

THE EFFECT OF ACTING EXTRAVERTED VERSUS INTROVERTED ON AFFECT:
TESTING THE REWARD SENSITIVITY MODEL

J. Murray McNiel

A dissertation submitted to the faculty of the University of North Carolina at Chapel Hill in
partial fulfillment of the requirements for the degree of Doctor of Philosophy in the
Department of Psychology

Chapel Hill
2006

Approved by
Advisor: Joseph C. Lowman
Reader: Bernadette Gray-Little
Reader: Mitchell J. Prinstein
Reader: Chester A. Insko
Reader: William Fleeson

ABSTRACT

J. MURRAY MCNIEL: The Effect of Acting Extraverted Versus Introverted on Affect:
Testing the Reward Sensitivity Model
(Under the direction of Joseph C. Lowman, Ph.D.)

A considerable body of research documents the relationship between dispositional extraversion and positive affect, and one recent study found that acting extraverted versus introverted for a short period of time (the manipulation of state extraversion) had an effect on positive affect (McNiel & Fleeson, in press). Building on this work, this study had three purposes: (i) to replicate the finding that the manipulation of state extraversion influences positive affect; (ii) to test whether reward sensitivity is a mechanism in the effect of state extraversion on positive affect via two different types of reward stimuli; and (iii) to determine how the manipulation of state extraversion influences other types of affect. State extraversion was found to have a strong effect on positive affect in a 10-minute dyadic discussion. However, no support for reward sensitivity as a mechanism was found. One type of potential reward stimuli, affectively valenced pictures, did not appear to function as effective reward stimuli. A second type of potential reward stimulus, the physical attractiveness of one's interaction partner, functioned as a reward stimulus but was unrelated to how much state extraversion influenced positive affect. Finally, state extraversion had effects on various types of affect as defined by an affect circumplex. Acting extraverted had the strongest effect on positive affect, and it also had smaller (but still strong) effects on pleasant and activated affect, with these latter two effects being almost equal in magnitude.

TABLE OF CONTENTS

	Page
LIST OF TABLES	vii
LIST OF FIGURES	viii
LIST OF APPENDICES.....	ix
Chapter	
I INTRODUCTION	1
Purposes of the Present Study.....	3
Is Reward Sensitivity a Mechanism in the Effect of State Extraversion on Positive Affect	4
The mechanism of reward sensitivity in the relationship between dispositional extraversion and positive affect	4
Testing the mechanism of reward sensitivity in the relationship between state extraversion and positive affect.....	8
What Other Types of Affect are Influenced by State Extraversion	12
Differing operationalizations of positive affect	12
Using a circumplex model of affect	13
Testing the effect of state extraversion on different aspects of affect	14
Summary	16
Purposes and Hypotheses.....	17

II	STUDY METHODS	19
	Design	19
	Participants.....	19
	Procedure	19
	Materials	20
	Manipulation of state extraversion	20
	Manipulation of affective quality of photos	21
	Physical attractiveness	21
	Affect	22
	Behavior	23
	Dispositional extraversion	23
III	RESULTS	24
	Purpose.....	24
	Design	24
	Assumptions of Statistical Analyses.....	25
	Reliabilities of Dependent Variables	25
	Gender.....	26
	Extraversion Manipulation Check	26
	Summary	27
	Picture Stimuli	28
	Summary	28
	Partner Attractiveness	28
	Summary	29

Affect	30
Positive Affect	30
Pleasant Affect	32
Activated Affect	33
Negative Affect	34
Summary	35
Comparing the Effects of State Extraversion on the Different Types of Affect	35
Summary	37
Order Effects.....	37
IV DISCUSSION.....	38
Purpose and Hypotheses	38
Effect of State Extraversion on Positive Affect.....	38
Reward Sensitivity Model.....	39
Background	39
Picture stimuli	40
Physical attractiveness of interaction partner	42
Implications for future research on reward sensitivity	45
The Effect of Acting Extraverted on Different Types of Affect.....	45
Applied Relevance of Findings.....	47
Limitations and Additional Directions for Future Research.....	48
Conclusion	50
TABLES	51

FIGURES	56
APPENDICES	60
REFERENCES	91

LIST OF TABLES

Table	Page
1. Analysis of Variance for Dependent Variables of Self-Reported Extraverted Behavior	51
2. Analysis of Variance Model for Dependent Variable of Self-Reported Positive Affect.....	52
3. Analysis of Variance Model for Dependent Variable of Self-Reported Pleasant Affect	53
4. Analysis of Variance Model for Dependent Variable of Self-Reported Activated Affect ..	54
5. Analysis of Variance Model for Dependent Variable of Self-Reported Negative Affect ...	55

