental conditions. These analyses are especially informative, as participants in the control condition were not aware that the participants in the experimental conditions had been given any instruction on how to behave.

The first comparison examined control participants' ratings of how participants in the act communally and act aloof conditions behaved. Scores of communal and aloof behaviour for the participants in the act communally condition were not normally distributed, D (22) = .23, p = .003, and D (22) = .19, p = .045. The distribution of these variables became normally distributed following a log transformation, and these transformed variables were used in the following parametric tests.[2]

Participants in the control condition perceived participants in the act communally condition as behaving more communally than those in the act aloofly condition, t (21) = 2.20, p = .040, r = .44. Controls also rated participants in the act aloof condition as behaving more aloofly than those in the act communally condition, t (21) = -2.71, p = .013, r = .51.

[2] Non-parametric analyses were also conducted on the original, non-normally distributed data. The analyses of these were largely similar, although the comparison between control participants' ratings of communal behaviour among the act communally and act aloofly conditions did not reach significance, z = -1.89, p = .059, r = .29.

The next of analyses compared control participants' ratings of the affect experienced by those in the act communally and act aloofly conditions. Controls' ratings of the warmth-affection experienced by those in the act communally condition were not normally distributed, D (22) = .21, p = .012, and remained so following logarithmic, square root and reciprocal transformation. A non-parametric Wilcoxon Signed Ranks test was therefore conducted to compare controls' ratings of warmth-affection experienced by the act communally and act aloofly groups.

The results of this test were significant, such that participants in the act communally condition were rated as experiencing more warmth-affection than those in the act aloofly condition, z = -2.71, p = .007, r = .41. Participants in the act communally condition were also rated as experiencing more positive activation, t (21) = 2.99, p = .007, r = .55, and more pleasure, t (21) = 2.27, p = .034, r = .44, than those in the act aloofly condition.

In sum, the manipulation of communal behaviours appears to have been successful. Participants who were instructed to act in a communal manner rated their behaviour as being more communal than those in the control condition, while those in the act aloofly condition rated their behaviour as being more aloof and less communal than those in the control condition. Participants in the act communally condition also reported experiencing greater levels of warmth-affection than those in the control group, whilst participants in the act aloofly condition reported lower levels of positive activation, warmth-affection and pleasure than those in the control condition.

These findings were largely corroborated by control participants' ratings of the act communally and act aloofly groups' behaviour and affect. Participants in the

act communally condition were rated as behaving more communally and less aloofly than those in the act aloof condition, and as experiencing greater levels of warmth-affection, positive activation and pleasure.

Self-reported social behaviour and affect following the dominant behaviour manipulation

The next set of analyses tested whether levels of dominant and submissive behaviour differed across the control and experimental conditions, and whether these differences were moderated by either agentic or affiliative extraversion. Table 11 shows the results of several analyses that examined the effect of acting condition on behaviour and the possible moderating effects of agentic extraversion.

Table 11

Predicting Dominant and Submissive Behaviour From the Act Dominant and Act Submissive Conditions and Agentic Extraversion

	Dominant behaviour			Submissive behaviour		
	ΔR^2	β	*t*	ΔR^2	β	*t*
Step 1:	.80***			.68***		
Social Potency		.11	1.92		-.14	-1.94
Act Dominant		.37	5.55***		-.10	-1.17
Act Submissive		-.66	-9.91***		.78	9.13***
Step 2:	.02*			.01		
Social Potency		.39	3.33**		-.22	-1.42
Act Dominant		.33	5.08***		-.09	-1.00
Act Submissive		-.69	-10.56***		.77	8.89***
Social Potency X Act Dominant		-.23	-2.49*		-.01	-.07
Social Potency X Act Submissive		-.21	-2.41*		.14	1.23
Achievement						
Step 1:	.79***			.66***		
Achievement		-.04	-.61		.06	.77
Act Dominant		.39	5.75***		-.13	-1.46
Act Submissive		-.63	-9.39***		-.74	8.60***
Step 2:	.01			.00		
Achievement		.00	-.01		-.03	-.20
Act Dominant		.38	5.70***		-.12	-1.38
Act Submissive		-.64	-9.40***		.74	8.50***
Achievement X Act Dominant		-.08	-.91		.05	.49
Achievement X Act Submissive		.02	.17		.09	.74

*$p < .05$, ** $p < .01$ *** $p < .001$

The first step of each model accounted for a significant portion of variance in self-reported dominant and submissive behaviour. Relative to the control condition, participants in the act dominant condition were found to report greater levels of dominant behaviour, while participants in the act submissive condition reported lower levels of dominant behaviour and greater levels of submissive behaviour. Of the possible moderation effects examined, only the acting condition X Social Potency interactions were significant in

predicting dominant behaviour. Adding these two interaction terms led to a significant increase in the prediction of dominant behaviour, $\Delta R^2 = .02$, $p = .031$, whereby the interactions between Social Potency and both the act dominant, $\beta = -.23$, $t = -2.49$, $p = .016$, and act submissive conditions, $\beta = -.21$, $t = -2.41$, $p = .019$, were both significant. These interactions are shown in Figures 2 and 3.

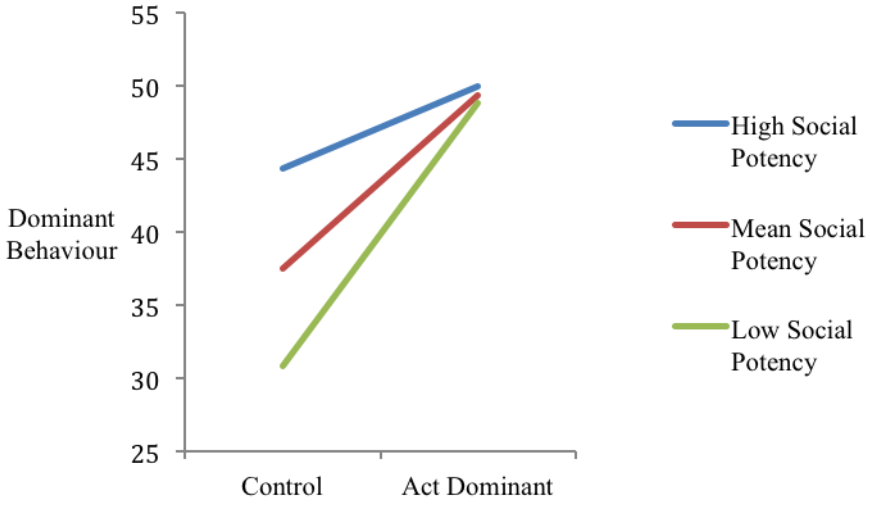

Figure 2. Levels of self-reported dominant behaviour in the act dominant and no-instruction control conditions, at high, moderate and low levels of Social Potency

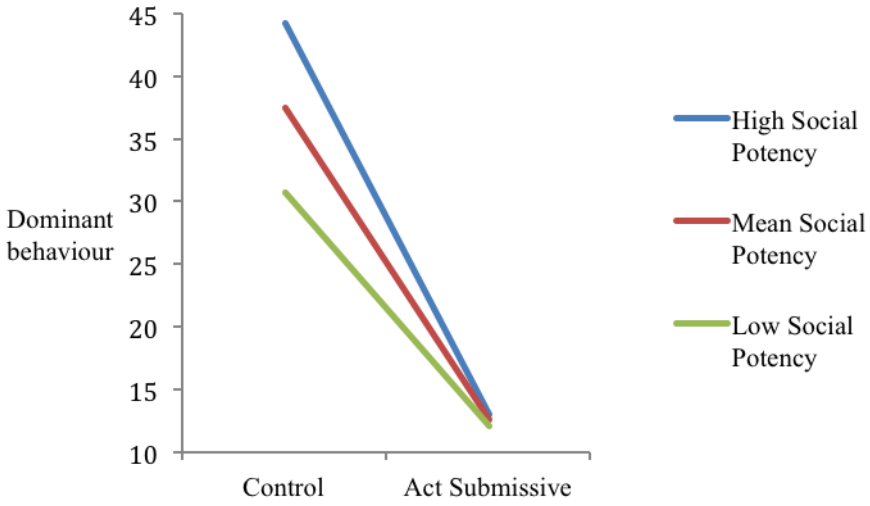

Figure 3. Levels of self-reported dominant behaviour in the act submissive and no-instruction control conditions at high, moderate and low levels of Social Potency

Analysis of simple slopes revealed that self-reported dominant behaviour was higher in the act dominant condition relative to the control condition for participants with low, $\beta = .50$, $t = 5.87$, $p < .001$, and moderate, $\beta = .33$, $t = 5.08$, $p < .001$, Social Potency scores, but not high scores, $\beta = .16$, $t = 1.52$, $p = .133$. Moreover, the difference in levels of dominant behaviour between the control and act submissive conditions was greater for participants with high, $\beta = -.87$, $t = -8.50$ $p < .001$, Social Potency scores relative to those with moderate, $\beta = -.69$, $t = -10.56$ $p < .001$, or low scores, $\beta = -.52$, $t = -2.49$, $p < .001$.

Finally, two further regressions were conducted to test whether the effects of acting condition on dominant and submissive behaviour were moderated by affiliative extraversion. The results of these analyses are shown in Table 12.

Table 12

Predicting Dominant and Submissive Behaviour from the Act Dominant and Act Submissive Acting Conditions and Affiliative Extraverision

	Dominant behaviour			Submissive behaviour		
	ΔR^2	β	t	ΔR^2	β	t
Step 1:	.80***			.66***		
Social Closeness		.08	1.30		.01	.08
Act Dominant		.37	5.45***		-.12	-1.40
Act Submissive		-.64	-9.66***		.74	8.61***
Step 2:	.01			.00		
Social Closeness		.21	2.25*		-.04	-.28
Act Dominant		.36	5.44***		-.12	-1.32
Act Submissive		-.66	-9.94***		.74	8.49***
Social Closeness X Act Dominant		-.16	-1.89		.02	.19
Social Closeness X Act Submissive		-.07	-1.02		.06	.67

*$p < .05$, ** $p < .01$ *** $p < .001$

One potential outlier was identified in the regression predicting dominant behaviour, although the results were identical when this case was removed and so it was retained in the analyses. There was no significant increase in prediction of either model when the acting condition X Social Closeness interaction terms were added in the second step of the models predicting either dominant behaviour, $\Delta R^2 = .01$, $p = .012$, or submissive behaviour, $\Delta R^2 = .00$, $p = .794$.

Naïve observers' ratings of participants' social behaviour and affect following the dominant behaviour manipulations

Control participants rated those in the act dominantly condition as behaving more dominantly, t (21) = 3.29, $p = .004$, $r = .58$, and less submissively, t (21) = -3.32, $p = .003$, $r = .59$ than those in the act submissively condition.

Control participants' ratings of positive activation, D (22) = .23, $p = .003$, and warmth-affection, D (22) = 21, $p = .10$, amongst the act submissively group were not normally distributed. Each of these variables were normally distributed following a log transformation, and so these transformed scores were used in the following parametric analyses.[3]

Participants in the control condition rated participants in the act dominantly condition as experiencing greater levels of positive activation than those in the act submissively condition, t (21) = 3.06, $p = .006$, $r = .56$. There were no differences in control participants' ratings of warmth-affection, t (21) = 1.30, $p = .207$, $r = .27$, or pleasure, t (21) = 1.62, $p = .120$, $r = .33$, experienced by each group however.

[3] Non-parametric analyses were also performed on the original data before transformations were applied. The results of these were identical to the parametric analyses performed on the transformed variables.

In sum, the dominant behaviour manipulations appear to have been successful. Participants in the act dominant group reported higher levels of dominant behaviour than those in the control group did. Furthermore, participants in the act submissive group reported greater levels of submissive behaviour and lower levels of dominant behaviour than those in the control group did. Participants in the act dominant condition also reported greater levels of positive activation than controls, while participants in the act submissive condition reported lower levels of positive activation and pleasure than those in the control group did.

These findings were corroborated by control participants' ratings. Participants in the act dominant group were perceived as behaving more dominantly and less submissively than those in the act submissive group. Participants in the act dominant group were also rated by controls as experiencing higher levels of positive activation.

Testing affective reactivity to social interactions

The following analyses tested the effects of acting condition on self-reported affect, and whether any of these effects were moderated by personality traits. To do so, a series of moderated multiple regressions were conducted to predict positive activation, warmth-affection and pleasure in each of the acting conditions. Mean centered personality scores were entered in the first step of each model, alongside two dummy coded variables that contrast each of the experimental groups with the control condition. Two personality x acting condition interaction terms were then entered in the second step.

The results of three multiple regression analyses predicting positive affects from the communal behaviour manipulations and Social Closeness are presented in Table 13.

Table 13

Predicting Warmth-affection, Pleasure and Posititve Activation Following a Social Interaction from a Communal Acting Condition and Affiliative Extraversion

	Warmth-affection			Pleasure			Positive Activation		
	ΔR^2	β	t	ΔR^2	β	t	ΔR^2	β	t
Step 1:	.29***			.31***			.31***		
Social Closeness		.11	1.04		-.07	-.62		-.13	-1.22
Act communally		.31	2.46*		.15	1.19		.20	1.63
Act aloof		-.29	-2.36*		-.47	-3.79***		-.41	-3.35**
Step 2:	.01			.02			.09*		
Social Closeness		.09	.50		.10	.56		.25	1.50
Act Communally		.30	2.37*		.13	1.03		.19	1.59
Act Aloof		-.29	-2.28*		-.48	-3.86***		-.45	-3.84***
Social Closeness X Act Communally		.07	.50		-.08	-.56		-.40	-2.96**
Social Closeness X Act Aloof		-.03	-.16		-.21	-1.38		-.29	-2.03*

*$p < .05$, ** $p < .01$ *** $p < .001$

The first step of the model predicting warmth-affection accounted for a significant portion of variance, $R^2 = .29$, F (3, 62) = 8.41, $p < .001$. Relative to the control condition, the act communally, $\beta = .31$, $t = 2.46$, $p = .017$, and act aloofly conditions, $\beta = -.29$, $t = -2.36$, $p = .021$, were associated with significantly greater and lesser levels of warmth-affection, respectively. Adding the two interaction terms in the second step did not lead to a significant increase in the variance accounted for however, $\Delta R^2 = .01$, $p = .802$.

The first step of the model also accounted for a significant portion of variance in pleasure, $R^2 = .31$, F (3, 62) = 9.34, $p < .001$, whereby the act aloof condition was

associated with lower levels of pleasure than the control condition, β = -.47, t = -3.79, p < .001. Adding the two interaction terms in the second step did not lead to a significant increase in prediction, however, ΔR^2 = .02, p =.389.

Finally, the first step of the model accounted for a significant portion of variance in positive scores, R^2 = 31, F (3, 62) = 9.25, p < 0.001, whereby participants reported lesser levels of positive activation in the act aloof condition relative to the control condition, β = -.41, t = -3.35, p = .001 . There was a significant increase in prediction at Step 2, ΔR^2 = .09, p = .013, whereby Social Closeness was found to moderate the relationships between positive activation and both the act communally, β = -.40, t = -3.00, p = .004, and act aloof conditions, β = -.29, t = -2.03, p = .046, conditions. These interactions are shown in Figures 4 and 5.

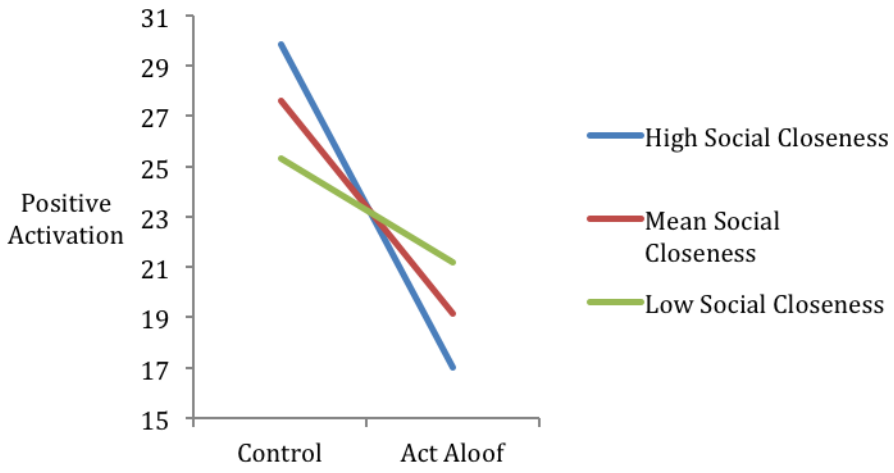

Figure 4. Levels of self-reported positive activation in the act aloof and no-instruction control conditions, at high, moderate and low levels of Social Closeness

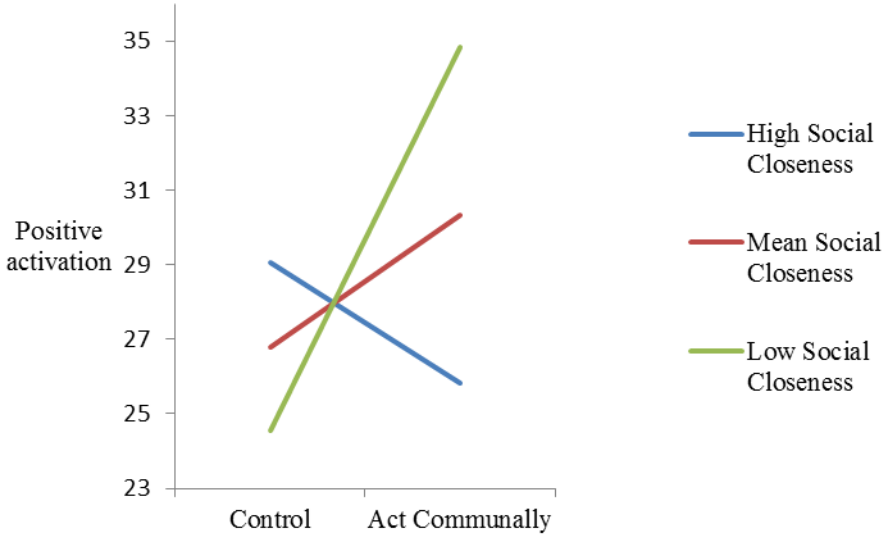

Figure 5. Levels of self-reported positive activation in the act communally and no-instruction control conditions, at high, moderate and low levels of Social Closeness

Analysis of simple slopes revealed that, relative to the control group, positive activation scores were greater in the act communally condition for low scorers on Social Closeness, β = .54, t = 3.24, p = .002, but not for moderate, β = .19, t = 1.59, p = .117, or high scorers, β = -.17, t = -1.00, p = .319. Furthermore, relative to the control condition, positive activation scores were lower in the act aloof condition for individuals with high, β = -.68, t = -4.04, p < .001, and moderate, β = -.45, t = -3.84, p < .001 Social Closeness scores. There were no differences in positive activation between the act aloof and control conditions among low scorers on Social Closeness however, β = -.22, t = -1.40, p = .167. These data therefore show differential patterns of affective reactivity to counter-dispositional social behaviours in affiliative extraversion.

An inspection of the simple slopes analyses therefore suggest that high and low levels of Social Closeness are associated with affective reactivity at differing levels of communal behaviour. At low (act aloof) to moderate (control) levels of

communal behaviour, there is a positive relationship between communal behaviour and positive activation, but only at moderate to high levels of Social Closeness. At moderate (control) to high levels of communal behaviour (act agreeably), there is a positive relationship between positive activation and communal behaviour, but only at low levels of Social Closeness.

A further set of regressions were conducted to test whether agentic extraversion moderates the relationships between communal acting condition and positive affect. The results of these regressions are presented in Table 14.

Table 14

Predicting Warmth-affection, Pleasure and Positive Activation Following a Social Interaction from Communal Acting Condition and Agentic Extraversion

	Positive Activation			Pleasure			Warmth-affection		
	ΔR^2	β	t	ΔR^2	β	t	ΔR^2	β	t
Social Potency									
Step 1:	.29***			.31***			.29***		
Social Potency		.02	.14		-.06	-.52		-.11	-.99
Act Communally		.18	1.42		.14	1.14		.34	2.72**
Act Aloof		-.44	-3.37**		-.45	-3.56**		-.24	-1.85
Step 2:	.02			.01			.00		
Social Potency		.22	.91		.04	.16		-.08	-.32
Act Communally		.15	1.17		.13	1.03		.33	2.54*
Act Aloof		-.43	-3.26**		-.44	-3.35**		-.24	-1.78
Social Potency X Act Communally		-.10	-.56		-.01	-.07		-.02	-.12
Social Potency X Act Aloof		-.22	-1.16		-.14	-.74		-.04	-.20
Achievement									
Step 1:	.32***			.32***			.29***		
Achievement		.17	1.62		.10	.93		.11	.98
Act Communally		.18	1.51		.14	1.14		.33	2.68**
Act Aloof		-.46	-3.78***		-.49	-4.01***		-.30	-2.38*
Step 2:	.01			.02			.01		
Achievement		.16	.78		.08	.39		.10	.49
Act Communally		.19	1.56		.15	1.26		.34	2.70**
Act Aloof		-.45	-3.58**		-.47	-3.76***		-.28	-2.21*
Achievement X Act Communally		.08	.50		.12	.77		.07	.40
Achievement X Act Aloof		-.06	-.34		-.09	-.58		-.06	-.35

*$p < .05$, ** $p < .01$ *** $p < .001$

There was no significant increase in prediction at Step 2 in any of the models when the agentic extraversion X acting condition terms were entered, ΔR^2 ranges

from .00 to .02, all *p*s > .05. Therefore, neither Social Potency nor Achievement moderated affective reactivity to communal behaviours.

Predicting positive activation, pleasure and warmth-affection following a social interaction from dominant acting condition and agentic extraversion.

The next set of analyses tested whether the affective consequences of dominant behaviour were moderated by agentic extraversion. The results of these analyses are presented in Table 15.

Table 15

Predicting Warmth-affection, Pleasure and Positive Activation Following a Social Interaction from Dominant Acting Condition and Agentic Extraversion

	Positive Activation			Pleasure			Warmth-affection		
	ΔR^2	β	t	ΔR^2	β	t	ΔR^2	β	t
Social Potency									
Step 1:	.51***			.35***			.06		
Social Potency		.11	1.16		-.10	-.98		-.16	-1.29
Act Dominantly		.28	2.67*		-.06	-.46		-.11	-.76
Act Submissively		-.54	-5.18***		-.59	-4.82***		-.18	-1.27
Step 2:	.06*			.02			.05		
Social Potency		.41	2.24*		-.01	-.06		.30	1.12
Act Dominantly		.23	2.30*		-.07	-.57		-.17	-1.17
Act Submissively		-.55	-5.37***		-.58	-4.63***		-.23	-1.58
Social Potency X Act Dominantly		-.13	-.89		.01	.04		-.38	-1.79
Social Potency X Act Submissively		-.37	-2.70**		-.16	-.96		-.35	-1.77
Achievement									
Step 1:	.51***			.34***			.05		
Achievement		-.10	-1.11		.06	.59		.10	.77
Act Dominantly		.30	2.91**		-.08	-.64		-.14	-.98
Act Submissively		-.51	-4.93***		-.62	-5.16***		-.23	-1.63
Step 2:	.02			.04			.04		
Achievement		.11	.66		.19	.97		-.11	-.49
Act Dominantly		.29	2.82**		-.08	-.69		-.13	-.91
Act Submissively		-.52	-5.05***		-.63	-5.36***		-.22	-1.53
Achievement X Act Dominantly		-.21	-1.64		-.24	-1.63		.27	.15
Achievement X Act Submissively		-.14	-1.03		.02	.13		.09	.47

*$p < .05$, ** $p < .01$ *** $p < .001$

With regard to Social Potency, the first step of the model accounted for a significant portion of variance in positive activation scores, $R^2 = .51$, F (3, 62) = 21.85, $p < .001$, whereby participants in the act dominantly and act submissively

condition reported greater, β = .28, t = 1.16, p = .010, and lesser, β = -.54, t = -5.54, p < .001, levels of positive activation than those in the control condition, respectively. Adding the two interaction terms at step two led to a significant increase in prediction, ΔR^2 = .06, p = .019. Specifically, Social Potency was found to moderate the contrast between the act submissively and control conditions, β = -.37, t = -2.70, p = .009. This interaction is presented in Figure 6.

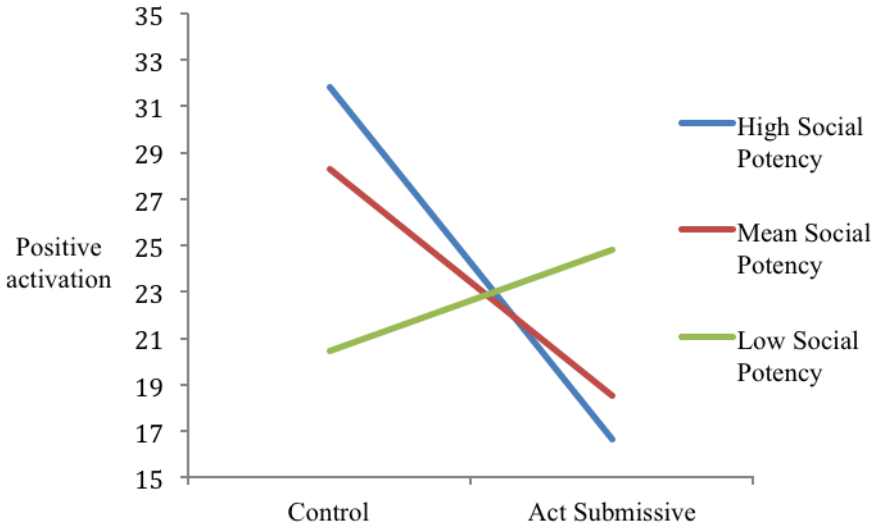

Figure 6. Levels of self-reported positive activation in the act submissive and no-instruction control conditions, at high, moderate and low levels of Social Potency

Analysis of simple slopes revealed that positive activation scores differed between these two conditions among individuals with high, β = -.85, t = -5.37, p < .001, and moderate, β = -.55, t = -5.37, p < .001 Social Potency scores, but not for individuals with low scores, β = -.24, t = -1.69, p = .096. Social Potency therefore moderated the relationship between dominant behaviour and positive activation at low (act submissive) to moderate (control) levels of dominant behaviour, but not at moderate (control) to high (act dominant) levels of dominant behaviour.

When Social Potency scores were replaced with Achievement scores on the other hand, adding the interaction terms in Step 2 did not lead to a significant increase in prediction of positive activation, $\Delta R^2 = .02$, $p = .267$.

In predicting pleasure, the first steps of both regression models were significant, $R^2 = .31$ and .34, both ps < .001, whereby participants reported less pleasure in the act submissively condition relative to the control condition, $\beta = -.59$ and .62, both ps < .001. Adding the Social Potency X acting condition and Achievement X acting condition interaction terms did not lead to a significant increase in prediction in either model however, $\Delta R^2 = .02$ and .04, $p = .448$ and .131.

In predicting warmth-affection, the first step of both models were non-significant, $R^2 = .04$ and .05, $p = .387$ and .251. Furthermore, adding the personality X acting condition interaction terms in the second step did not lead to a significant increase in prediction in either model, $\Delta R = .05$ and .04, $p = .319$ and .153.

Finally, a further three regression analyses were conducted to test whether affiliative extraversion moderates affective reactivity to dominant social interactions. The results of these analyses are shown in Table 16.

Table 16

Predicting Warmth-affection, Pleasure and Positive Activation Following a Social Interaction From Dominant Acting Condition and Affiliative Extraversion

	Positive Activation			Pleasure			Warmth-affection		
	ΔR^2	β	t	ΔR^2	β	t	ΔR^2	β	t
Step 1:	.50***			.34***			.04		
Social Closeness		.01	.10		.10	.93		-.04	-.29
Act Dominantly		.29	2.76**		-.09	-.77		-.13	-.87
Act Submissive		-.52	-4.98***		-.62	-5.21***		-.22	-1.53
Step 2:	.06*			.04			.08		
Social Closeness		.32	2.26*		.30	1.79		.10	.50
Act Dominantly		.27	2.71**		-.12	-.97		-.16	-1.10
Act Submissive		-.55	-5.51***		-.64	-5.45***		-.23	-1.65
Social Closeness X Act Dominantly		-.31	-2.43*		-.14	-.89		.01	.03
Social Closeness X Act Submissive		-.24	-2.30*		-.26	-2.06*		-.31	-2.09*

*$p < .05$, ** $p < .01$ *** $p < .001$

One potentially influential case was identified in the regression predicting positive activation from acting condition and Social Closeness. The results were similar when this case was removed however, and so it was retained in the analysis. There was a significant increase in prediction of positive activation when the Social Closeness X acting condition interaction terms were added in the second step of the model, whereby differences in positive activation scores between the control group and both the act dominantly and act submissively group were both moderated by Social Closeness. These interactions are represented in Figures 7 and 8.

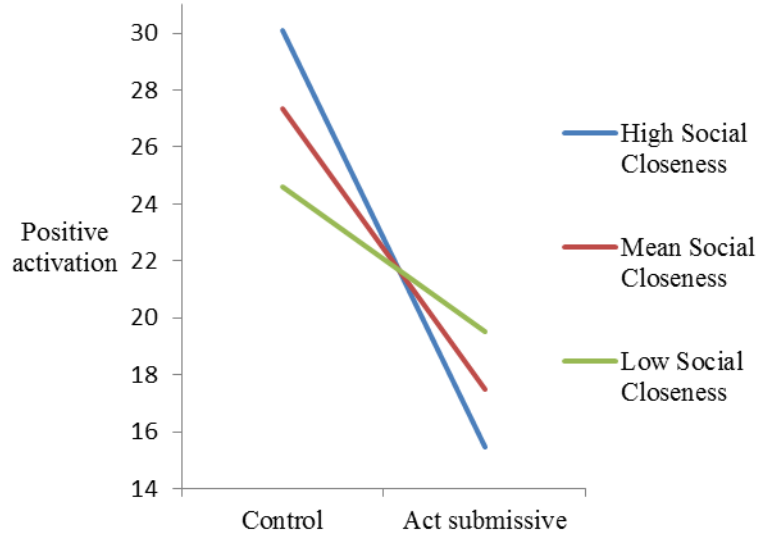

Figure 7. Levels of self-reported positive activation in the act submissive and no-instruction control condition, at high, moderate and low levels of Social Closeness

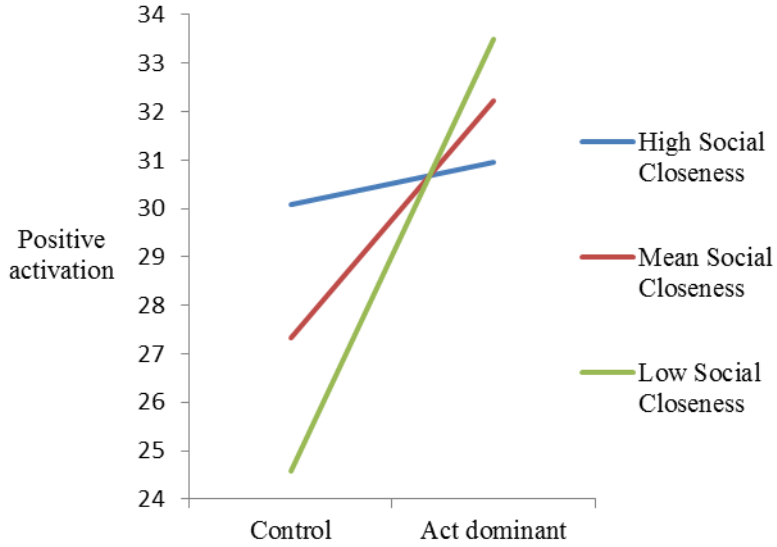

Figure 8. Levels of self-reported positive activation in the act dominant and no-instruction control conditions, at high, moderate and low levels of Social Closeness

Analysis of simple slopes revealed that reports of positive activation were lower in the act submissive condition relative to the control condition for participants with high, β = -.82, t = -5.13, p < .001, and moderate, β = -.55, t = -5.51, p < .001

Social Closeness scores, but not for participants with low scores, β = -.29, t =1.95, p = .056.

Additionally, positive activation scores were greater in the act dominant condition relative to the control condition for participants with low, β = -.50, t = 3.67, p = .001 and moderate, β = .27, t = 2.71, p = .009 Social Closeness scores, but not high scores, β = .05, t = .36, p = .723.

In the regression predicting feelings of pleasure, there was no significant increase in the prediction of the overall model when the acting condition by Social Closeness interaction terms were added in the second step, although Social Closeness was found to moderate the difference in pleasure scores between the act submissively and control conditions. This interaction is shown in Figure 9.

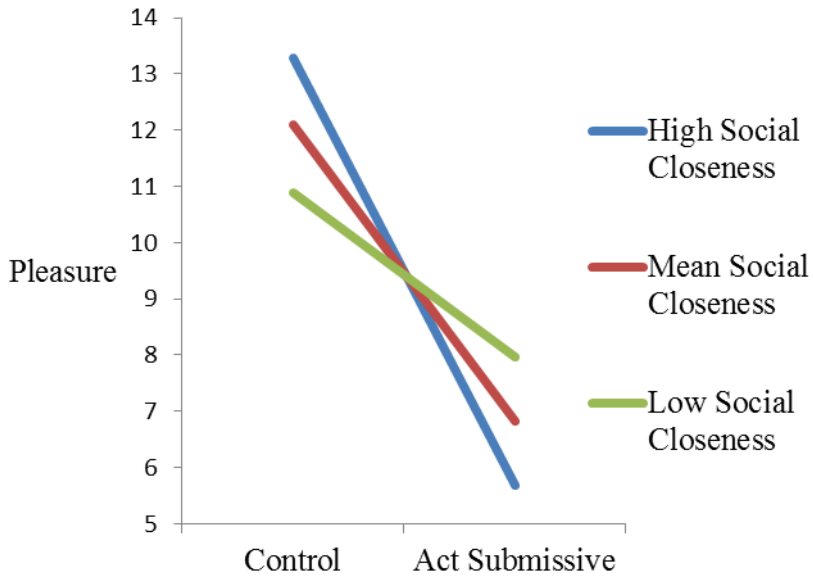

Figure 9. Levels of self-reported pleasure in the act submissive and no-instruction control conditions, at high, moderate and low levels of Social Closeness

Follow up simple slopes analyses revealed that the difference in pleasure scores between the control and act submissively conditions was greater for participants with high Social Closeness scores, β = -.93, t = -4.92, p < .001 than for participants with low Social Closeness scores, β = -.36, t = -2.10, p = .040.

The final model tested whether affiliative extraversion moderated the relationships between dominant acting conditions and warmth-affection. Neither the first, F (3, 62) = 0.85, p = .471, nor the second step of this model was significant however, F (5, 60), = 1.62, p = .168.

4.4 Discussion

The aim of this experiment was to test affective reactivity to social interactions. This experiment improved on the cross-sectional design of Study 1 by manipulating social behaviours experimentally. By instructing individuals to show high and low levels of communal and dominant behaviours, it was possible to investigate the influence of such behaviours on affect relative to a control group who were given no such instructions. It was predicted that communal behaviours would be associated with warmth-affection and pleasure, and that these relationships would be moderated by affiliative extraversion. On the other hand, it was predicted that dominant behaviours would be associated with positive activation, and that this relationship would be moderated by agentic extraversion.

The effects of acting condition on self-reported behaviour and affect

This is the first reported attempt to manipulate communal and dominant behaviours experimentally. It appears as though, for the most part, these

manipulations were successful. Overall, participants in the act communally condition reported greater levels of communal behaviour and lower levels of aloof behaviour than those in the respective control condition, while those in the act aloof condition reported greater levels of aloof behaviour. Furthermore, participants in the act dominantly condition reported greater levels of dominant behaviour than those in the respective control condition, whilst participants instructed to act submissively reported greater levels of submissive behaviour and lower levels of dominant behaviour.

In some instances, the effects of acting condition on behaviour were moderated by personality. Levels of communal behaviour were not found to differ between the act communally condition and the respective control group in participants with low scores on Social Closeness for example. Furthermore, levels of dominant behaviour did not differ between the act dominantly condition and the respective control group in participants with high scores on Social Potency. In the case of the former, it appears as though affiliative introverts did not adhere to the acting instructions in the act communally condition, and behaved similarly to affiliative introverts in the control condition. With regard to the latter, it appears that agentic extraverts behaved just as dominantly when given no instructions as they did when they were asked to be dominant.

The proposed relationships between communal and dominant social behaviours and affect were largely supported. For the most part, instructing individuals to show high levels of communal behaviour caused increases in warmth-affection, whilst instructing individuals to show low levels of communal behaviour caused decreases in warmth-affection, pleasure and positive activation. With regard

to dominant behaviour, instructing individuals to act dominantly caused increases in positive activation, whilst instructing individuals to behave submissively caused decreases in positive activation and pleasure. These findings support prior evidence that – at high levels at least – dominant and communal behaviours are associated with positive affects of greater and lesser activation, respectively (Timmermans et al., 2010).

The moderating role of personality traits on the relationship between social behaviour and affect

Individual differences in affective reactivity to social interactions can be most readily tested by comparing the affect reported by participants in the control group to the act communally and act dominantly groups. These comparisons provided some evidence for personality differences in affective reactivity, but not in the directions predicted. For example, the difference in warmth-affection scores between the act communally and control conditions was not moderated by Social Closeness. On the other hand, Social Closeness did moderate the difference in positive activation scores between the control and act communally conditions, whereby only low scorers on Social Closeness reported greater levels of positive activation in the act communally condition relative to the control condition. This finding is difficult to interpret however, as low scorers on Social Closeness in the act communally condition did not report greater levels of communal behaviour than those in the control condition. It appears as though affiliative introverts in the act communally condition did not

adhere to the instructions, but nonetheless found this situation to be more rewarding than those in the control condition did.

Furthermore, participants who were instructed to act dominantly reported greater levels of positive activation than those in the control condition, but this was not moderated by agentic extraversion. Instead, this effect was moderated by affiliative extraversion, whereby the difference in positive activation scores between the control and act dominant condition was greater for low scorers on Social Closeness than high scorers. The finding that affiliative introverts reported greater levels of positive activation in response to the act communal and act dominant conditions was unexpected, though not entirely without precedent in the literature. In one experience sampling study for example, the relationship between momentary extraverted behaviour (being *talkative, energetic, assertive* and *alert*) and positive affect was more strongly positive for introverts than for extraverts (Fleeson et al., 2002). Therefore, the present findings are not the first to suggest that introverts may find counter-dispositional behaviour to be rewarding. On the other hand, the weight of available evidence does not support this conclusion, as extraversion has largely been found not to moderate the relationship between extraverted behaviours and positive affect (McNeil & Fleeson, 2006; McNeil et al., 2010; Zelenski et al., 2012; Zelenski et al., 2013).

Personality also moderated some of the affective consequences of displaying low levels of communal and dominant behaviour. Levels of positive activation were lower in both the act aloof and act submissive conditions relative to the control conditions for participants with high Social Closeness scores, but not for participants with low Social Closeness scores. Moreover, Social Potency was found to moderate

the difference in positive activation scores between the control condition and the act submissive condition.

These data therefore show that counter-dispositional behaviour comes with significant affective costs for both agentic and affiliative extraverts. On the other hand, counter-dispositional behaviour may have affective gains for affiliative introverts, who reported greater levels of positive activation in both the act communally and act dominantly conditions. In sum however, these data do not support for the affective reactivity hypothesis of agentic nor affiliative extraversion.

Considering the causal mechanisms that underlie the relationship between extraverted behaviour and positive affect may help to explain the observed personality differences. One plausible explanation for the relationship between state extraversion and positive affect is that extraverted behaviour attracts social attention from others, which is inherently rewarding (Ashton, Lee, & Paunonen, 2002; Smillie et al., 2013). From this view, affiliative introverts, who are dispositionally aloof, distant and unsociable persons (Tellegen & Waller, 2008), may find such attention to be particularly novel and therefore respond to such situations with greater levels of positive activation. Affiliative extraverts may be more accustomed to such behaviours in their daily lives however, and therefore be relatively habituated to such forms of social attention. On the other hand, affiliative extraverts respond to aloof and submissive behaviours – which are presumably accompanied by a loss in social attention – with sharp drops in positive activation. This is not true of affiliative introverts however, who presumably typically experience relatively low levels of social attention in their day to day lives.

Social attention per se cannot account for all of the observed personality differences in affect across the acting conditions however. For example, exhibitionism is a component of agentic extraversion (Tellegen & Waller, 2008), and it may therefore be expected that agentic extraverts would experience significant drops in positive activation in response to both aloof and submissive behaviours. This was not found to be the case however: agentic extraversion moderated the effect of submissive behaviour but not aloof behaviour. It may be that the context and appraised meaning of a social interaction is especially important in determining an individual's affective response. A loss of social attention may only carry affective consequences for socially dominant individuals for example, when it signals a loss of rank or status. Presumably, this occurs when individuals are submissive, but not necessarily aloof.