LIST OF FIGURES

Figure	Page
1. Affect Circumplex	56
2. Effect of State Extraversion on Self-Reported Positive and Pleasant Affect	57
3. Effect of State Extraversion on Self-Reported Positive and Activated Affect	58
4. Affect Circumplex with Effect Sizes	59

LIST OF APPENDICES

Appendix	Page
A. General Directions	60
B. Part One Task Instructions	62
C. Part One Task.....	66
D. Behavior Ratings.....	69
E. Affect Ratings.....	72
F. Part Two Task Instructions.....	75
G. Part Two Task	79
H. Physical Attractiveness Ratings.....	82
I. Typical Behavior	84
J. Examples of IAPS Pictures	86

CHAPTER I

INTRODUCTION

There is a sizable research base documenting that more extraverted individuals experience greater positive affect (e.g., Charles, Reynolds, & Gatz, 2001; DeNeve & Cooper, 1998; Diener & Lucas, 1999; Diener, Oishi, & Lucas, 2003; Fossum & Barrett, 2000; Lucas, 2000; Williams, Surwit, Babyak, & McCaskill, 1998; Wilson & Gullone, 1999). That is, individuals who are more outgoing, assertive, talkative, etc., tend to experience greater positive emotion in their lives. The relationship is strong, with extraversion accounting for an average of about 15% of the variance in positive affect (Costa & McCrae, 1980; David, Green, Martin, & Suls, 1997; Gross, Sutton, & Ketelaar, 1998; Larsen & Ketelaar, 1989, 1991; Lucas & Baird, 2004; Lucas & Fujita, 2000; McCrae & Costa, 1991; Rusting, 1999; Watson & Clark, 1992).

The extraversion-positive affect relationship is robust across methodologies. The most common method of measurement is the self-report of both general trait behavior and the general experience of affect (e.g., Lucas, Diener, Grob, Suh, & Shao, 2000; Watson & Clark, 1992). The relationship also has been observed when positive affect is recorded daily (e.g., David et al., 1997; Suls, Green, & Hillis, 1998). Extraversion predicts the amount of positive affect experienced when watching a comedy film (Gross et al., 1998; Larsen & Ketelaar, 1991), and extraversion also predicts mood-related cognitive processing, such as free recall of positive words (Rusting & Larsen, 1998; Sandvik, Diener, & Seidlitz, 1993). Findings of this association are not limited to self-report, as the extraversion-positive affect relationship

has been found in ratings by spouses (e.g., Costa & McCrae, 1988). Additionally, it has been found to exist for children, adolescents, adults (Lucas & Diener, 2000; Wilson & Gullone, 1999), and chimpanzees (Weiss, King, & Enns, 2002). Finally, there is ample cross-cultural support for the extraversion-positive affect relationship (Allik & Realo, 1997; Hamid & Cheng, 1996; Headey & Wearing, 1989; Steel & Ones, 2002), including one study that included 39 countries representing a diversity of ethnic backgrounds, economic levels, and geographic regions (Lucas et al., 2000). Overall, the association between extraversion and positive affect is not in dispute, and it is one of the strongest relationships studied by personality researchers (Lucas & Baird, 2004).

However, because almost all the research on the extraversion-positive affect relationship has been correlational in nature, the direction of influence has not been definitively established. Does extraversion cause positive affect? Or does positive affect cause extraversion? Or does some third variable cause both? The answer is likely to be some combination of these factors. However, the present study aims to consider only the first of these possibilities, extraversion's influence on positive affect.

McNiel and Fleeson (in press) researched the influence of extraversion on positive affect using an experimental methodology. Specifically, they had individuals act extraverted and introverted (i.e., low in extraversion-relevant behavior) in two different discussions and tested whether there was any difference in positive affect under these different circumstances. In fact, both self-reports and observers' ratings indicated that individuals experienced increased positive affect when acting extraverted as opposed to acting introverted, with the effect size quite large (approximately one standard deviation). Additionally, this effect held equally for dispositional extraverts and dispositional introverts,

suggesting that the affective benefit of acting extraverted does not vary depending on whether an individual typically acts extraverted or introverted.

It is important to note that in having individuals act extraverted and introverted for short periods, the research of McNiel and Fleeson (in press) could be described as having manipulated state extraversion. That is, although extraversion is usually conceptualized as a trait-level characteristic, it is reasonable to describe an individual's momentary level of extraversion as state extraversion. Thus, the term **state extraversion** will be used in this paper to describe an individual's level of extraversion over a short period of time. An individual's average level of extraversion, which is what is usually meant when one discusses the trait of extraversion, can be thought of as dispositional extraversion. Thus, the term **dispositional extraversion** will be used in this paper to describe an individual's level of extraversion on average.