Limitations of the current research

Clearly, the relationships between social behaviour, affect and personality are complex and there are likely several unidentified mediators at play. While previous tests of affective reactivity in agentic and affiliative extraversion have employed simple stimulus-response designs (Morrone-Strupinsky & Depue, 2004; Morrone et al., 2000) the behavioural manipulations included in this study required participants to engage in relatively complex social situations. These situations are unlikely to induce affect in the same manner as relatively simple stimuli such as pictures or films do. Moreover, the inclusion of other participants in each interaction will have increased the number of affectively salient features of the situations, as participants respond to others' behaviour as well as their own. Of course, participants were also

continuously interacting with one another throughout the tasks, and the degree to which their behaviour complemented the others' behaviour may also have had important affective consequences. For example, interpersonal theorists suggest that communal behaviours invite communal responses from others, whilst dominant behaviours invite submissive responses (Markey, Funder, & Ozer, 2001). Individuals' have also been found to be more comfortable during social interactions, and to like their interaction partners more, when their behaviour compliments one another's (Tiedens & Fragale, 2003). Therefore, the behaviour of the other participants in each interaction are likely to have also contributed to participants' affective states, and therefore represent an important moderator that was not considered in this study.

Another limitation of this study was the selection of the discussion tasks and comparison conditions. The two discussion tasks chosen for this experiment were taken from previous studies where researchers have manipulated extraverted behaviour by supplying participants with acting instructions (Zelenski et al., 2012). These tasks – planning a day together and ranking the usefulness of ten items - were selected because they represented situations in which participants in the experimental conditions would be able to modify their communal and dominant behaviours in a way that would appear natural, without arousing the suspicion of the other participants. The nature of these tasks also placed behavioural demands on participants who were not given any instruction on how to act however, and both tasks require a certain level of communal and dominant behaviour. In sum, these tasks are not neutral, and may therefore be inappropriate comparison conditions (McNeil & Fleeson, 2006).

In sum, the data do not support the affective reactivity hypothesis of agentic and affiliative extraversion. There was some evidence that personality traits moderate affective reactivity to social interactions, but the observed effects were not in the directions anticipated. Affiliative introverts appear to experience greater levels of positive activation when instructed to act communally or dominantly than do affiliative extraverts, whilst affiliative extraverts experience sharper drops in positive activation when behaving in aloof and submissive ways than do affiliative introverts. Moreover, agentic extraverts also experience lower levels of positive activation than do agentic introverts when they are instructed to behave submissively. It is difficult to account for these findings on the basis of the available data, or from affective-reactivity models more generally.

Chapter 4

Testing appraisals as mediators of agentic and affiliative affective reactivity

4.1 Introduction

Studies 1 and 2 tested affective reactivity in response to social behaviours. In neither sample was the reactivity hypothesis of agentic and affiliative extraversion supported. The aim of the current study is to further test agentic and affiliative affective reactivity using a different emotion induction paradigm, namely, guided imagery. A second aim is to test whether appraisals can account for individual differences in affective reactivity.

Appraisal theorists contend that emotions are elicited and differentiated by an individual's appraisal of an object or event's relevance to its well-being (Ellsworth & Scherer, 2003; Moors, Ellsworth, Scherer, & Frijda, 2013; Scherer, 1999). It is the outcomes of these subjective evaluations that determine an individual's emotional response, rather than the objective features of the event. (Ellsworth & Scherer, 2003; van Reekum & Scherer, 1997). Several appraisal models have been developed, each of which describes a relatively small number of appraisal criteria. These models differ in the number of appraisal dimensions proposed, although there is considerable overlap in the dimensions that appraisal theorists consider to be important (Moors et al., 2013). Commonly suggested appraisals include pleasantness, predictability, importance, agency, power, and compatibility with personal standards (Ellsworth & Scherer, 2003). Collectively, these appraisals glean at least four types of information:

whether the event is relevant to the individual or his or her reference group (relevance); the consequences of the event and how these impact on the individual's goals and well-being (implications); how it can cope with these consequences (coping potential); and how the event relates to its self-concept and social norms (normative significance; Sander, Grandjean, & Scherer, 2005; Scherer, 2001).

These evaluations result in patterns of appraisals that are associated with particular emotional states. Anger for example is associated with appraisals of low goal conduciveness and high urgency and coping potential. Sadness is also associated with appraisals of low goal conduciveness, but in contrast to anger, is also associated with appraisals of low urgency and low coping potential (Ellsworth & Scherer, 2003).

Appraisal processes occur at different levels and take various forms, ranging from rapid, automatic and unconscious operations to slower, deliberate and conscious evaluations (Lazarus, 2001; Scherer, 1999; van Reekum & Scherer, 1997). There are at least three levels at which an organism can evaluate the significance of an event: the sensory-motor, schematic, and conceptual levels (Scherer, 2001; van Reekum & Scherer, 1997). Appraisals made at the sensory-motor level are likely automatic and reflexive, based primarily on hard-wired processes that have been shaped by evolution to detect the intrinsic benefit or harm potential of stimuli. Appraisals made at the schematic level are also expected to be unconscious and automatic, though these processes are acquired through learning and past experience, as opposed to being inherited. Processes occurring at the conceptual level are effortful, conscious and are comparatively more complex than those occurring at

either the sensory-motor or schematic levels (Scherer, 2001; van Reekum & Scherer, 1997).

Recognising that appraisals occur at various levels of awareness and that these processes differ temporally addresses a common criticism that appraisal models are too slow, deliberate and conscious to account for the rapid onset of emotional responses (Scherer, 1999). In practice however, the majority of appraisal research has been conducted at the conceptual level, where individuals' interpretations of events are measured through self-report questionnaires. These methods have been applied in various paradigms to test models of appraisal. One common strategy is to ask individuals to recall past emotional episodes, and then to report on how they appraised these events (Ellsworth & Smith, 1988; Fitness & Fletcher, 1993; Frijda, Kuipers, & Schure, 1989; Roseman, 1996; Scherer, 1997). An alternative approach is to measure individuals' appraisals of recent or currently unfolding events by either sampling naturally occurring situations (Folkman & Lazarus, 1985; Scherer & Ceschi, 1997; Smith & Ellsworth, 1987; Tong et al., 2007) or by inducing emotions experimentally (Siemer, Mauss, & Gross, 2007). Other researchers have chosen to construct vignettes in order to manipulate some aspect of the appraisal process, and have individuals report on how they would feel in these situations (Smith, Haynes, Lazarus, & Pope, 1993; Smith & Lazarus, 1993). These methods have generally supported the predictions made by appraisal researchers, whereby a relatively small number of appraisals can account for between 40 to 50% of the emotions studied (Ellsworth & Scherer, 2003).

In addition to accounting for the elicitation and differentiation of emotions, appraisals also contribute to the intensity of affect (Sonnemans & Frijda, 1995;

Verduyn, Mechelen, & Frederix, 2012). Appraisals of motivational relevance, unfairness, frustration and other-accountability have been found to be associated with intense experiences of anger for example (Kuppens, Mechelen, & Rijmen, 2008). Furthermore, appraisal measures have been found to account for between 13 to 25% (Siemer et al., 2007) and 21 to 39% (Brans & Verduyn, 2014) of the variance in the felt intensity of experimentally induced and recalled emotional experiences, respectively.

Individual differences in appraisal processes

Several researchers have suggested that there exist stable individual differences in appraisal processes, which bias how individuals appraise events and consequently experience emotion (Kuppens & Tong, 2010; Moors et al., 2013; Scherer, 2009; van Reekum & Scherer, 1997). Examples of these individual differences include the tendency to attribute the cause of events to others' hostile intentions (Dodge, 2006; Dodge & Crick, 1990), and the tendency to attribute negative events to global and stable causes, which underlies vulnerabilities to hopelessness and depression (Abramson, Metalsky, & Alloy, 1989).

There are several sources of individual differences in appraisal biases. There exist for example cultural differences in appraisals (Imada & Ellsworth, 2011). Individual differences in appraisal also relate to personality traits (Hemenover & Dienstbier, 1996; Johnson et al., 2012; Tong et al., 2006). For example, trait anger has been associated with appraisals of other-blame and accountability, goal-incongruence and lower levels of coping potential (Hazebroek, Howells, & Day, 2001; Kuppens & Mechelen, 2007). With regard to the Big Five, neuroticism has

been associated with tendencies to appraise events as being unfair, unconducive to goals, uncontrollable, uncertain and as violating moral standards (Tong et al., 2006). Conscientiousness has been associated with tendencies to appraise events as being pleasant, controllable, and certain, and with lower tendencies to ascribe the cause of events to other people, or to appraise events as being unfair or violating moral standards (Tong et al., 2006).

These dispositional appraisal styles describe general tendencies for individuals to appraise events in particular ways across situations. Appraisal processes are relational however, and emerge from an interaction between the individual and the event that is to be appraised. When individuals appraise events, they do so in relation to their current needs, goals and resources (Kuppens & Tong, 2010; Smith & Kirby, 2009). An individual will only appraise an event as being goal-relevant for example, if that situation has consequences for their personal goals; a different event with no bearing for the individual's goals will not be appraised as being goal-relevant. As evidence of this, possessing competence based goals is positively associated with the extent to which individuals rate achievement-related events as being goal-relevant (Smith & Pope, 1992). Similarly, the degree to which individuals hold affiliation goals is positively related to the extent to which they appraise communal events as being goal-relevant (Griner & Smith, 2000). Moving beyond evaluations of goal-relevance, Kuppens and Van Mechelen (2007) found that neuroticism was positively associated with appraisals of other-blame and threat to self-esteem in some circumstances but not others.

These data suggest that individual differences in appraisal may be able to account for individual differences in emotion (Scherer, 2009; Smith & Kirby, 2009).

Specifically, appraisals may mediate individual differences in emotional reactivity. Roseman and colleagues tested this mediation model by collecting American and Indian individuals' accounts of events that elicited feelings of sadness, anger and fear, including measures of how they felt in these situations and how they appraised them (Roseman, Dhawan, Rettek, Naidu, & Thapa, 1995). The results indicated that Indian participants were less likely to report feelings of sadness and anger in these situations than their American counterparts, and that this was mediated by Indian persons' tendencies to appraise the events as being less motivationally inconsistent. In other words, cultural differences in appraisals accounted for the lower levels of sadness and anger reported by Indian participants. These findings clearly demonstrate how appraisals can account for individual differences in emotional intensity. Additionally, Silvia (2008) similarly found that trait curiosity predicts feelings of interest in response to complex artworks, and that this effect was fully mediated by individuals' appraised ability to understand these works. In other words, highly curious people consider themselves to be capable of understanding complex art, which in turn causes these individuals to experience high levels of interest in response to these stimuli.

Aims and hypotheses

This study has two primary aims. The first is to test affective reactivity in agentic and affiliative extraversion. The second is to test whether affective reactivity in agentic and affiliative extraversion is mediated by cognitive appraisals. To do so, it is first necessary to identify which appraisals should be considered. In the absence of a consensus on how many appraisals are sufficient to account for the elicitation

and differentiation of emotions, the work of several theorists' works were reviewed to identify dimensions that are common across models (Ellsworth & Smith, 1988; Frijda et al., 1989; Lazarus, 2001; Roseman, 1996; Scherer, 2001). From this review, 12 appraisal dimensions were identified and included in the current study: *Intrinsic Pleasantness* (how pleasant an event is considered to be regardless of the individual's current state or needs); *Importance* (whether the event has any implication for the individual's goals or needs); *Situational-Agency* (whether the event was caused by external, situational circumstances); *Self-Agency* (whether the event was caused by oneself); *Other-Agency* (whether the event was caused by another person); *Outcome Probability* (the extent to which an individual can predict the outcome of the event); *Goal Conduciveness* (the extent to which the event helps the individual fulfill their goals or needs); *Controllability* (the extent to which an event or its outcomes can be controlled by a human agent); *Power* (the extent to which an event or its outcomes can be controlled by oneself); *Compatibility with Internal Standards* (the extent to which the event is compatible with the individuals' self-image, ideals and morals); *Effort* (the degree of effort an individual expects to expend during a situation); and *Fairness* (the degree to which an event or its outcomes are considered to be fair and just).

It is hypothesised that agentic extraversion will predict feelings of positive activation following an appetitive stimulus, and that affiliative extraversion will predict feelings of warmth-affection and pleasure following an affiliative stimulus. It is further hypothesised that these relationships will be mediated by cognitive appraisals.

It is difficult to make confident predictions about which appraisal dimensions will mediate the predicted personality-affect relationships based on the previous research. There are some data on how positive affects are associated with different patterns of appraisal however. For example, combined ratings of *hopeful, expectant, confident, proud* and *triumphant* have been found to be associated with appraisals of Pleasantness, Self-Agency, Effort, Predictability and Importance (Ellsworth & Smith, 1988). It was therefore tentatively predicted that these appraisals would mediate the relationship between agentic extraversion and positive activation. Additionally, combined feelings of *loving, friendly, admiring* and *grateful* have been found to be positively associated with appraisals of Pleasantness, Other-Agency, Importance and negatively associated with appraisals of Effort (Ellsworth & Smith, 1988). It was therefore predicted that these appraisals would mediate the relationship between affiliative extraversion and warmth-affection.

4.2 Piloting guided imagery vignettes to induce positive activation and warmth-affection.

4.2.1 Method

A guided imagery emotion induction paradigm was chosen to test the hypothesis that appraisals mediate the relationship between agentic extraversion and positive activation and affiliative extraversion and warmth-affection. Guided imagery was deemed an appropriate method, as it has previously been used to test both affective reactivity in extraversion (Smillie et al., 2013) and appraisal processes

in emotion (Smith & Lazarus, 1993). The guided imagery vignettes created to test agentic and affiliative reactivity were first tested in a pilot study.

Participants

86 (67 female) participants took part in the study. The mean age of participants was 32.62 years.

Materials

Emotion induction vignettes

The vignettes were written to reflect the content of the films developed by Morrone-Strupinsky and colleagues to induce states of positive activation and warmth-affection (Morrone-Strupinsky & Depue, 2004; Morrone et al., 2000). The positive activation vignette read:

"You are a footballer, playing a match in front of a huge crowd. The score is tied, and your team has been awarded a penalty in the last few moments of the game. You have been chosen as the player to take the penalty, and the crowd begins to chant your name loudly as you stand in front of the ball; scoring this penalty will win the match for your team. You run toward the ball, strike it with the side of your foot and score - the stadium erupts with applause as your team mates rush towards you and lift you onto their shoulders. The crowd continues to chant your name and applaud you and chant your name as your team mates carry you around the pitch in celebration."

The warmth-affection vignette read:

"It is a few days after the birth of your first son, and you are asleep in bed with your partner. When you are awoken by your son crying, your partner leaves the room to attend to him. You move to the other room a few moments later and watch your partner holding your son close to their chest and kissing him softly on the forehead. Your partner turns toward you and smiles as you place one arm over their shoulder and the other across your son. Your partner also places an arm over your shoulder and kisses you, and you both spend the next few moments holding your son together."

Affect measures

Positive activation was measured with the Positive Activation scale of the PANAS (Watson et al., 1988). Warmth affection was measured with five items (*warm, caring, loving, fondness* and *affection*). Pleasure was measured with four items (*happy, satisfied, pleased* and *content*). Participants rated each item on a five point scale to indicate the extent to which they feel "right now, that is at the present moment." The internal consistencies of these scales ranged from .90 to .96.

Procedure

Ethical approval for this study was obtained from the University of Strathclyde's School of Psychological Sciences and Health Ethics Committee.

The study was conducted online and presented through Qualtrics (www.qualtrics.com). The study was advertised on social media (e.g. Facebook and Twitter) and through posters placed throughout the University of Strathclyde campus.

After accessing the study online, participants were first presented with the affect questionnaires, where they were asked to indicate how they felt at that point in time. Participants were then presented with one of the vignettes and were instructed to:

"Please read the following scenario and imagine yourself experiencing the events as vividly as you can. Picture the event happening to you. Try to imagine all the details of the situation. Close your eyes and picture in your "mind's eye" the surroundings as clearly as possible. See the people or objects; hear the sounds; experience the event happening to you. Think the thoughts and feel the same feelings that you would actually think in this situation. Let yourself react as if you were actually there.

Spend a few minutes doing so. When you are experiencing these feelings and thoughts, please move on to the next section"

These instructions were taken from Smith and Lazarus (1993). The vignettes were not presented for a fixed time, and participants were free to choose when they moved on to the next section of the experiment, where they were asked to complete the affect measures again. The process was then repeated with the second guided imagery vignette. The order in which the vignettes were presented was counterbalanced across participants.

Missing data

Some participants did not complete the experiment, which led to some missing data. Between 0 to 5.8% of values were missing across each variable, and Little's MCAR test revealed that these data were missing completely at random, χ^2 (27) = 3.10, p = 1.00. Following the advice of Tabachnik and Fidell (2007) and Howell (2007), missing values were replaced with multiple imputation, with five imputations. The results of the analyses conducted with the multiple imputation data were similar to those obtained when the original data with missing values were used. The original data with pairwise deletion of missing values is therefore presented to ease the interpretation and reporting of the results.

4.2.2 Results

The data were first converted to z-scores and screened for outliers. Six values were identified with z-scores ± 3.29 across all of the variables and these were replaced with the mean ± three times the standard deviation. Descriptive statistics for participants' affect scores before and after each guided imagery task are presented in Table 17.

Table 17

Means (Standard Deviation) of Affect Scores Before and After the Appetitive Football and Affiliative Family Imagery Conditions

	Appetitive sports imagery		Affiliative family imagery	
	Pre	Post	Pre	Post
Positive Activation	28.17 (8.46)	39.96 (9.59)	28.09 (8.60)	37.75 (9.31)
Warmth-affection	15.10 (5.45)	20.44 (5.61)	14.94 (5.37)	22.92 (3.74)
Pleasure	12.02 (3.84)	17.50 (3.73)	11.88 (3.84)	17.68 (3.77)

Each of the post-imagery affect scores were skewed in both conditions (zSkewness ranges from -4.05 to -7.51). Data remained skewed after applying logarithmic, square root and reciprocal transformations, and so the efficacy of the imagery tasks was assessed with a series of non-parametric Wilcoxon signed-rank tests.

Following the sports imagery, there were large increases in positive activation $z = -6.64$, $p < .001$, $r = .52$, pleasure, $z = -6.92$, $p < .001$, $r = .54$, and warmth-affection, $z = -6.13$, $p < .001$, $r = .48$. Following the family imagery, there were also significant increases in warmth-affection, $z = -6.42$, $p < .001$, $r = .57$, pleasure, $z = -7.49$, $p < .001$, $r = .56$ and positive activation, $z = -6.42$, $p < .001$, $r = .49$.

To test the relative efficacy of the imagery tasks in inducing the intended affects, average scores on each affect measure were computed for each condition and then compared in a further series of Wilcoxon signed-rank tests.

Following the football imagery, positive activation and warmth-affection scores did not differ significantly, $z = -1.15$, $p = .251$, $r = .09$. Furthermore, pleasure scores were significantly higher than both positive activation, $z = -4.31$, $p < .001$, $r = .33$, and warmth-affection scores, $z = -3.02$, $p = .003$, $r = .24$.

Following the family imagery, warmth-affection scores were significantly higher than positive activation, $z = -7.72$, $p < .001$, $r = .59$, and pleasure scores, $z = -3.78$, $p < .001$, $r = .29$. Furthermore, pleasure scores were significantly higher than positive activation scores, $z = -7.01$, $p < .001$, $r = .54$.

The results of these analyses suggest that the affiliative family vignette did induce the target affect of warmth-affection, and more so than it did positive activation. The appetitive football vignette did induce positive activation as intended, but this task also produced equivalent levels of warmth-affection. A different vignette was therefore selected to induce positive activation in the full study.

4.3 Testing individual differences in appraisals and affective reactivity in response to guided imagery vignettes

4.3.1 Method

Participants

260 (181 females) participants accessed the study and completed at least the initial personality questionnaires. The average age of participants was 26.38 years, SD = 11.28. There was a substantial amount of missing data, with between 7.70 - 21.20 % data missing across all variables. These data were missing completely at random, χ^2 (184) = 187.44, p = .416. It was not possible to estimate missing values with multiple imputation, as the SPSS add-on that was chosen to analyse the data– PROCESS (Hayes, 2013) - does not currently support multiple imputation data. Therefore, it was decided to adopt a listwise deletion approach, whereby participants with any form of missing data were dropped from the analyses. When data are missing at random, the only downside of this approach is a loss of statistical power, although given the large sample size this was not considered to be especially problematic (Howell, 2007).

Following the listwise deletion, the final sample consisted of 192 participants (132 females). The mean age of participants was 26.33 years, SD = 11.86.

Emotion induction vignettes

States of positive activation and warmth affection were again induced with two guided imagery tasks. The affiliative family vignette that was used in the pilot study was chosen to induce warmth-affection, wherein participants are asked to imagine themselves in an affectionate exchange with their romantic partner and newborn child. The results from the pilot study indicated that the football vignette that was designed to induce positive activation also induced an equivalent degree of warmth-affection. An alternative vignette was chosen to induce positive activation therefore, where participants were asked to imagine themselves buying a lottery ticket and winning £1000. This vignette has previously been developed to induce states of positive activation in studies of affective reactivity in extraversion (Smillie et al., 2012).

Appraisal measures

The items used to measure appraisals were adapted from measures employed by previous researchers (Ellsworth & Smith, 1988; Frijda et al., 1989; Lazarus, 2001; Roseman, 1996; Scherer, 2001) Appraisal dimensions are typically measured with between 1 to 3 items, whereby longer scales provide more reliable measurements (Schorr, 2001). A balance was sought between the number of items included in each scale and the total number of appraisals included. To avoid fatiguing participants,

three items were selected to measure each appraisal, with the exception of Intrinsic Pleasantness which was measured with a single item ("*How pleasant would this family interaction/ winning the lottery be in general, regardless of your current needs, desires or feelings?"*).

The phrasing of the items was changed slightly to reflect either the Lottery or Family scenarios. Examples of items include, "*To what extent was this family interaction/ winning the lottery important to you?*" (Importance); "*To what extent did this family interaction occur/ did you win the lottery by chance*?" (Situational-Agency); "*How responsible were you for this family interaction occurring/ winning the lottery*?" (Self-Agency); "*How responsible was another person for what happened in this family interaction/ for the lottery win*?" (Other-Agency); "*To what extent did you think that the outcome of this family interaction/ buying the lottery ticket was clearly predictable?*" (Outcome Probability); and "*To what extent did you think that this family interaction/ winning the lottery would have positive consequences for you?*" (Goal Conduciveness); "*To what extent could a person (either you or another person) influence the outcome of this family interaction/ buying the lottery ticket?*" (Controllability); "*To what extent did you think that you were able to control the potential consequences of this family interaction/ buying the lottery ticket*? (Power); "*To what extent was this family interaction/ winning the lottery consistent with your personal beliefs, values and ideas?*" (Compatibility with Internal Standards); "*How much effort (mental or physical) did you feel you had to expend during this family interaction/ situation?*" (Effort); and "*To what extent did you think that what happened to you in this family interaction/ winning the lottery*

was fair?" (Fairness). Participants responded to each with a five point scale ranging from 1(Not at all) to 5 (Completely).

The internal consistencies of each scale were reviewed to identify any scales with especially low reliabilities. The Power and Controllability scales showed exceptionally low reliabilities in both the Lottery and Family conditions (αs ranged between -.59 to .29). These low coefficients appeared to be caused by a reversed item question in each scale, which participants may have misread or misunderstood. These items were removed from each scale, which resulted in two item measures of Power and Controllability in both the Lottery and Family conditions. These shortened scales possessed markedly improved reliabilities (αs ranged from .61 to .88).

In the lottery condition, the reliabilities for the Situational Agency, Own Agency and Controllability scales were low, αs range between = .54 to .64 respectively. The remaining scales showed adequate reliability (αs ranged between .74 - .93). Each of the family appraisal measures possessed a high degree of internal reliability (αs ranged between .70 - .92).

Affect measures

The same measures of positive activation, warmth affection and pleasure used in Studies 1 and 2 were employed here. Positive activation was measured with the Positive Activation scale of the PANAS (Watson et al., 1988). Warmth affection was measured with five items (*warm, caring, loving, fondness* and *affection*). Pleasure was measured with four items (*happy, satisfied, pleased* and *content*). Participants rated each item on a five point scale to indicate the extent to which they

feel “right now, that is at the present moment.” Each scale was found to possess adequate internal consistency (Cronbach’s α range between .84-.97).

Personality measures

As this study was conducted online, public domain personality measures were sought to measure personality. For this reason, agentic and affiliative extraversion were measured with the Assertiveness and Enthusiasm scales of the Big Five Aspect Scales, respectively (BFAS; (DeYoung et al., 2007). BFAS Assertiveness and Enthusiasm are highly correlated with MPQ Social Potency and Social Closeness (r = .75 and .64, respectively) and have previously been used to test affective reactivity in agentic and affiliative extraversion (Smillie et al., 2013). In the current sample, the internal consistency of the Assertiveness scale was .88 and .84 for the Enthusiasm scale.

Procedure

Ethical approval for this study was obtained from the University of Strathclyde’s School of Psychological Sciences and Health Ethics Committee.

The study was conducted online, and was advertised on social media (e.g. Facebook and Twitter) and websites dedicated to recruiting participants for online psychology experiments (e.g. socialpsychology.org).

The procedure was similar to that of the pilot study. Participants first completed the affect questionnaires to rate their current emotional states, and were then presented with one of the guided imagery vignettes. The instructions presented to participants were the same as those given in the pilot study, although here all

participants imagined themselves in each scenario for 90 seconds. After this, the experiment automatically proceeded to the next screen, where participants completed the affect questionnaires again and then completed the appraisal questionnaire to rate how they had appraised the previously imagined situation. This procedure was then repeated with the second imagery vignette. The order in which each imagery condition was presented was counterbalanced between participants.

Statistical analyses

The data were first screened for outliers by calculating z-scores. Outlier scores were defined as any value with a z-score ± 3.29. Outlier scores were the replaced with the mean ± three times the standard deviation (Field, 2009).

The relationships between personality and affect, and then personality and appraisals were tested with a series of hierarchical multiple regressions. The data were screened for influential cases in each of these analyses using the same procedures as those described in Study 1. First, cases with standard deviations greater than 2 or less than -2 were identified. Cook's distance, average leverage, Mahalanobis distance and DFBeta statistics were then produced for these cases. Cases were suspected of having an undue influence over the model if i) the Cook's distance was greater than 1, ii) the centered leverage value was three times greater than the average leverage, iii) the Mahalonobis distance was greater than 15, or iv) the DFBeta was greater than 1.

The assumptions of each multiple regression model were also assessed using the same methods as those described in Study 1. Multicollinearity was suspected if: i) IVs correlated ≥ .70, ii) a VIF value was greater than 10, iii) mean VIF was substantially greater than 1.00, iv) a tolerance value was less than .10, v) more than one predictor's variance loads substantially onto a small eigenvalue (Field, 2009).

The Durbin-Watson test was used to check the assumption that the residuals in the model were independent. Test statistics less than 1 or greater than 3 were considered to be problematic. To assess the assumptions of linearity and homoscedasticity, the standardised values of the dependent variable predicted by the model were plotted against the standardised residuals in a scatterplot graph. If the points appeared to be randomly and evenly spread out then it was accepted that the assumptions had been met (Field, 2009). Where the assumption of homoscedasticity was found to be violated, the distribution of independent variables was examined and a logarithmic, square root or reciprocal transformation was applied to any that were found to be skewed. The dependent variable was also transformed, as this can also help to correct for heteroscedasticity (Tabachnick & Fidell, 2007). Some regression models did not meet the assumption of homoscedasticity after applying these transformations. In these cases, the regressions were repeated with bootstrapping, which are robust to violations of homoscedasticity (Field, 2013). The results of each analysis were comparable when the original data was used, compared to the transformed data or bootstrapped analyses. The original data is therefore presented throughout to aid the interpretation and presentation of the results.

To test the normality of residuals, both the histogram and normal probability plots were inspected visually.

4.3.2 Results

Data were first converted to z-scores and screened for outliers. 17 values were identified with z-scores scores ± 3.29, and these were replaced with the mean ± three times the standard deviation.

Manipulation checks

Descriptive statistics of affect scores are presented in Table 18. The first set of analyses tested whether the lottery and family vignettes induced states of positive activation and warmth-affection, as intended.

Table 18

Descriptive Statistics and Comparisons of Affect Scores Pre and Post the Appetitive Lottery and Affiliative Family Imagery Conditions

	Appetitive lottery imagery		Affiliative family imagery	
	Pre	Post	Pre	Post
Positive Activation	28.88 (10.34)	36.91 (10.34)	28.18 (9.22)	37.47 (9.68)
Warmth-affection	15.14 (5.86)	15.84 (6.05)	14.36 (5.55)	22.16 (4.77)
Pleasure	12.07 (4.50)	16.14 (4.10)	11.34 (4.03)	17.30 (3.90)

Several of the post imagery affect scores showed signs of significant skewness, with zSkewness scores ranging between -4.24 to -11.06. Post family imagery warmth-affection and pleasure scores also showed signs of kurtosis - zKurtosis = 8.44 and 6.65, respectively. Square root transformations improved the distribution of some variables, although post family imagery warmth affection and

pleasure scores remained skewed after square root, logarithmic and reciprocal transformations were applied. Analyses involving these latter two variables were therefore conducted using non-parametric Wilcoxon signed-rank tests.

Following the lottery imagery task, there were large increases in self-reported positive activation, t (191) = -11.40, $p < .001$, $r = .64$, and pleasure, t (191) = -12.83, $p < .001$, $r = .68$ though there was no change in warmth-affection scores, t (191) = -1.65, $p = .101$, $r = .01$. Following the family imagery, there were large increases in warmth-affection, $z = -10.90$, $p < .001$, $r = .56$, positive activation t (191) = -12.18, $p < .001$, $r = .66$, and pleasure scores, $z = -10.66$, $p < .001$, $r = .54$. [4]

To test the relative efficacy of the imagery tasks in inducing the intended affects, average scores on each affect measure were computed by dividing each score by the number of items in the measure. The distributions of these adjusted scores were identical to the distributions of the original scores, and most of these values remained non-normally distributed. The distributions of the adjusted affect scores following the lottery imagery were improved following a log transformation, although the post family imagery affect scores remained skewed after logarithmic, square root and reciprocal transformations were applied. Analyses of these latter values were therefore conducted with non-parametric tests.

These analyses showed that following the lottery imagery, positive activation scores were significantly greater than warmth-affection scores t (191) = 10.44, $p < .001$, $r = .60$, as were pleasure scores, t (191) = -13.64, $p < .001$, $r = .70$. Pleasure scores were also significantly greater than positive activation scores following the lottery imagery, t (191) = -9.44, $p < .001$, $r = .56$.

[4] Where data were transformed, non-parametric analyses were also performed on the untransformed data. The results of these analyses were identical to the results of the parametric tests conducted on the transformed data.

Following the family imagery, warmth-affection scores were significantly greater than positive activation (z = -10.36, p < .001, r = .53), and pleasure scores (z = -4.16, p < .001, r = .21). Pleasure scores were also greater than positive activation scores (z = -9.95, p < .001, r = .51). [5]

Appetitive Lottery condition

Descriptive statistics for personality, affect and appraisal measures in the appetitive lottery condition are presented in Table 19. As some data was heavily skewed, non-parametric Spearman's correlations were conducted to allow for comparisons across analyses.

[5] Where data were transformed, non-parametric analyses were also performed on the original, untransformed data. The results of these analyses were identical to the parametric tests performed on the original data.

Table 19

Descriptive Statistics and Correlations Between Personality, Affect, and Appraisal Measures in the Appetitive Lottery Imagery Conditions

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Mean (SD)
1. Assertiveness	**.44*** **	**.37*** **	**.33*** **	**.33*** **	**.24** **	**.30*** **	**.26*** **	**.22** **	.13	.14	.00	-.03	**.13**	.11	.05	**.11**	.13	.02	**.18***	3.32 (0.76)
2. Enthusiasm		**.41*** **	**.34*** **	**.47*** **	**.30*** **	**.45*** **	**.34*** **	**.16***	.04	**.17** **	.11	.04	**.16***	.06	.10	**.15***	**.18***	-.04	**.17***	3.58 (0.69)
3. Pre Positive Activation			**.51*** **	**.81*** **	**.50*** **	**.85*** **	**.38*** **	.13	.03	.11	.03	.01	.11	.05	.05	.05	.12	.01	.11	28.88(10.14)
4. Post Positive activation				**.47*** **	**.84*** **	**.46*** **	**.83*** **	**.39*** **	**.30*** **	.13	**.22** **	.03	.06	**.39*** **	.09	.08	**.26*** **	.09	**.36*** **	36.91(10.34)
5.Pre Warmth-affection					**.50*** **	**.81*** **	**.41*** **	**.21** **	.01	.07	.09	.00	.07	.07	.03	.01	.10	-.04	.14	15.13 (5.86)
6. Post Warmth-affection						**.44*** **	**.67*** **	**.23** **	**.19***	.11	.13	.08	.13	**.24** **	.09	.10	**.29*** **	.12	**.31*** **	15.84 (6.05)
7. Pre Pleasure							**.38*** **	**.19** **	-.08	.08	.04	.03	.10	-.01	.05	.07	.10	-.07	.07	12.07 (4.54)
8. Post Pleasure								**.43*** **	**.25** **	.06	**.22** **	-.02	-.04	**.39*** **	.07	.06	**.19** **	.00	**.26*** **	16.17 (3.99)
9. Intrinsic Pleasantness									**.27*** **	.04	**.24** **	**-.15***	**-.18***	**.44*** **	-.02	-.03	.01	.01	**.29*** **	4.61 (0.71)
10. Importance										**.33*** **	.13	**.19** **	**.23** **	**.59*** **	**.23** **	**.22** **	**.34*** **	**.42*** **	**.50*** **	10.36 (3.15)
11. Self-Agency											**-.19** **	**.58*** **	**.64*** **	.12	**.49*** **	**.62*** **	**.48*** **	**.46*** **	**.36*** **	7.10 (3.10)
12. Situational-Agency												**-.20** **	**-.23** **	**.34*** **	-.06	-.13	-.01	-.12	**.15***	12.17 (2.55)
13. Other-Agency													**.56*** **	-.04	**.50*** **	**.59*** **	**.37*** **	**.44*** **	**.16***	5.59 (3.28)
14. Outcome Probability														-.06	**.54*** **	**.58*** **	**.48*** **	**.47*** **	**.20** **	5.24 (3.19)
15. Goal Conduciveness															.03	.01	**.20** **	**.16***	**.48*** **	11.96 (2.27)
16. Controllability																**.66*** **	**.43*** **	**.44*** **	**.25*** **	4.60 (2.25)
17. Power																	**.42*** **	**.39*** **	**.16***	4.05 (2.40)
18. Compatibility with Internal Standards																		**.44*** **	**.48*** **	7.80 (3.13)
19. Effort																			**.27*** **	7.19 (3.06)
20. Fairness																				9.68 (3.26)

*$p < .05$, **$p < .01$, ***$p < .001$

Three hierarchial regressions were conducted to test whether Assertiveness predicted positive activation, warmth-affection or pleasure following the lottery imagery task. Participants' age, gender and pre-imagery affect scores were entered in the first step, followed by Assertiveness in the second. Assertiveness was not found to predict positive activation (β = .09, p = .161; R^2_{change} = .01), pleasure (β = .07, p = .316; R^2_{change} = .00) or warmth-affection (β = .05, p = 0.422; R^2_{change} = .00).

These regressions were then repeated, with Assertiveness being replaced with Enthusiasm. Enthusiasm was not found to predict positive activation (β = .12, p = 0.075; R^2_{change} = .01), pleasure (β = .10, p = 0.176; R^2_{change} = .01), or warmth-affection (β = .07, p = 0.350; R^2_{change} = .00) following the lottery imagery.

Testing the relationships between personality, affect and appraisals following the affiliative family imagery

The next set of analyses tested whether personality traits predicted affect following the affiliative family imagery, and whether these relationships were mediated by appraisals. Descriptive statistics are reported in Table 20. As some data was heavily skewed, non-parametric Spearman's correlations were conducted to allow for comparisons across analyses.

Table 20

Descriptive Statistics and Correlations Between Personality, Affect and Appraisal Measures in the Affiliaitve Family Imagery Conditions

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Mean (SD)
1. Assertiveness	**.46*** **	**.39*** **	**.33*** **	**.33*** **	**.18***	**.28*** **	**.28*** **	.11	.06	**.19*** *	-.02	.11	**.18***	.08	**.15***	**.17***	.12	-.02	.11	3.32 (0.76)
2. Enthusiasm		**.36*** **	**.31*** **	**.44*** **	**.26*** **	**.41*** **	**.27*** **	**.18***	**.17***	.14	.03	.09	.12	**.17***	.12	**.16***	**.19*** *	-.11	.09	3.58 (0.69)
3. Pre Positive Activation			**.44*** **	**.73*** **	**.28*** **	**.78*** **	**.32*** **	.11	**.17***	**.24*** *	.04	.11	**.15***	.09	**.22*** *	**.34*** **	**.23*** *	.09	**.19***	28.18 (9.22)
4. Post Positive activation				**.42*** **	**.64*** **	**.33*** **	**.73*** **	**.39*** **	**.58*** **	**.34*** **	.00	**.20*** *	**.15***	**.44*** **	**.20*** *	**.29*** **	**.46*** **	.09	**.38*** **	37.47(9.68)
5.Pre Warmth-affection					**.33*** **	**.68*** **	**.34*** **	.08	**.19*** *	**.15***	.04	.08	**.15***	.12	.11	**.23*** *	**.19*** *	.10	**.15***	14.36(5.55)
6. Post Warmth-affection						**.27*** **	**.81*** **	**.57*** **	**.53*** **	**.28*** **	-.08	**.25*** **	.01	**.44*** **	**.25*** **	**.30*** **	**.50*** **	**-.17***	**.42*** **	22.16(4.77)
7. Pre Pleasure							**.34*** **	**.16***	**.20*** *	**.17***	.00	.08	**.18***	.10	**.14***	**.36*** **	**.26*** **	.00	**.23*** *	11.84 (4.03)
8. Post Pleasure								**.57*** **	**.54*** **	**.31*** **	-.09	**.32*** **	.01	**.47*** **	**.26*** **	**.35*** **	**.52*** **	-.11	**.47*** **	17.30 (3.90)
9. Intrinsic Pleasantness									**.58*** **	**.28*** **	-.12	**.28*** **	.01	**.50*** **	**.26*** **	**.34*** **	**.52*** **	**-.36*** **	**.38*** **	4.55 (0.76)
10. Importance										**.33*** **	-.06	**.29*** **	.04	**.61*** **	**.29*** **	**.40*** **	**.52*** **	.00	**.36*** **	12.78(2.26)
11. Self-Agency											-.08	**.45*** **	**.19***	**.46*** **	**.41*** **	**.53*** **	**.39*** **	.07	**.42*** **	11.01 (2.63)
12. Situational-Agency												-.10	**.09**	**-.21*** *	-.07	-.05	**-.20*** *	**.29*** **	**-.16***	7.83 (3.25)
13. Other-Agency													.11	**.39*** **	**.59*** **	**.50*** **	**.33*** **	-.06	**.39*** **	11.19(2.75)
14. Outcome Probability														**.16***	**.22*** *	**.22*** *	.12	.13	.13	9.81 (2.79)
15. Goal Conduciveness															**.41*** **	**.43*** **	**.69*** **	**-.20*** *	**.49*** **	12.44 (2.61)
16. Controllability																**.51*** **	**.36*** **	-.03	**.37*** **	7.64 (1.77)
17. Power																	**.52*** **	.03	**.52*** **	7.58 (1.77)
18. Compatibility with Internal Standards																		**-.26*** *	**.58*** **	12.37(2.73)
19. Effort																			-.04	7.84 (3.14)
20. Fairness																				12.08 (2.52)

*$p < .05$, **$p < .01$, ***$p < .001$

Three hierarchical multiple regressions were conducted to test whether Enthusiasm predicted feelings of warmth-affection, positive activation and pleasure. In the first step of each regression, participants' age, gender and baseline affect scores were entered, followed by Enthusiasm scores at the second step. Post-analysis screening revealed one potentially influential case in each regression, although the results were comparable after these cases were removed. The results presented below therefore include these cases.

Enthusiasm was found to significantly predict warmth-affection (β = 0.21, p = .008; R^2_{change} = .03), positive activation (β = 0.19, p = .007; R^2_{change} = .03) and pleasure (β = 0.19, p = .014; R^2_{change} = .03) following the family imagery. To simplify the mediation analyses, 12 hierarchical multiple regressions were then conducted to test whether Enthusiasm predicted each of the appraisal measures. Only those appraisal measures that were significantly associated with Enthusiasm were included in the mediation analysis. One potentially influential case was identified in several of the regression models, although as the results were largely identical then these cases were removed, they were retained in the analyses.

Enthusiasm was a significant predictor of five appraisals: Pleasantness (β = 0.21, p = .004; R^2_{change} = .04), Importance (β = 0.25, p = .001; R^2_{change} = .06), Self-Agency (β = 0.20, p = .009; R^2_{change} = .04), Goal Conduciveness (β = 0.22, p = .003; R^2_{change} = .05) and Compatibility with Internal Standards (β = 0.26, p < .001; R^2_{change} = .06).

Enthusiasm was not associated with Situational-Agency (β = 0.03, p = .698; R^2_{change} = .00), Other-Agency (β = 0.11, p = 0.147; R^2_{change} = .01), Outcome-Probability (β = .13, p = .072; R^2_{change} = .02), Controllability (β = 0.12, p = .100; R^2_{change} = .01)[6], Power (β = 0.14, p = 0.055; R^2_{change} = .02), Effort (β = -0.12, p = 0.113; R^2_{change} = .01), or Fairness (β = .11, p = 0.149; R^2_{change} = .01).

Individuals scoring highly on Enthusiasm therefore appraised the family interaction as being more pleasant, more relevant and more conducive to their goals than individuals who score low on this trait. Highly enthusiastic individuals also perceived themselves as being more in control of the situation, and appraised the situation as matching their internal standards more than less enthusiastic individuals.

Model 4 using the PROCESS macros provided by Hayes (2013) was used to test whether the five identified appraisal measures mediate the relationship between Enthusiasm and the three affect measures (Hayes, 2013). In each analysis, participants' age, gender and baseline affect scores were included as covariates. The first of these analyses tested whether appraisals mediate the relationship between Enthusiasm and warmth-affection. The results of this analysis are presented in Figure 10 and Table 21.

[6] One potentially influential case was identified in the post-analysis screening of this regression. This particular case had a leverage value greater than three times the average. Removal of this case resulted in a significant relationship between Enthusiasm and Controllability (β = .15, p = 0.04; R^2_{change} = .02). The Cook's distance for this case however was 0.16. On the advice of Stevens (cited in Field, 2009), it was therefore decided to retain this case in the analysis.

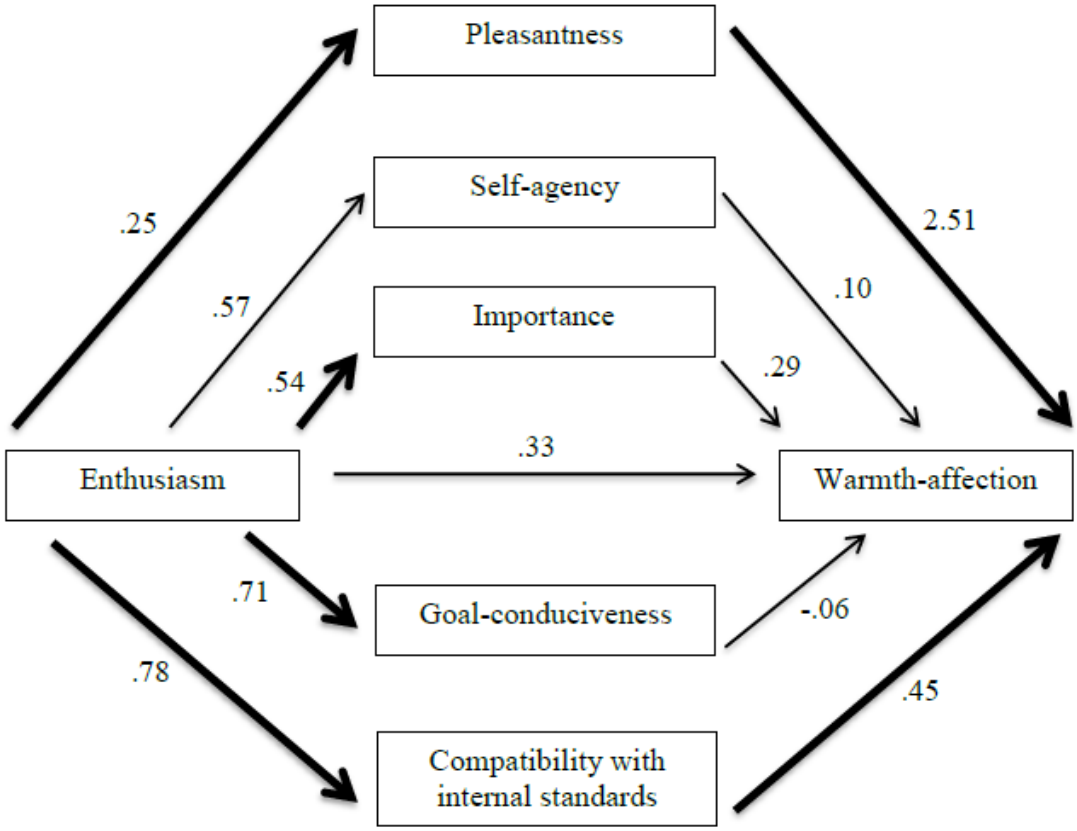

Figure 10. Parallel multiple mediation model of affiliative extraversion and warmth-affection through appraisal following the family imagery. All coefficients represent unstandardised regression coefficients controlling for participants' age, gender and baseline warmth-affection scores. Bold lines represent significant coefficients, $p < .05$.

Table 21

Unstandardised Coefficients, Standard Errors and Confidence Intervals of the Parallel Multiple Mediator Model Testing the Indirect Effects of Affiliative Extraversion on Warmth-affection Through Appraisals Following the Family Imagery

			95% BC CI	
	Coeff.	SE	Lower	Upper
Total	1.15	.53	.2426	2.3094
Pleasantness	.64	.35	.0994	1.5767
Self-Agency	.06	.08	-.0300	.3416
Importance	.15	.16	-.0597	.6213
Goal conduciveness	-.04	.13	-.3837	.1413
Compatibility with Internal Standards	.35	.21	.0617	.9462

Note: BC CI = Bias-corrected confidence intervals based on 1000 bootstrapped samples.

The total indirect effect was significant, as were the indirect effects of Intrinsic Pleasantness and Compatibility with Internal Standards. The indirect effects of Importance, Goal Conduciveness and Self-agency were not significant. Appraisals of Intrinsic Pleasantness and Compatibility with Internal Standards therefore mediated the relationship between Enthusiasm and warmth-affection. Specifically, Enthusiasm was positively associated with appraisals of Intrinsic Pleasantness (B = 0.25, p = .006) and Compatibility with Internal Standards (B = 0.78, p = .017), which were in turn positively associated with warmth-affection (B = 2.51, p < .001 and B = 0.45, p = .001, respectively).

The next analysis tested whether appraisals mediated the relationship between Enthusiasm and positive activation following the family imagery. The results of this analysis are presented in Figure 11 and Table 22.

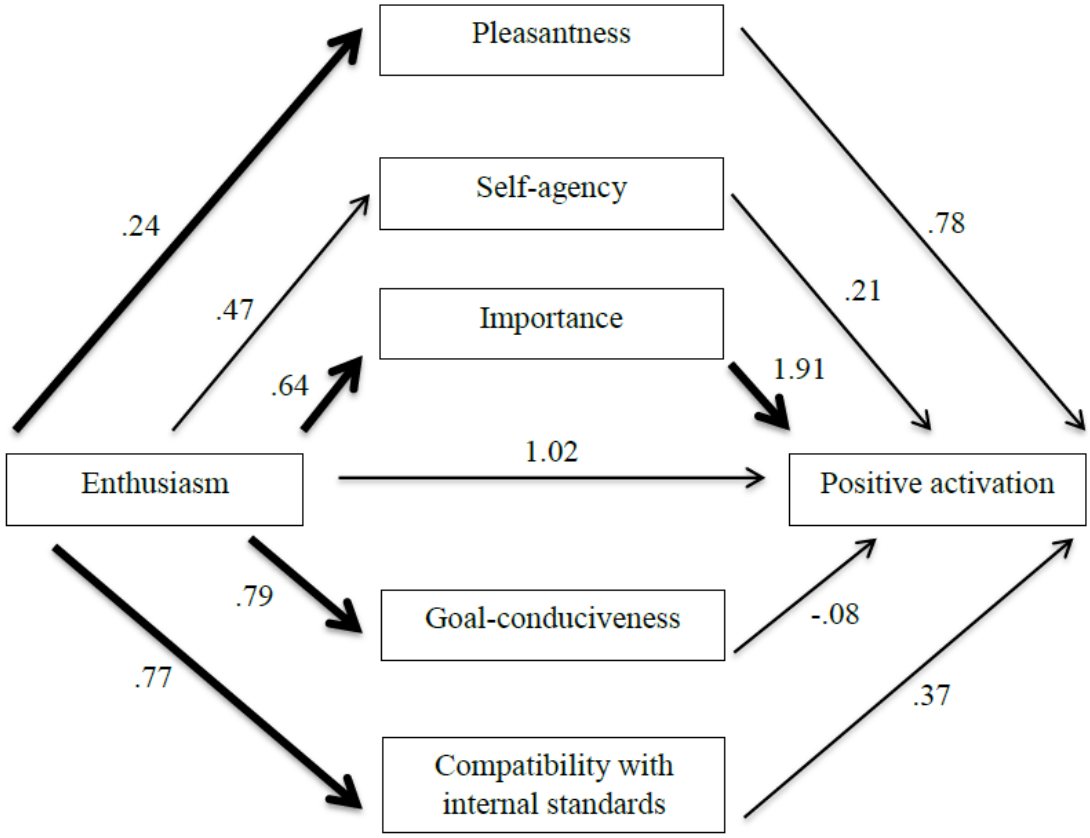

Figure 11. Parallel multiple mediation model of affiliative extraversion and positive activation through appraisal following the family imagery. All coefficients represent unstandardised regression coefficients controlling for participants' age, gender and baseline positive activation scores. Bold lines represent significant coefficients, $p < .05$.

Table 22

Unstandardised Coefficients, Standard Errors and Confidence Intervals of the Parallel Multiple Mediator Model Testing the Indirect Effects of the Affiliative Extraversion on Positive Activation Through Appraisals Following the Family Imagery

			95% BC CI	
	Coeff.	SE	Lower	Upper
Total	1.72	.82	.0244	3.1962
Pleasantness	.18	.28	-.2603	.9533
Self-agency	.10	.14	-.0759	.5202
Importance	1.22	.68	-.0011	2.6424
Goal conduciveness	-.06	.28	-.8216	.3989
Compatibility with internal standards	.29	.29	-.1131	1.0852

Note: BC CI = Bias-corrected confidence intervals based on 1000 bootstrapped samples.

The total indirect effect was significant, although the indirect effects of Pleasantness, Goal Conduciveness, Self-agency, Importance and Compatibility with Internal Standards were not.

The next analysis tested whether appraisals mediated the relationship between Enthusiasm and pleasure following the family imagery. The results of this analysis are presented in Figure 12 and Table 23

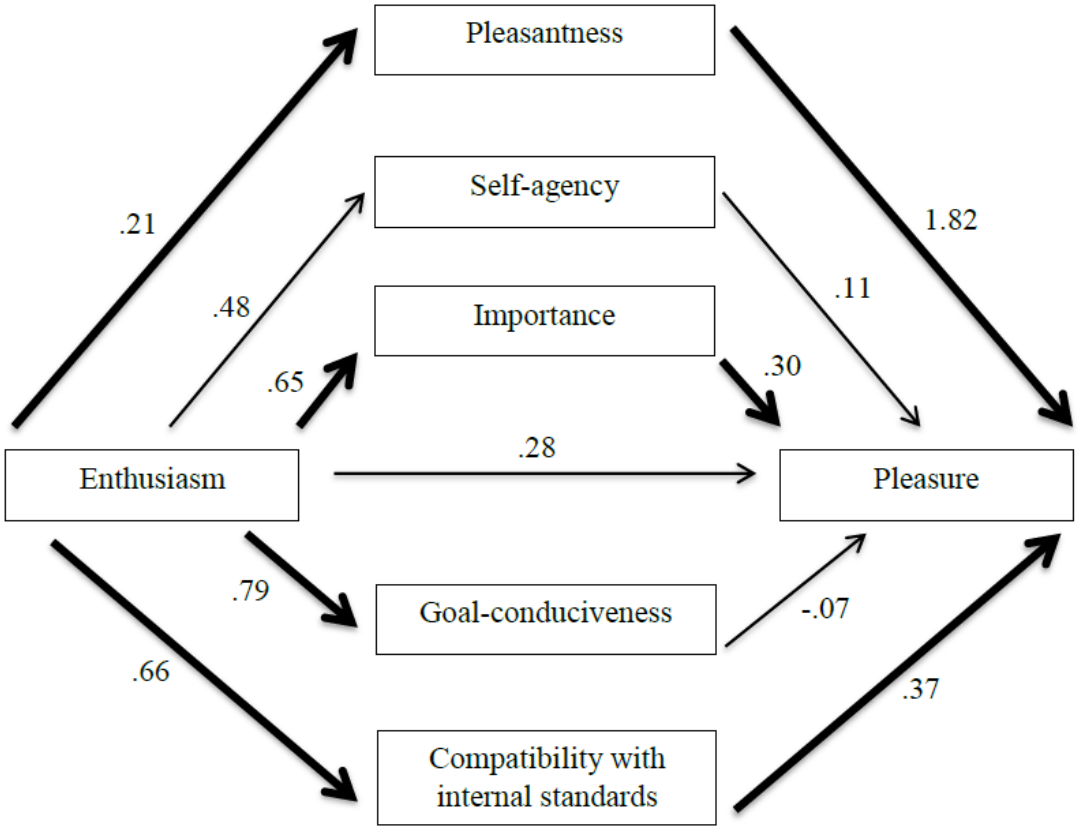

Figure 12. Parallel multiple mediation model of affiliative extraversion and pleasure through appraisal following the family imagery. All coefficients represent unstandardised regression coefficients controlling for participants' age, gender and baseline pleasure scores. Bold lines represent significant coefficients, $p < .05$

Table 23

Unstandardised Coefficients, Standard Errors and Confidence Intervals of the Parallel Multiple Mediator Model Testing the Indirect Effects of Affiliative Extraversion on Pleasure Through Appraisals Following the Family Imagery

			95% BC CI	
	Coeff.	SE	Lower	Upper
Total	.82	.39	.0609	1.5758
Pleasantness	.39	.23	.0306	1.0088
Self-Agency	.05	.06	-.0221	.2795
Importance	.19	.15	-.0036	.6262
Goal conduciveness	-.05	.13	-.3943	.1241
Compatibility with internal standards	.25	.17	-.0089	.6919

Note: BC CI = Bias-corrected confidence intervals based on 1000 bootstrapped samples.

The total effect was significant, as were the indirect effects of Intrinsic Pleasantness and Compatibility with Internal Standards. Therefore, the effect of Enthusiasm on pleasure following the family imagery was mediated by appraisals of Intrinsic Pleasantness. Specifically, Enthusiasm was positively associated with appraisals of Intrinsic Pleasantness, $B = .02$, $p = .020$, which was in turn was associated with pleasure, $B = 1.82$, $p < .001$.

Three hierarchial regressions were then conducted to test whether Assertiveness predicted warmth-affection, positive activation or pleasure following the family imagery task. As before, participants' age, gender and pre-imagery affect scores were entered in the first step, followed by the target personality trait – Assertiveness – in the second. Post analyses screening revealed one potentially influential case in each regression. The results were identical when these cases were removed however, and so they were retained in the analyses. Assertiveness was

found to significantly predict positive activation following the family imagery (β = 0.18, p = .013; R^2_{change} = .03), but not warmth affection (β =0.06, p = .460; R^2_{change} = .00) or pleasure (β =0.12, p = .097; R^2_{change} = .01).

Twelve further hierarchial regressions were conducted to predict each of the appraisal measures from Assertiveness. In each model, participants' age and gender were entered in the first step followed by Assertiveness scores in the second. One potentially influential case was identified in three of the regression analyses, although the results were identical when these cases were removed, and so they were retained in the analyses.

Assertiveness was found to predict ratings of Self-Agency (β =.15, p = .047; R^2_{change} = .02)[7] Controllability (β =.17, p = .021; R^2_{change} = .03) and Power (β =.16, p = .031; R^2_{change} = .02) but not any other form of appraisal (βs range from -.01 - .17, all ps > .05).

A parallel multiple mediator model was run to test whether appraisals of Self Agency, Power and Controllability mediated the relationship between Assertiveness and positive activation. Participants' age, gender and baseline affect scores were included as covariates. The results of this analysis are displayed in Figure 12 and Table 24.

[7] One potentially influential case was identified in the post-analysis screening of this regression. This particular case had a leverage value greater than three times the average. Removal of this case resulted in a non-significant relationship between Assertiveness and Self-Agency (β = .14, p = 0.067). The Cook's distance for this case however was 0.12 however. On the advice of Stevens (cited in Field, 2009), it was therefore decided to retain this case in the analysis.

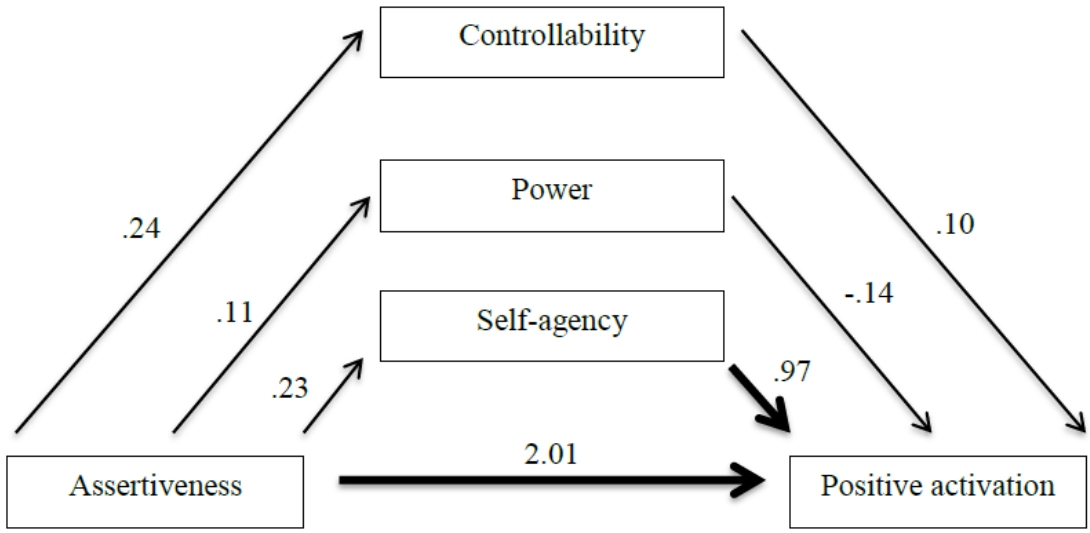

Figure 13. Parallel multiple mediation model of agentic extraversion and positive activation through appraisal. All coefficients are unstandardised regression coefficients controlling for participants' age, gender and baseline positive activation scores. Bold lines represent significant coefficients, $p < .05$.

Table 24

Unstandardised Coefficients, Standard Errors and Confidence Intervals of the Parallel Multiple Mediator Model Testing the Indirect Effects of Agentic Extraversion on Positive Activation Through Appraisals

			95% BC CI	
	Coeff.	SE	Lower	Upper
Total	.23	.30	-.3067	.8619
Controllability	.02	.13	-.1742	.3729
Power	-.02	.08	-.2574	.0836
Self-Agency	.22	.29	-.3017	.8269

Note: BC CI = Bias-corrected confidence intervals based on 1000 bootstrapped samples.

The total indirect was not significant, nor was the indirect effect of either Controllability or Self-Agency. Consequently, neither Self-Agency nor Controllability mediated the relationship between Assertiveness and positive activation, which remained positive and significant, $B = .20$, $p = .021$.

In sum, BFAS Enthusiasm was found to predict warmth-affection, pleasure and positive activation following the affiliative imagery. Furthermore, the relationship between BFAS Enthusiasm and pleasure was mediated by appraisals of Intrinsic Pleasantness, whilst the relationship between Enthusaism and warmth-affection was mediated by appraisals of Intrinsic Pleasantness and Compatibility with Internal Standards. BFAS Assertiveness was also found to predict positive activation following the affiliative imagery, although this relationship was not mediated by appraisals.

4.3.3 Discussion

This study had two aims. The first was to test affective reactivity in agentic and affiliative extraversion. The second was to test whether appraisals mediate the relationships between personality and affective reactivity. It was predicted that agentic extraversion would predict positive activation in response to an appetitive imagery task whilst affiliative extraversion would predict warmth-affection and pleasure following an affiliative imagery task. It was further expected that appraisals would mediate each of these personality-affect relationships.

Examining the relationships between personality and affect.

As expected, affiliative extraversion was found to predict warmth-affection and pleasure following an affiliative stimulus, similar to the results reported by Morrone-Strupinsky and Depue (Depue & Morrone-Strupinsky, 2005; Morrone-

Strupinsky & Depue, 2004). Smillie and colleagues have recently argued that neither the agentic nor the affiliative components of extraversion are associated with affective reactivity on measures of pleasure however. In support of this, these researchers have demonstrated that BFAS Enthusiasm does not predict pleasure following either appetitive nor merely pleasant (e.g. a humourous film clip) mood inductions (Smillie et al., 2013). However, under Depue's model (Depue & Morrone-Strupinsky, 2005), affiliative extraversion would only be expected to predict pleasure following an affiliative stimulus or event. The results reported here support this prediction.

Affiliative extraversion was also found to predict positive activation following the affiliative imagery. While these findings were not predicted here, they are not completely without precedent in the literature. Smillie et al. (2013) for example found that BFAS Enthusiasm predicts positive activation following an appetitive film clip with no apparent affiliative content. In the current sample, the relationship between BFAS enthusiasm and positive activation following a non-affiliative appetitive stimulus only just fell short of significance ($p = .075$). It may be that the relationships observed between BFAS Enthusiasm and positive activation reflects the content of the Enthusiasm scale. While this scale is highly correlated with other measures of affiliative extraversion - such as MPQ Social Closeness (DeYoung et al., 2013) - there are some important differences in the item content of these scales. Most notably, the BFAS combines items that assess individuals' preferences for affiliation (e.g. "warm up quickly to others") with items that tap positive affectivity (e.g. "have a lot of fun"; (DeYoung et al., 2007). MPQ Social Closeness on the other hand is a relatively purer measure of affiliation, and items tapping

positive affectivity load onto a separate MPQ scale, labelled Well-Being (Patrick et al., 2002; Tellegen & Waller, 2008). In future research it would be advantageous to include multiple measures of affiliative extraversion, and test how these scales differ in their predictive power as a function of the item contents of each.

Counter to expectations, agentic extraversion did not predict positive activation following an appetitive mood induction. This is in contrast to previous findings that measures of agentic extraversion – including BFAS Assertiveness - predict positive activation following an appetitive positive mood induction (Morrone-Strupinsky & Depue, 2004; Morrone et al., 2000; Smillie et al., 2013). Instead, agentic extraversion only predicted positive activation following the affiliative family imagery task. Furthermore, the relationship between Assertiveness and positive activation (β = 0.16) in this condition was near identical to the size of the relationship Enthusiasm and positive activation (β = .17).

Appraisals as mediators of the relationships between personality and affect

There was also some support for the hypothesis that appraisals mediate the relationships between personality and affective reactivity: the relationship between Enthusiasm and warmth-affection was mediated by appraisals of intrinsic pleasantness and compatability with internal standards, and the relationship between Enthusiasm and pleasure was mediated by appraisals of intrinsic pleasantness. These results corroborate previous findings that appraisals can account for individual differences in emotional experience (Kuppens & Tong, 2010; Roseman et al., 1995; Silvia, 2008), and therefore indicate a potential psychological mechanism underlying individual differences in responsiveness to affiliative stimuli.

The present data do not fully support the hypothesis that appraisals can account for individual differences in affective reactivity however: both affiliative and agentic extraversion were found to predict positive activation following the affiliative imagery, but these relationships were not mediated by appraisals.

Appraisals of intrinsic pleasantness and compatibility with internal standards

Appraisals of intrinsic pleasantness and compatibility with internal standards were both found to be mediators of personality-affect relationships in this study. The meaning of these appraisals is therefore considered in greater detail below, alongside recommendations for future appraisals research.

Some researchers have argued that it is not possible to separate the cognitive appraisal of pleasantntess from feelings of pleasure (Frijda et al., 1989). Others however argue that individuals appraise the intrinsic pleasantness of events independently of their current motivational states. In this sense, appraisals of intrinsic pleasantness can be distinguished from appraisals of goal conduciveness and feelings of pleasure (Ellsworth & Scherer, 2003; Scherer, 1999). For example, a person trying to lose weight may appraise chocolate as being intrinsically pleasant, but it can simultaneously be not conducive to a dieter's goals and may therefore provoke negative affect.

Moreover, while appraisals of Intrinsic Pleasantness were moderately correlated with feelings of pleasure in the current study, the size of these relationships were not so great as to suggest that these measures tap the same underlying processes. Based on these data at least, it appears as though participants

were in some part able to distinguish between appraisals of pleasantness from feelings of pleasure.

Appraisals of compatability with internal standards are complex, as individuals make these appraisals with reference to their self-concepts, values and morals (Ellsworth & Scherer, 2003). Future research should therefore consider a finer-grained analysis of how individuals evaluate how compatible an event is with their internal standards. With regard to self-concepts, McConnell's Multiple Self-Aspects Framework may be a useful model for doing so. In this model, the self is not a unitary construct. Rather, individuals' self-concepts consist of several self-aspects, which can comprise several constructs, such as roles (e.g. mother), social identities (e.g. Scottish) and goals (e.g. ideal selves). Each of these aspects is associated with a number of diverse attributes, which include physical characteristics, behaviours and affects among others. Furthermore, each attribute may be associated with one or many self-aspects (McConnell, 2011; McConnell, Shoda, & Skuborstad, 2012; McConnell & Strain, 2007).

There are several possible links between self-concept structure and affective experience. For example, receiving positive feedback with regard to a particular self-aspect or attribute is expected to produce positive affect (McConnell, 2011; McConnell, Rydell, & Brown, 2009). Self-aspects that relate to desired selves are likely to be especially important here. Desired selves function as goal states that represent how one would like to be. In keeping with cybernetic models of self-regulation, individuals continually compare their current standing against these desired selves to monitor any discrepancies between the two (Higgins, 1997). In this model, affect serves as a signal to indicate how well individuals are minimising these

discrepancies and approaching their goals according to some criterion value. When the rate of progress toward goal attainment exceeds or falls short of this criterion value, the individual experiences positive or negative affect, respectively (C.S. Carver, 2006).

Furthermore, positive feedback on a particular self-aspect can cause greater levels of positive affect if that self-aspect is connected to other self-aspects via common attributes. Similarly, the extent to which an individual experiences positive affect following positive feedback about a particular self-aspect attribute increases proportionally to the number of self-aspects associated with that attribute (McConnell, 2011; McConnell et al., 2009). From these findings it is possible to speculate on how affiliative extraverts' and introverts' self-concepts may differ, and in turn how this could account for differential patterns of affective reactivity. For example it may be that affiliative extraverts possess a greater number of desired affiliative self-aspects than do affiliative introverts. Or, it may be that affiliative extraverts' self-aspects share a greater number of common attributes. Consider two individuals who score high and low on affiliative extraversion for example, both of whom possess the self-concepts of father and teacher. Both individuals may further associate the self-aspect of father with attributes of warm and friendly, but perhaps only the highly affiliative individual also associates these attributes with the teacher self-aspect. Under these conditions, positive feedbacks on the attributes of warm and friendly would propagate throughout the affiliative individual's self-concept and activate both the father and teacher self-concepts – which would in turn lead to greater feelings of positive affect.

Individuals may also refer to their values when appraising how compatible an event is with their internal standards. Future research should therefore include measures of values in order to identify those that are pertinent to affiliative extraversion. Examples of these include the Benevolence and Security scales from the Schwartz Values Survey (Schwartz, 1994), and the Communal scale from the Circumplex Scales of Interpersonal Values (Locke, 2000). The variety of possible affiliative values that could be sampled introduces a problem of parsimony. However, Trapnell and Paulhaus (2012) describe how two broad dimensions of agency and communion can be derived from factor analyses of multiple values inventories. These researchers have subsequently developed the Agentic and Communal Values scales to measure these higher order dimensions, which will likely be a useful starting point for researchers.

This brief discussion highlights the complexity of appraisal dimensions, and in particular appraisals of how compatible an event is with an individual's internal standards. Future research that explores the mechanisms underpinning these appraisals will be valuable in understanding individual differences in appraisal and affective reactivity.

Limitations of the current research

There are some limitations to the current research. For example, although the findings are interpreted as showing that appraisals cause individual differences in emotional reactivity, the data are correlational which makes any assumptions about causal directions tentative. Previous appraisal researchers have approached this problem by attempting to manipulate individuals' appraisals of situations

experimentally (Roseman & Evdokas, 2004). For example Smith and Lazarus (1993) modified the content of vignettes in order to direct individuals' appraisals of imagined situations along particular dimensions (e.g. other-blame or self-blame). If it were possible to similarly manipulate individuals' appraisals of Intrinsic Pleasantness and Compatibility with Internal Standards experimentally, then it would be possible to test the causal role of these appraisals in affective reactivity.

In sum, this study provides some evidence for affective reactivity in agentic and affiliative extraversion, although the results were not entirely consistent with predictions. Affiliative extraversion was found to be associated with positive activation in response to an appetitive and affiliative imagery task, and with warmth-affection and pleasure in response to the affiliative imagery task only. Agentic extraversion on the other hand was only found to be associated with positive activation following the affiliative imagery. The results also provide some evidence for the hypothesis that appraisals mediate the relationships between affiliative extraversion and affective reactivity. This suggests that social-cognitive models may complement the existing neurobiological accounts of affiliative affective reactivity, though more research will be needed to clarify exactly how these processes operate.

Chapter 5

Psychophysiological evidence for emotional reactivity in agentic and affiliative extraversion

5.1 Introduction

The results of Study 3 provided some support for the affective reactivity hypothesis of agentic and affiliative extraversion. For example, affiliative extraversion predicted reports of warmth-affection, positive-activation and pleasure in response to an affiliative stimulus. A key limitation of these data was the reliance on self-reported affect however, and it isn't clear whether these personality differences also generalise to physiological indices of emotion. This is an important question, as subjective and physiological indices of emotion have previously been found to be only moderately correlated (correlated; Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005). Therefore, it cannot be assumed that individual differences in self-reported affect also apply to physiological markers of emotion.

Psychophysiological indices of reward processes and extraversion

There have been no reported studies of whether agentic or affiliative extraversion moderate psychophysiological responses to either appetitive or affiliative rewards. On the other hand, investigators have tested whether big five extraversion moderates psychophysiological responses to reward. This literature serves as a starting point to explore the plausibility that personality traits might be associated with psychophysiological markers of emotion, and is therefore reviewed here.

Kumari et al., (1996) and Corr et al., (1995) tested whether extraversion moderates the attenuation of the startle response by pleasant stimuli. The startle response is a defensive mechanism that begins with a rapid eye blink. This response is typically induced experimentally by exposing participants to a sudden abrasive stimulus, such as an abrupt burst of white noise, and the magnitude of the response can be measured by placing electrodes over the *orbicularis supercilli* muscle that surrounds the eye. Crucially, the magnitude of the startle eyeblink response has been found to be moderated by the individuals' emotional state, and is inhibited when individuals are exposed to pleasant stimuli (Bradley & Lang, 2007; Lang, Bradley, & Cuthbert, 1990). If extraverts are especially sensitive to reward, then it would be predicted that the attenuation of the eye blink response by positive stimuli would be greater for extraverts than for introverts. Both Kumari et al., (1996) and Corr et al., (Corr et al., 1995) report that this is not the case however, and that positive stimuli

attenuate the magnitude of the startle response in both introverts and extraverts to a similar degree.

Other researchers have tested whether extraversion moderates activity of the *zygomaticus major* muscle, which is involved in smiling behaviour and is positively associated with self-reported positive affect (Bradley & Lang, 2007; J. T. Larsen, Norris, & Cacioppo, 2003). The results of these experiments do not support the affective reactivity hypothesis however, as extraversion has not been found to moderate zygomatic activation in response to positively valanced pictures or film clips (Jäncke, 1993; Tobin, Graziano, Vanman, & Tassinary, 2000).

Additional research has examined individual differences in electrodermal activation, where extraversion has been found to be unrelated to skin conductance responses to positive images (Mardaga & Hansenne, 2010; Norris, Larsen, & Cacioppo, 2007).

In contrast to the null-results reported in studies of peripheral physiology, extraversion has been found to moderate neural processes associated with reward. Electroencephalographic studies for example have revealed that extraverts display more pronounced event-related potentials and less pronounced feedback-related negativity in response to positive images and unexpected monetary rewards than do introverts (Jiajin, Yuanyuan, Yi, Jiemin, & Hong, 2009; Smillie, Cooper, & Pickering, 2010; Yuan et al., 2011). Moreover, several authors of imaging studies have reported that extraversion is positively associated with activation of brain regions associated with reward processing. For example, Cohen, Young, Baek, Kessler and Ranganath (2005) report moderately sized correlations between extraversion and activation of regions such as the nucleus accumbens following the

receipt of monetary rewards in a gambling task. Additionally, Canli and colleagues have similarly found that extraversion is positively associated with activation of regions such as the amygdala in response to pleasantly valanced images (Canli et al., 2001) and pictures of smiling faces (Canli, Sivers, Whitfield, Gotlib, & Gabrieli, 2002).

Psychophysiological indices of reward processes and extraversion-like constructs

Although relatively few studies have tested whether extraversion moderates psychophysiological responses to reward, a wider literature has examined the role of other overlapping personality constructs. These include the Novelty Seeking scale from Cloninger's Temperament and Character Inventory, which is moderately correlated with NEO-PI-R extraversion (De Fruyt, Van De Wiele, & Van Heeringen, 2000). The results of this research is mixed. For example Yoshino, Kimura, Yoshida, Takahashi and Nomura (Yoshino, Kimura, Takahashi, & Nomura, 2004) found that Novelty Seeking was positively associated with electrodermal activity in response to subliminally presented positive – and negative – images, but not neutral images. Subsequent research however has not revealed any moderation effects of Novelty Seeking on electrodermal responses to consciously presented positive pictures (Mardaga, Laloyaux, & Hansenne, 2006) or monetary gains in a gambling task however (Mardaga & Hansenne, 2012).

Additionally, several researchers have investigated whether measures of behavioural activation moderate physiological responses to reward. Measures such as Carver and White's BAS scales are positively related with extraversion (Charles S. Carver & White, 1994) - particularly the agentic component (Wacker et al., 2012a) -

and have further been found to be positively associated with several indices of reward processing. For example, high BAS scores are positively associated with greater neural (ventral striatum and orbitofrontal cortex activation) and electrodermal activity during the receipt of monetary rewards (Lole, Gonsalvez, Blaszczynski, & Clarke, 2012; Simon et al., 2010), and greater reactivity to positive images on measures of electrodermal, electrocardiographic and cortical activation (Balconi, Brambilla, & Falbo, 2009; Balconi, Falbo, & Conte, 2012).

In sum, there is some mixed evidence that extraversion does moderate psychophysiological responses to reward. These findings therefore lend some support for the proposition that personality traits are associated with psychophysiological markers of emotion, although there are likely to be several unidentified moderators that account for the inconsistent results recorded to date. It may be that distinguishing between appetitive and affiliative rewards, and between agentic and affiliative extraversion will be help to establish clearer results in this regard.

Aims and hypotheses

The aim of this study is to test the hypothesis that agentic and affiliative extraversion are associated with particular forms of emotional reactivity. This experiment builds on previous investigations of agentic and affiliative reactivity by including physiological indices of emotion. Two psychophysiological measures were included in this study: skin conductance and facial electromyography. These measures were selected as they index the two major dimensions of affective experience, arousal and pleasure.

Skin conductance reflects activation of the sympathetic branch of the autonomic nervous system, and is one of the most commonly reported autonomic measures of emotion (Mauss & Robinson, 2009). As the sympathetic nervous system becomes more active, the sweat ducts of the eccrine sweat glands begin to fill which creates a more conductive path through the corneum. It is this process that produces measurable changes in electrodermal activity (Dawson, Schell, & Filion, 2007; Mendes, 2009).

Electrodermal activation has been found to be greater in response to both positive and negative emotional stimuli compared to neutral stimuli. Specifically, it appears as though skin conductance activity reflects levels of arousal rather than hedonic valance. The relationship between skin conductance and arousal is robust, and has been demonstrated to apply to a range of stimuli including static pictures, films, sounds and imagined events (Bradley, Codispoti, Cuthbert, & Lang, 2001; Bradley & Lang, 2007; Lang, Greenwald, Bradley, & Hamm, 1993).

Facial electromyography is a measure of action potentials along facial muscle fibers during muscle contraction (Hess, 2009). Placing electrodes over specific regions of the face allows researchers to monitor the activation of particular muscles, which can provide an index of an individual's emotional state. One of the most commonly studied muscles in this regard is the zygomaticus major, which runs from the corner of the lip, diagonally upward toward the ear. When activated, this muscle contracts and draws the corner of the lip upwards, as occurs during smiling behaviour. Zygomatic activation has been found to be greater when participants view pleasant versus unpleasant stimuli, and is further positively associated with self-

reports of positive affect (Bradley et al., 2001; Bradley & Lang, 2007; Cacioppo, Petty, Losch, & Kim, 1986; J. T. Larsen et al., 2003).

It is predicted that agentic extraversion will be associated with self-reported positive activation, zygomaticus activation and skin conductance in response to an appetitive stimulus. It is further predicted that affiliative extraversion will be associated with self-reported warmth-affection and pleasure and zygomaticus activation in response to an affiliative stimulus.

5.2 Method

Participants

Participants were recruited from the undergraduate and postgraduate communities at the University of Strathclyde as well as from the wider Glasgow community. 62 participants (41 females) completed the study. The mean age of participants was 27.23 years, SD = 9.78.

Measures

Personality measures

Personality was measured with the Social Potency, Achievement, Social Closeness and Wellbeing scales from the Brief Form of the MPQ (Patrick et al., 2002). The internal consistencies of these scales ranged from .76 to .85.

Consistent with Studies 1 and 2, agentic extraversion was measured with the Social Potency and Achievement scales, whilst affiliative extraversion was measured with the Social Closeness scale. The addition of the Wellbeing scale also allowed for additional measures of agentic and affiliative extraversion to be constructed.

Previous factor analytic work demonstrates how the Social Potency, Achievement, Social Closeness and Wellbeing scales load onto a single higher order factor, which Tellegen et al., labeled Positive Emotionality (Patrick et al., 2002; Tellegen & Waller, 2008). These researchers have also reported an alternative factor structure however, where Positive Emotionality bifurcates into two separate factors that Tellegen and colleagues labeled Agentic Positive Emotionality (PEM-A) and Communal Positive Emotionality (PEM-C). PEM-A is characterised by high loadings of Social Potency and Achievement, while PEM-C is characterised by a high loading of Social Closeness. Wellbeing loads onto both PEM-A and PEM-C.

PEM-A and PEM-C have been included as measures of agentic and affiliative extraversion - alongside the primary Social Potency, Achievement and Wellbeing scales - in prior investigations of affective reactivity (Morrone-Strupinsky & Depue, 2004; Morrone et al., 2000). One advantage of including these composite scales alongside the primary MPQ scales is that it allows for a comparison between different measures of agentic and affiliative extraversion. This is especially advantageous in light of the results from Study 3, where the BFAS Enthusiasm scale was used to measure affiliative extraversion. This scale confounds affiliation with positive affectivity, and it is not clear how this may affect the relationships between affiliative extraversion and affective reactivity. Including both the primary MPQ scales alongside composite measures of agentic and affiliative extraversion that include positive affectivity (Wellbeing) allows for this issue to be explored.

Therefore, PEM-A scores were calculated by summing Social Potency, Achievement and Wellbeing scores, and PEM-C scores were created by summing Social Closeness and Wellbeing scores.

Affect measures

Positive activation was measured with the Positive Activation scale from the PANAS (Watson et al., 1988). Warmth-affection was measured with five adjectives (*warm*, *caring*, *love*, *affection*, and *fondness*) and pleasure with three (*pleased*, *satisfied*, and *content*). Participants indicated the extent to which they were experiencing each of these feelings on a scale from 1 ("very little or not at all") to 5 ("extremely"). Cronbach's alphas for these measures ranged from .76 to .94.

Film materials

Participants were shown two film clips to induce states of positive activation and warmth-affection, alongside a third film that was intended to serve as a neutral comparison condition.

An appetitive sports film was selected to induce positive activation. This film clip shows a young American football player playing in front of a huge crowd. The film begins with the crowd chanting the player's name, shows the player successfully tackling a member of the opposition, and ends with the player celebrating with his teammates. To induce warmth-affection, participants were shown an affiliative family film that shows a young couple engaged in an affectionate interaction with their newborn son. The positive activation and warmth-affection films lasted 3.07 and 2.34 minutes, respectively, and both films were preceded by a short spoken

introduction that set the context for the scene. Both the appetitive sports film and the affiliative family film have been previously found to induce states of positive-activation and warmth-affection, respectively (Morrone-Strupinsky & Depue, 2004; Morrone et al., 2000).

Participants were also shown a neutral film clip, where coloured sticks are shown to appear and disappear randomly (Rottenberg, Ray, & Gross, 2007). This clip lasted for 3.26 minutes.

Procedure

Ethical approval for this study was obtained from the University of Strathclyde's School of Psychological Sciences and Health Ethics Committee.

Participants were greeted by the experimenter upon arriving at the laboratory, and were asked to wash their hands prior to skin conductance recordings. Participants were then sat in front of a computer monitor, and were prepared for psychophysiological recording.

First, a respiration belt was placed above participants' chests to monitor respiration throughout the experiment. Electrodermal activation was recorded by placing two electrodes on the volnar surfaces of the distal phalanges on the index and fourth fingers of participants' non-dominant hand. The surface of each electrode was covered with a thin layer of TD-246 skin conductance electrode paste (Med Associates Inc.), and the electrodes were attached to the skin with surgical tape.

Facial EMG was recorded with a pair of electrodes placed over the *zygomaticus major* (cheek), in accordance with the Society for Psychophysiological Research's guidelines (Fridlund & Cacioppo, 1986). Each electrode was filled with

Signagel Electrode Gel (Parker Laboratories, Inc.), and attached to the skin with a double-sided adhesive ring.

After being connected to the skin conductance and EMG equipment (ActiveTwo; BioSemi, Inc.) participants were asked to complete the MPQ BF scales using their free, dominant hand. Once completed, participants were shown the three film clips. The order of the films was counterbalanced across sessions, and participants completed the affect questionnaires before and after each film to rate how they felt at that moment in time.

Following the experiment, participants were debriefed and thanked for their time. Each participant received either course credit or a £5 shopping voucher for taking part.

Treatment of psychophysiological data

Skin conductance and EMG data were sampled at 2048 Hz. The choice of sampling rate was informed by Fridlund and Cacioppo's (1986) recommendation that the sampling rate be 4-8 times the highest frequency of interest, with higher sampling rates being preferable where possible. As the primary energy in the surface EMG signal lies between approximately 10 and 200 Hz (Fridlund & Cacioppo, 1986), a sampling rate of 2048 Hz was deemed to be sufficient.

A low-pass filter of 10 Hz was applied to skin conductance data offline in preparation for analysis (Norris et al., 2007). Tonic electrodermal activity (EDA) was defined as the frequency of non-specific skin conductance responses (NS SCR) that occurred during the target periods (Boucsein et al., 2012). A NS SCR was defined as a change in skin conductance of at least 0.03µS (Boucsein et al., 2012; Dawson et

al., 2007). To ensure that these responses were not respiratory artifacts, the EDA and respiration curves were then examined visually. EDA changes that occurred within 1-3 seconds after a large inspiration were deemed to be respiratory artifacts (Boucsein, 2012).

A bipolar EMG signal was created by subtracting the activity recorded at one electrode site from the activity recorded by the adjacent electrode. The result was a single bipolar signal of electromyographic activation at the zygomatic region. A 10-500 Hz bandpass filter was then applied to this signal, which was further rectified and integrated (Tassinary, Cacioppo, & Berntson, 2007).

Physiological activation was recorded throughout the experimental session, although only the data recorded during the final 60 seconds of each film were analysed. There were several reasons for this. First, it was reasoned that participants' responses to the initial moments of each film would likely be noisier as they attempt to understand the happenings of the scene and familiarize themselves with the characters. Second, both the appetitive sports and affiliative family films begin with content that is unlikely to induce the target emotions, and build toward an emotional climax at the end. For example, the affiliative family film begins with a baby crying. Third, analysing the final 60 seconds of each film allowed for comparisons to be made with the physiological recordings taken during the 60 second resting period that preceded each film.

Missing data

Between 0 – 9.7% of data was missing due to participants omitting questionnaire items or due to equipment failures. Little's MCAR test revealed that

these data were missing completely at random, χ^2 (435) = 391.667, p = .933, and were replaced with multiple imputation, with five imputations (Howell, 2007). There were some differences in the results obtained from the original data with missing information and the pooled statistics from the multiple imputation data. The pooled statistics from the multiple imputation data are therefore reported.

5.3 Results

The data were first converted to z-scores and screened for any values ± 3.29. Between one to two outliers were identified in the zygomaticus activation scores in the baseline periods for each of the films. Between one to two outliers were also identified among several of the affect, skin conductance and electromyographic scores following the film clips. Each of these scores was replaced with three times the standard deviation plus the mean (Field, 2009).

A series of Kalmogorov-Smirnov tests revealed that Social Closeness scores, as well as several of the affect and psychophysiological activation scores were not normally distributed, *D*s range between .12 - .30, all *p*s < .05. Moreover, several of these variables remained non-normally distributed following logarithmic, square root and reciprocal transformations. Therefore, a series of non-parametric Spearman correlations were conducted on the untransformed data to allow for comparisons across analyses. The results of these analyses are shown in Tables 25, 26 and 27, alongside descriptive statistics for each film condition.

Table 25

Means, Standard Deviations and Correlations Between Personality Traits, Self-Reported Affect, Facial Electromyography and Electrodermal Activation in the Appetitive Sports Film Condition

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Mean (SD)
1. Social Potency	.24	.25	**.64*** **	.21	.06	-.01	.00	-.04	-.01	-.08	.09	.11	-.24	-.05	5.89 (3.20)
2. Achievement		.01	**.65*** **	.12	.06	.14	-.02	-.05	.05	.07	.13	-.17	.11	.12	7.56 (2.83)
3. Social Closeness			**.25***	**.79*** **	-.08	-.04	.03	.11	.01	.09	-.10	.10	-.25	.13	8.11 (3.33)
4. PEM-A				**.53*** **	.17	.18	.09	.08	.16	.14	.14	.06	-.03	.06	20.90 (6.42)
5. PEM-C					.05	.08	.08	.16	.15	.17	-.03	.18	-.09	.21	15.72 (5.39)
6. Baseline Positive Activation						**.62*** **	**.74*** **	**.46*** **	**.75*** **	**.51*** **	.15	.12	.05	-.02	22.25 (7.71)
7. Post Film Positive Activation							**.51*** **	**.73*** **	**.44*** **	**.76*** **	.19	.20	-.22	.00	26.25 (9.18)
8. Baseline warmth-affection								**.59*** **	**.64*** **	**.52*** **	.03	.00	-.09	-.12	9.98 (4.30)
9. Post film warmth-affection									**.33** **	**.83*** **	-.03	.17	-.25	.02	12.81 (4.67)
10. Baseline pleasure										**.47*** **	-.07	.04	.10	-.02	7.02 (2.65)
11. Post film pleasure											-.07	.17	-.17	.05	9.00 (2.75)
12. Baseline zygomaticus activation												.23	.01	.13	3.19 (1.66)
13. Film zygomaticus activation													-.22	.08	4.67 (2.99)
14. Baseline electrodermal activation														.21	2.35 (2.01)
15. Post film electrodermal activation															0.85 (1.18)

*$p < .05$, ** $p < .01$ *** $p < .001$

Table 26

Means, Standard Deviations and Correlations Between Personality Traits, Self-Reported Affect, Facial Electromyography and Electrodermal Activation in the Affiliative Family Film Condition

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Mean (SD)
1. Social Potency	.24	.25	**.64*** **	.21	-.10	.01	-.20	-.01	-.20	-.02	-.08	.16	-.10	-.17	5.89 (3.20)
2. Achievement		.01	**.65*** **	.12	.10	.16	-.04	.12	.00	.04	-.07	.04	.16	.18	7.56 (2.83)
3. Social Closeness			**.25***	**.79*** **	-.22	-.06	.11	.10	.10	.16	-.20	.12	-.06	-.16	8.11 (3.33)
4. PEM-A				**.53*** **	.08	.23	.02	.19	.06	.17	-.02	.23	.08	.12	20.90 (6.42)
5. PEM-C					-.03	.16	.22	.21	**.30***	**.30***	-.06	.23	.05	.05	15.72 (5.39)
6. Baseline Positive Activation						**.54*** **	**.59*** **	**.41** **	**.63*** **	**.35** **	.07	.06	**.29***	.19	24.80 (8.02)
7. Post Film Positive Activation							**.56*** **	**.72*** **	**.47*** **	**.63*** **	.10	**.39** **	.19	**.38** **	23.55 (8.15)
8. Baseline warmth-affection								**.56*** **	**.59*** **	**.47*** **	.19	.17	.18	.17	10.37 (4.57)
9. Post film warmth-affection									**.35** **	**.69*** **	.10	**.39** **	-.07	.23	15.87 (4.84)
10. Baseline pleasure										**.53*** **	.03	-.01	**.28***	**.29***	7.15 (2.65)
11. Post film pleasure											.24	**.42***	.15	.25	8.82 (2.77)
12. Baseline zygomaticus activation												**.33** **	-.01	**.28***	3.34 (1.86)
13. Film zygomaticus activation													-.05	.13	4.44 (3.12)
14. Baseline electrodermal activation														**.31***	2.23 (1.87)
15. Post film electrodermal activation															1.02 (1.38)

*$p < .05$, ** $p < .01$ *** $p < .001$

Table 27

Means, Standard Deviations and Correlations Between Personality Traits, Self-Reported Affect, Facial Electromyography and Electrodermal Activation in the Coloured Sticks Film Condition

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Mean (SD)
1. Social Potency	.24	.25	**.64*** **	.21	.01	-.03	-.04	-.02	-.01	.00	.03	-.01	.10	-.25	5.89 (3.20)
2. Achievement		.01	**.65*** **	.12	.16	-.12	.06	-.09	.12	.03	-.17	-.09	.21	-.15	7.56 (2.83)
3. Social Closeness			**.25***	**.79*** **	-.11	-.13	.09	-.09	.14	.06	-.12	.00	.07	.07	8.11 (3.33)
4. PEM-A				**.55*** **	.19	-.09	.17	.03	.22	.13	-.03	-.02	.22	-.09	20.90 (6.42)
5. PEM-C					.06	-.14	.23	-.03	**.32***	.19	-.01	.10	.19	.16	15.72 (5.39)
6. Baseline Positive Activation						**.42** **	**.74*** **	**.46*** **	**.72*** **	**.30***	.20	.09	.10	.14	24.49 (8.51)
7. Post Film Positive Activation							.23	**.71*** **	.21	**.66*** **	-.03	-.09	.06	.06	15.78 (6.42)
8. Baseline warmth-affection								**.50*** **	**.71*** **	.16	**.41** **	.19	.06	.15	11.73 (4.61)
9. Post film warmth-affection									**.31***	**.49*** **	.11	-.08	.00	.03	7.07 (3.41)
10. Baseline pleasure										**.35** **	**.26***	.10	.10	.09	8.36 (2.66)
11. Post film pleasure											-.05	-.12	.20	.09	4.87 (2.21)
12. Baseline zygomaticus activation												**.49*** **	.00	.15	3.27 (1.84)
13. Film zygomaticus activation													.00	.09	2.81 (1.26)
14. Baseline electrodermal activation														**.31***	2.26 (1.73)
15. Post film electrodermal activation															1.10 (1.53)

*$p < .05$, ** $p < .01$ *** $p < .001$

Manipulation checks

Self-reported affect and psychophysiological activation scores recorded before and after each film were compared to test the efficacy of each film in inducing the target emotion. These comparisons could not be made through MANOVA as several of the variables were not normally distributed (Field, 2009). Therefore, pre and post film scores were compared with a series of univariate analyses. T-tests were conducted where the distribution of variables were improved with transformations. Otherwise, non-parametric Wilcoxon tests were conducted.

Following the appetitive sports film, there were significant increases in positive activation, $Z = -3.99$, $p < .001$, warmth-affection, $Z = -4.83$, $p < .001$, and pleasure, $Z = -4.52$, $p < 001$. Moreover, during the final 60 seconds of the film, there was a significant increase in zygomaticus activation, $Z = -3.60$, $p < .001$, and a significant decrease in electrodermal activation, $Z = -4.65$, $p < .001$, relative to baseline.

Following the affiliative family film, there was a significant increase in warmth-affection, $Z = -6.21$, $p < .001$, and pleasure, $t\ (12050) = 9.28$, $p < .001$, but there was no increase in positive activation $Z = -1.11$, $p = .267$. During the final 60 seconds of the film, there was no increase in zygomatic activation, $t\ (1537) = 0.83$, $p = .407$[8], although there was a significant decrease in electrodermal activation, $Z = -4.40$, $p < .001$.

[8] A reciprocal transformation was applied to improve the distribution of the data. A non-parametric test on the original, non-normally distributed data showed that zygomatic activation was greater during the final 60 seconds of the film than during the 60 second baseline, $Z = -2.17$, $p = .030$.

In response to the coloured sticks film, there was a significant decrease in positive activation, $Z = -5.89$, $p < .001$, pleasure, $Z = -5.96$, $p < .001$, warmth-affection, $Z = -5.87$, $p < .001$, zygomaticus activation, $t\ (184) = 4.55$, $p < .001$[9], and electrodermal activation, $Z = -4.42$, $p < .001$.

Testing affective reactivity to the appetitive sports film

The finding that the coloured sticks film caused decreases in both positive affect and zygomatic activation prevents the use of this stimulus as a neutral comparison condition. Therefore, pre-post change scores were created by subtracting baseline scores from each of the post-film scores. Pre-analysis screening revealed that the change scores for the majority of variables were not normally distributed, *D*s range from .13 to .14, all *p*s < .05. Furthermore, these distributions were not improved by applying logarithmic, square root or reciprocal transformations. Therefore, the relationships between personality and changes in affect, zygomatic activation and electrodermal activity were assessed through a series of non-parametric Spearman correlations.

Table 28 shows the results of the Spearman correlations between personality and change scores in self-reported affect, zygomaticus and electrodermal activation following the appetitive sports film.

[9] A reciprocal transformation was applied to improve the distribution of the data. A non-parametric test on the original, non-normally distributed data also showed that zygomatic activation was lower during the final 60 seconds of the film than during the 60 second baseline, $Z = -1.99$, $p = .047$.

Table 28

Spearman Correlations Between Personality Traits and Change Scores in Self-reported Affect, Zygomaticus Activation and Electrodermal Activity Following the Appetitive Sports Film

	Positive Activation	Pleasure	Warmth-affection	Zygomaticus Activaiton	EDA
Wellbeing	.11	-.05	.10	.21	.04
Social Potency	-.06	-.07	.00	.08	.22
Achievement	.07	.08	.04	-.19	-.08
PEM-A	.02	-.02	.06	.03	.05
Social Closeness	.12	.13	.13	.16	**.29***
PEM-C	.16	.06	.13	.24	.18

Note: Correlation coefficients and *p* values derived from pooled multiple imputation data, with five imputations.

As can be seen from Table 28, Social Closeness was positively associated with the change in electrodermal activation in the final 60 seconds of the film relative to baseline. Specifically, higher Social Closeness scores were associated with smaller decreased in electrodermal activation during the film relative to baseline.

A further series of Spearman correlations were conducted to test the relationships between personality and changes in self-reported affect and psychophysiological activation in response to the affiliative family film. The results of these are shown in Table 29.

Table 29

Spearman Correlations Between Personality Traits and Change Scores in Self-reported Affect, Zyogmaticus Activation and Electrodermal Activity Following the Affiliative Family Film

	Warmth Affection	Pleasure	Positive Activation	Zygomaticus Activaiton	EDA
Wellbeing	.96	.73	.04	.27	.10
Social Closeness	.01	.06	.12	.13	-.05
PEM-C	.01	.02	.12	**.26***	.05
Social Potency	.15	.13	.06	.14	-.04
Achievement	.16	-.05	-.02	.18	-.01
PEM-A	.17	.09	.06	.28	.05

Note: Correlation coefficients and *p* values derived from pooled multiple imputation data, with five imputations.

As can be seen from Table 29, PEM-C was positively associated with changes in zygomaticus activation during the final 60 seconds of the family film relative to baseline. The relationship between changes in zygomaticus activation and PEM-A also approached significance, $p = .050$[10].

5.4 Discussion

The aim of this study was to test emotional reactivity in agentic and affiliative extraversion. It was predicted that agentic extraversion would be positively

[10] This relationship was found to be significant in the original data set, with missing data, *rho* = .28, *p* = .031.

associated with reports of positive activation, and with zygomaticus and electrodermal activation in response to an agentic sports film. Furthermore, affiliative extraversion was expected to be positively associated with self-reports of warmth-affection and pleasure, and with zygomaticus activation in response to an affiliative family film. The data did not support these predictions for the most part.

Relationships between personality and self-reported affect

Firstly, neither agentic nor affiliative extraversion were associated with any form of affective reactivity on measures of positive activation, warmth-affection or pleasure. This is in contrast to previous research that has examined individual differences in emotional responses to the films employed in this study, whereby MPQ Social Potency and Achievement have been found to be associated with positive activation, and MPQ Social Closeness has been found to be positively associated with warmth-affection (Depue & Morrone-Strupinsky, 2005; Morrone-Strupinsky & Depue, 2004; Morrone et al., 2000). There are some important differences between the current study and Morrone-Strupinsky and colleagues' research, however. For example, Morrone-Strupinsky and colleagues pre-selected participants based on their MPQ scores to ensure that their samples represented a wide distribution of the relevant traits. This likely led to more sensitive tests of personality effects, particularly in comparison to the current sample that was recruited opportunistically and may represent a more restricted range of MPQ scores. Additionally, a mixed-sex sample was recruited for the current study, although the relationship between MPQ Social Closeness and warmth-affection has to date only been demonstrated among female samples (Depue & Morrone-Strupinsky, 2005;

Morrone-Strupinsky & Depue, 2004). Females are also found to be more affiliative than males in general (Costa, Terracciano, & McCrae, 2001), which suggests that gender may be an important moderator of the relationship between affiliative extraversion and affective reactivity. This may be the reason than Morrone-Strupinsky and Lane (2007) did not observe any relationship between MPQ Social Closeness and warmth-affection in a mixed-sex sample's responses to affiliative pictures.

In order to test for potential gender effects in affiliative reactivity, it will be necessary for future researchers to recruit larger samples of both males and females. Moreover, Morrone-Strupinsky and Depue (2004) describe how warmth-affection is induced by different stimuli in males and females. This suggests that future researchers will also have to include a range of stimuli that are able to sufficiently induce warmth-affection in both genders.

The finding that neither agentic nor affiliative extraversion are associated with any form of affective reactivity are also inconsistent with previous findings that BFAS Enthusiasm and Assertiveness both predict positive activation following an appetitive emotion induction (Smillie et al., 2013). The present findings also contradict those reported in Chapter 4, where affiliative extraversion was found to predict positive activation, warmth-affection and pleasure following an affiliative imagery task, whilst agentic extraversion was found to predict positive activation following the same task.

Relationships between personality and psychophysiology

In contrast to the self-reported affect, there was some evidence that both electrodermal and electromyographic activation following the film stimuli were associated with personality. These findings support the inclusion of psychophysiological variables in studies of emotional reactivity, and suggest that measures of skin conductance and electromyography may reveal individual differences that are not reflected in self-reported affect.

As predicted, affiliative extraversion was positively related to zygomaticus reactivity in response to the affiliative family film. This was only found to be the case when affiliative extraversion was measured with PEM-C however, which is a combination of MPQ-BF Social Closeness and Wellbeing scores; Social Closeness on its own did not predict zygomaticus activation. The finding that PEM-C and Social Closeness were differentially associated with particular aspects of emotional reactivity raises questions about how affiliative extraversion should be measured. The MPQ Social Closeness and Wellbeing scales were derived atheoretically from factor analyses, and subsequent factor analyses showed that these scales also jointly load onto the higher order factor PEM-C (2008). The higher order PEM-C factor broadly corresponds to the Enthusiasm scale of the BFAS (DeYoung et al., 2007), which assesses the extent to which individuals are sociable and experience positive affect. Each of these scales – MPQ Social Closeness, MPQ PEM-C and BFAS Enthusiasm – have previously been employed as measures of affiliative extraversion (Morrone et al., 2000; Smillie et al., 2013) but at present there is no consensus on whether the positive affective component of extraversion should be considered as a marker of affiliation. Until this issue is resolved, it may be helpful for researchers to include multiple measures of affiliative extraversion, and compare how each is

associated with affiliative emotional reactivity. Theoretically, affiliative extraversion is considered to reflect variation in the capacity to experience affiliative reward (Depue & Morrone-Strupinsky, 2005). From this viewpoint, measures that are more predictive of emotional reactivity to affiliative rewards may be better representations of the underlying trait.

Limitations of the current study

There are some limitations to this study. Most prominently, the film that was intended to serve as a neutral stimulus was found to have a significant impact on participants' emotional states. Large decreases were observed in positive activation, pleasure and warmth-affection following this film, which suggests that participants may have found it to be boring or frustrating to watch. As a result, this film could not be used as a comparison condition, and participants' responses to the stimuli had to be compared against the baseline measures recorded before the onset of each film.

Selecting the 60 seconds before the films began as a baseline may have been problematic however. Viewing emotional stimuli such as pictures (Bradley et al., 2001; Lang et al., 1993) and films (Gross, 1993) is typically associated with an increase in electrodermal activation, although in the present study, electrodermal activation was lower during the films relative to the baseline. This may be because the baseline measure was recorded as participants waited for the film to begin. While this was intended to serve as a resting baseline, it is likely that participants were actually in a state of anticipation. Such states are generally arousing and are associated with increased skin conductance (Bradley & Lang, 2007), which may

explain why electrodermal activation was higher during the baseline periods than during the films.

In sum, the results of this experiment provide little evidence of greater emotional reactivity in either agentic or affiliative extraversion. Previous findings that agentic and affiliative extraversion predict positive activation and warmth-affection in response to film clips were not replicated, although there was some indication that affiliative extraversion is related to certain psychophysiological responses to both appetitive and affiliative stimuli.

Chapter 6

General Discussion

Aims of thesis

Extraversion is consistently found to be positively associated with positive affect (Steel et al., 2008; Watson & Clark, 1997a). One explanation for this relationship is the affective-reactivity hypothesis, whereby extraverts are expected to experience greater levels of positive affect in response to rewards than are introverts (Smillie, 2013; Smillie et al., 2012). This issue is complicated by the fact that there are two major components of extraversion that are associated with particular patterns of affective reactivity. Agentic extraversion reflects social dominance, exhibitionism and achievement striving, and is associated with positive activation in response to appetitive stimuli and goal pursuit. Affiliative extraversion reflects being warm, affectionate and valuing close interpersonal bonds, and is associated with warmth-affection in response to affiliative rewards (Depue & Morrone-Strupinsky, 2005; Morrone-Strupinsky & Depue, 2004; Morrone-Strupinsky & Lane, 2007; Morrone et al., 2000).

The aim of this thesis was to test affective reactivity in agentic and affiliative extraversion across four studies, each of which employed a different methodology. A major advantage of this approach is that it allows researchers to attempt to conceptually replicate past research, and to test the generalisability of previously reported findings. The results from these four different methodologies were mixed however. There was no evidence that agentic extraversion moderates individuals'

responses to appetitive scenarios, and the findings were mixed with as to whether affiliative extraversion moderates affective responses to affiliative rewards.

Agentic and affiliative affective reactivity to social behaviours

In Study 1, affective reactivity was examined in the context of individuals' responses to naturally occurring interactions. It was expected that communal behaviour would be associated with warmth-affection and pleasure, and that these relationships would be moderated by affiliative extraversion. On the other hand, it was predicted that dominant behaviour would be associated with positive activation, and that this relationship would be moderated by agentic extraversion. The data did not support these predictions. For example, although communal behaviours were found to be associated with warmth-affection, pleasure and, to a lesser extent, positive activation, none of these relationships were moderated by either affiliative or agentic extraversion.

One limitation of Study 1 was that the data were cross-sectional, which makes it difficult to determine whether social behaviour cause positive affect, or whether positive affect causes social behaviour. This issue was addressed in Study 2, where participants were randomly instructed to display varying degrees of dominant and communal behaviour during group interactions. As predicted, individuals who were instructed to act communally reported greater levels of warmth-affection than participants who were given no instruction on how to behave. Counter to predictions however, this relationship was not moderated by affiliative extraversion. On the other hand, individuals who scored low on Social Closeness reported greater levels of positive activation when they were assigned to act communally than when they

were given no instructions. Moreover, levels of warmth-affection, pleasure and positive-activation were lower in the "act aloof" condition relative to the condition, although the latter difference was only significant for high to moderate scorers on MPQ Social Closeness.

With regard to dominant behaviour, participants in the "act dominantly" condition reported greater levels of positive activation than did those in the control condition, as expected. Counter to predictions, this relationship was not moderated by agentic extraversion, but by affiliative extraversion; the difference in positive activation scores between the "act dominantly" and no-instruction control conditions was only significant for low scorers on MPQ Social Closeness, and not for moderate to high scorers. Furthermore, participants in the "act submissively" condition reported lower levels of positive activation and pleasure than those in the control condition did. Both MPQ Social Closeness and Social Potency further moderated the difference in positive activation scores between these conditions: relative to the control condition, submissive behaviours caused decreases in positive activation among moderate to high scorers on MPQ Social Closeness and Social Potency, but there was no difference in positive activation scores between these two conditions among low scorers on either trait.

Taken together, the results of studies 1 and 2 studies did not support the affective reactivity hypothesis in agentic and affiliative extraversion: there was no evidence that these personality dimensions moderated the affective consequences of social behaviour. In Study 1, and in Study 2, it was affiliative introverts who were found to respond more positively to both communal and dominant behaviours. It should be noted however that personality differences in individuals' responses to

social behaviours are rarely observed. In experimental work for example, instructing individuals to behave like extraverts (e.g. being *bold, adventurous,* and *assertive*) has been found to cause increases in arousal, pleasure, positive activation in particular. Trait extraversion has not been found to moderate the relationship between these behaviours and any of the resulting positive affects however (Fleeson et al., 2002; McNeil & Fleeson, 2006; McNeil et al., 2010; Zelenski et al., 2012). The data derived from experience sampling research has been mixed, however. In one sample reported by Fleeson, Malanos and Achille (2002) for example, introverts were found to report greater levels of positive affect following everyday extraverted behaviours. On the other hand, there is some evidence to suggest that traits of Warm-Agreeableness and Extraversion are positively associated with pleasant affect following communal behaviours (Coté & Moskowitz, 1998; Moskowitz & Coté, 1995).

Agentic and affiliative reactivity, cognitive appraisals and psychophysiology

In Study 3, agentic and affiliative affective reactivity was tested in response to guided imagery vignettes. An additional aim of Study 3 was to test whether cognitive appraisals would mediate any of the observed personality differences in affective reactivity. Guided imagery methods are a common means of affect induction, and have previously revealed individual differences in both affective reactivity and appraisals (Kuppens & Mechelen, 2007; Smillie et al., 2012). It was expected that agentic extraversion would predict positive activation in response to an appetitive imagery task, and that affiliative extraversion would predict warmth-affection and pleasure following an affiliative imagery task. It was further expected

that these differences would be mediated by cognitive appraisals, although no specific predictions were made with regard to which appraisals would be important.

The results partially supported these predictions. Affiliative extraversion was positively associated with reports of warmth-affection and pleasure in response to an affiliative imagery task. Counter to predictions however, affiliative extraversion also predicted positive activation in response to this task. Furthermore, agentic extraversion was found to predict positive activation in response to the affiliative imagery, but not the appetitive imagery.

There was also some evidence that cognitive appraisals underlie personality differences in affective reactivity. Specifically, appraisals of intrinsic pleasantness mediated the relationship between affiliaitve extraversion and pleasure, and appraisals of intrinsic pleasantness and compatibility with internal standards mediated the relationship between affiliative extraversion and warmth-affection. These findings supports previous research that documents how appraisals can account for individual differences in emotion, and points to a potential psychological mechanism that may account for some aspects of affiliative affective-reactivity (Scherer, 2009; Smith & Kirby, 2009). Should these findings be replicated, they would add a new level of analysis and explanation to the affective-reactivity literature, which is currently dominated by biological accounts (Depue & Collins, 1999; Depue & Morrone-Strupinsky, 2005). Future researchers can expand on these findings by further exploring which aspects of an individual's internal standards are relevant to the experience of warmth-affection in affiliative contexts. For example, affiliative extraversion may be associated with the values that individuals hold, or with the structure and content of individuals'' self-concepts (McConnell et al., 2009).

In contrast to Studies 1 and 2 then, some of the predictions from the affective reactivity hypothesis of agentic and affiliative extraversion were supported in this study. One potential explanation for this discrepancy in findings is that studies 1 and 2 investigated individuals' responses to actual events, whilst study 3 tested how participants' respond to imaginary situations. The psychological processes that determine an individual's response to real events are likely to be quite different to those that are involved when a person imagines himself or herself in a situation. For example, mental imagery may involve affective forecasting, where individuals attempt to predict how they will feel in response to some future event. In order to do so, individuals may attempt to recall similar events that they have previously experienced, or they may rely on their beliefs about themselves or about how particular events influence their affective states (Robinson & Clore, 2002; Wilson & Gilbert, 2003). For example, when asked to imagine an affiliative situation and to feel the feelings that they would do if that situation were really happening, participants may rely on beliefs about those situations (e.g. "caring for babies make me feel warm"), or beliefs about themselves (e.g. "I am a warm and caring person" ;Robinson & Clore, 2002). These beliefs are often erroneous however, which can bias individuals' estimates of how they feel in particular settings. For example, McFarland, Ross and DeCourville (McFarland, Ross, & DeCourville, 1989) report how many women believe their moods are more negative when they are menstruating, and recall being in worse moods during their period. When women were asked to record daily ratings of their moods for several weeks however, participants' ratings of negative affect were unrelated to their phase of cycle.

The purpose of this brief discussion is to raise the point that the conflicting results obtained across Studies 1-3 may be attributed to differences in the processes that are involved in actually experiencing a social interaction and merely imagining one. These processes may in turn be differentially related to aspects of personality, and therefore lead to divergent patterns of affective-reactivity across methods. In partial support of this view, Zelenski et al., (Zelenski et al., 2013) instructed four samples of participants to act in either an extraverted or introverted manner in a group task. Furthermore, after receiving the acting instructions, participants were then asked to estimate how much positive affect they expected to experience during the task. These researchers found that participants who were instructed to act like extraverts experienced greater levels of positive affect than those who were instructed to act like introverts, and that this difference was not moderated by trait extraversion. On the other hand, there was an interaction between acting condition and trait extraversion on ratings of anticipated positive affect, whereby only extraverts expected to experience greater levels of positive affect when they were instructed to act like extraverts rather than introverts.

The differences in the results observed across Studies 1 to 3 may also be attributed to the measures of personality employed. In studies 1 and 2, agentic and affiliative extraversion were measured with the Social Closeness, Social Potency and Achievement scales of the MPQ-BF (Tellegen & Waller, 2008). In Study 3 on the other hand, personality was measured with the BFAS Enthusiasm and Assertiveness scales (DeYoung et al., 2007). There are some important differences in the content of these scales. For example, BFAS Assertiveness taps a similar content domain to MPQ Social Potency, but it does not include the achievement striving and

persistence that is assessed by MPQ Achievement. Moreover, Social Closeness is a relatively pure measure of the extent to which individuals enjoy social relationships, whilst BFAS Enthusiasm combines similar affiliative content with items that tap positive affectivity. This issue was addressed in Study 4.

The aim of Study 4 was to test affective reactivity by investigating whether agentic and affiliaitve extravesion moderate individuals' subjective and psychophysiological responses to film clips. The film clips used in this study were taken from previous research that demonstrates individual differences in agentic and affiliative affective reactivity (Morrone-Strupinsky & Depue, 2004; Morrone et al., 2000). As in Studies 1 and 2, personality was measured via the Social Closeness, Social Potency and Achievement scales of the MPQ-BF. The MPQ-BF Wellbeing scale was also included in this study, which allowed for additional personality measures to be created however: affiliaitve extraversion was further measured by summing the Social Closeness and Wellbeing scales to form Communal Positive Emotionality (PEM-C) and agentic extraversion was further measured by summing the Social Potency, Achievement and Wellbeing scales to form Agentic Positive Emotionality.

Counter to predictions, there was no evidence that personality traits were associated with any form of self-reported affect. On the other hand, affiliative extraversion was found to be positively associated with zygomatic activation following the affiliative film, and skin conductance following the appetitive film. This partially supports the view that affiliative extraversion broadly reflects individual differences in sensitivities to affiliative rewards (Depue & Morrone-Strupinsky, 2005). These findings did not generalize across the two measures of

agentic and affiliative extraversion included in this study however. Only MPQ PEM-C - a combination of affiliation and positive affectivity - was associated with zygomatic activation following the affiliative stimulus, and only Social Closeness predicted skin conductance during the appetitive film. Therefore, the choice of personality measure may have a significant impact on the results derived from affective reactivity research.

Taken together, the results from studies 3 and 4 only provide modest support for affective reactivity in agentic and affiliative extraversion. As predicted, affiliative extraversion was found to be positively associated with warmth-affection and pleasure in response to affiliative imagery in Study 3, although these findings were not replicated when an affiliative film clip was used in Study 4. Whilst there was some psychophysiological evidence of greater reward reactivity among affiliative extraverts in response to the affiliative stimulus in Study 4, although this appeared to be dependent on the measure of affiliative extraversion employed.

These results are roughly consistent with previous results obtained by other investigators. The specific patterns of affiliative affective reactivity predicted in this thesis have only been reported in two female samples to date, in response to the film stimulus employed in Study 4 (Depue & Morrone-Strupinsky, 2005; Morrone-Strupinsky & Depue, 2004). On the other hand, Morrone-Strupinsky and Lane (Morrone-Strupinsky & Lane, 2007) describe how affiliative extraversion did not moderate affective reactions to affiliative pictures in a mixed-sex sample. Mixed results such as these suggest that there may be some important moderators that have yet to be identified (Smillie et al., 2012). One obvious variable for future researchers to consider is participants' gender. Larger samples will be needed to do so, and

greater care may have to be taken in selecting stimuli that are effective in inducing states of warmth-affection in both males and females (Morrone-Strupinsky & Depue, 2004).

In contrast to the mixed results in support of affective-reactivity in affiliative extraversion, there was no support for the prediction that agentic traits would moderate reports of positive activation in response to appetitive stimuli in either Study 3 or Study 4. These findings are more difficult to account for as to date, agentic extraversion has consistently been found to be positively associated with individuals' reports of positive activation following films (Morrone-Strupinsky & Depue, 2004; Morrone et al., 2000) and pictures (Morrone-Strupinsky & Lane, 2007).

Strengths, limitations and recommendations for future research

One major strength of the research reported here is the range of methods used to test affective-reactivity in agentic and affiliative extraversion. By testing the affective-reactivity hypothesis with a number of different methods, it was possible to consider how any observed personality differences might generalise to various contexts both within and outside of the laboratory. Moreover, evidence in favour of affective-reactivity would be more compelling should it be demonstrated across a number of methodologies as opposed to being limited to one. The use of these methods also allowed for the investigation to beyond self-reported affect and to include cognitive appraisals and psychophysiology. The data reported are the first to examine whether agentic and affiliaitve extraversion moderate the affective consequences of social behaviours for example, in both naturally occurring and

experimentally controlled situations. Individual differences in affective reactivity were also investigated in more traditional emotion induction paradigms using mental imagery and film clips. Despite the number of methods employed however, affective reactivity in affiliaitve extraversion was only clearly identified in one study using mental imagery, and none of the methods produced evidence for affective-reactivity in agentic extraversion.

There are some limitations to the current research however, which highlight several issues for future research to consider. For example, there is no consensus on how agentic and affiliative extraversion ought to be defined, and therefore there is no clear rationale to guide researchers' choices over how these traits should be measured. For example, agentic extraversion has been defined as a broad dimension that includes social dominance, mastery and achievement (Depue & Collins, 1999). As such, agentic extraversion has been measured with scales that tap assertiveness, leadership and exhibitionism, such as MPQ Social Potency (Morrone et al., 2000) and BFAS Assertiveness (Smillie et al., 2013), and with scales that reflect persistence, achievement striving and an enjoyment of hard work, such as MPQ Achievement (Morrone et al., 2000). Moverover, there is debate over whether achievement striving should be considered a facet of extraversion. Tellegen and colleagues for example have described how MPQ Achievement is moderately correlated with MPQ Social Potency, and how these scales jointly load onto a higher order dimension, alongside MPQ Wellbeing and Social Closeness (Tellegen & Waller, 2008). Other researchers on the other hand have conceptualised achievement striving as a facet of consciousness (Costa & McCrae, 1995).

There is also some ambiguity concerning affiliative extraversion. Some authors for example have equated affiliative extraversion with Agreeableness from the five-factor model of personality (Depue, 2006; Depue & Morrone-Strupinsky, 2005). There is clearly some overlap between these traits, as NEO Agreeableness has been found to load onto a common factor alongside markers of affiliative extraversion, such as MPQ Social Closeness, and NEO Warmth and Gregariousness (Church, 1994; Church & Burke, 1994). Moreover, whilst warmth is included as a facet of extraversion in some personality inventories (Costa & McCrae, 1995), other investigators have argued that this specific trait is more strongly related to Agreeableness (Goldberg, 1999; John & Srivastava, 1999).

Investigators have recently begun to examine how aspects of affiliative extraversion and agreeableness overlap, and how these traits can be distinguished from one another. Much like extraversion is comprised of two major components of agency and affiliation, there is some evidence that agreeableness is comprised of two components, which DeYoung and colleagues have labeled Compassion and Politeness (DeYoung et al., 2007). Compassion reflects the extent to which individuals are warm, empathic and sympathetic towards others, whilst Politeness reflects cooperation, humility and respect for others. Markers of affiliative extraversion are moderately correlated with the compassion component of agreeableness, but not with the politeness component (DeYoung et al., 2007; DeYoung et al., 2013). This work clearly demonstrates that the broad trait of Agreeableness contains phenotypic content that is unrelated to the more specific aspects of affiliative extraversion. DeYoung et al., (2013) have concluded from this evidence that trait affiliation is best considered as a higher order trait comprised of

the affiliative component of extraversion and the compassion component of agreeableness. These investigators further suggest that researchers interested in affiliation ought to include measures of the affiliative components of both extraversion and agreeableness.

This discussion highlights some of the difficulties in defining agentic and affiliative extraversion, and suggests that future researchers ought to take care when selecting measures of these traits. One potential solution to these problems is to include multiple measures that cover the breadth of the proposed phenotypes under investigation, and identify underlying patterns of shared variance through factor analysis. The resulting factor scores could then be used as the dependent variables in any further analyses, as some investigators have done (Wacker et al., 2012b).

In addition to considering which personality scales best measure agentic and affiliative extraversion, more care may have to be given to how participants are recruited in future research. An opportunistic sampling strategy was applied in each of the studies reported here, where there was no attempt made to select participants according to any set criteria. Other researchers on the other hand have pre-selected participants to ensure a wide distribution of scores across the extraversion spectrum, and have subsequently found support for individual differences in affective reactivity (Morrone-Strupinsky & Depue, 2004; Morrone et al., 2000). Opportunistic sampling will likely lead to a more restricted range of trait scores however, which may make it more difficult to observe the relationships between personality and affect (Morrone-Strupinsky & Lane, 2007) Where possible therefore, future researchers should aim to screen large numbers of individuals and purposively select participants based on their personality scores.

Future researchers should also continue to explore the psychological mechanisms that underlie affective reactivity. Affective reactivity is traditionally investigated by selecting a stimulus or task that produces a target affect – such as positive activation or warmth-affection – although researchers generally do not discuss the pathways that lead to these affective reactions. As discussed earlier however, the choice of task may be an important moderator in this literature. For example, there are likely different processes engaged when an individual reports their affective state immediately following an actual social interaction, as opposed to when they are asked to imagine a social interaction.

Similarly, affective-reactivity research would likely benefit from researchers incorporating psychological models of emotion into their work, such as appraisal theory (Scherer, 1999). For example, in Study 3 it was found that appraisals of compatibility with internal standards can account for some aspects of affective-reactivity in affiliative extraversion. This research will be important for understanding the psychological mechanisms that underpin personality differences in affect, and will complement existing biological accounts of affective reactivity.

Conclusion

The aim of this thesis was to test affective reactivity in agentic and affiliative extraversion. Four studies were conducted to test the predictions that agentic extraversion would predict positive activation in response to an appetitive stimulus, and that affiliative extraversion would predict warmth-affection and pleasure in response to an affiliative stimulus. Various methods were used in each study, which

made it possible to test affective-reactivity in a variety of different contexts. While the results were mixed, they did not support the predictions for the most part. For example, there was no evidence that agentic extraversion was associated with any form of affective reactivity following an appetitive event. Furthermore, affiliative extraversion was only found to be positively associated with warmth-affection and pleasure when participants imagined themselves in an affiliative situation; no such relationship was observed when participants engaged in affiliative behaviours themselves, or when they observed a film showing others behaving affiliatively. In conclusion therefore, the evidence presented in this thesis does not support affective-reactivity in agentic extraversion, and only partly supports affective reactivity in affiliative extraversion.

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