Purposes of the Present Study

Based on the work of McNiel and Fleeson (in press), the present study has three purposes: (i) to replicate the finding of McNiel and Fleeson that acting extraverted versus introverted for a short time (the manipulation of state extraversion) influences positive affect; (ii) to test one proposed mechanism explaining the effect of state extraversion on positive affect, reward sensitivity; and (iii) to determine whether state extraversion influences other types of affect.

The first purpose is important because the finding that acting extraverted as opposed to introverted influences positive affect has only been demonstrated in one study (McNiel & Fleeson, in press), and the replication of this experimental finding is necessary to increase confidence that the finding is veridical. Because this first purpose is to replicate a previous

study (McNiel & Fleeson), this paper will not provide an in-depth theoretical treatment of this purpose. The second purpose is important because understanding one specific way that state extraversion influences positive affect would further our understanding of this pathway. That is, demonstrating an empirically-supported mechanism for the effect of state extraversion on positive affect would extend our knowledge of this finding. The third purpose is important because the operationalization of positive affect sometimes varies from study to study, and so understanding more accurately what types of affect state extraversion does and does not influence also furthers our understanding of this pathway.

Next, the second and third purposes will be discussed in more detail in the following two sub-sections in order to provide both an empirical and theoretical background for these purposes.

Is Reward Sensitivity a Mechanism in the Effect of State Extraversion on Positive Affect?

The mechanism of reward sensitivity in the relationship between dispositional extraversion and positive affect. Because research documenting the relationship between dispositional extraversion and positive affect is correlational, the direction of causality is unclear. However, most approaches assume that extraversion is the causal force, and there are several proposed explanations for extraversion's effect on positive affect. One proposed mechanism with empirical support is increased sensitivity to reward (e.g., Gross et al., 1998; Larsen & Ketelaar, 1989; 1991; Lucas & Baird, 2004). The reward sensitivity model posits that extraverts are more sensitive to rewarding stimuli than are introverts. If extraverts are more sensitive to rewarding stimuli than are introverts, as a consequence these more extraverted individuals will experience increased positive affect.

The theoretical basis for the reward sensitivity model comes from the work of Gray (1970, 1981). Gray proposed that there are two physiological sub-systems that account for much of our behavior, the behavioral activation system (BAS) controlling responses to reward and the behavioral inhibition system (BIS) controlling responses to punishment. Gray originally argued that both systems were related to both extraversion and neuroticism, with extraversion reflecting the relative strength of the systems (i.e., extraverts would have a stronger BAS than BIS) and neuroticism reflecting overall sensitivity (i.e., neurotics would be more sensitive in general) (1970). However, in his later work Gray revised his model, rotating the factors such that the BAS was closely aligned with extraversion and the BIS was closely aligned with neuroticism (1981). This revised model thus contends that extraversion is positively correlated with sensitivity to reward and that neuroticism is positively correlated with sensitivity to punishment. Gray's revised model is consistent with the considerable literature documenting the relationships between extraversion and positive affect and between neuroticism and negative affect (e.g., Charles, Reynolds, & Gatz, 2001; Costa & McCrae, 1980; David, Green, Martin, & Suls, 1997; DeNeve & Cooper, 1998; Diener & Lucas, 1999; Diener et al., 2003; Fossum & Barrett, 2000; Gross, Sutton, & Ketelaar, 1998; Larsen & Ketelaar, 1989, 1991; McCrae & Costa, 1991; Rusting, 1999; Watson & Clark, 1992; Williams, Surwit, Babyak, & McCaskill, 1998; Wilson & Gullone, 1999). Thus, it is this model that forms the theoretical basis for the explanatory mechanism being examined in the present study. Extraversion is related to sensitivity to reward, and neuroticism is related to sensitivity to punishment. Because extraversion is related to sensitivity to reward but not to sensitivity to punishment, and because extraversion is the subject of the proposed study, sensitivity to punishment will not be discussed further. To be clear, the line of reasoning

being used here is that extraverts are more sensitive to reward than are introverts, leading to the experience of increased positive affect by extraverts. In other words, if more extraverted individuals are more sensitive to rewards in the environment than are less extraverted individuals, this differential sensitivity to reward should translate into the greater experience of positive affect by more extraverted individuals.

Having provided a theoretical basis for the proposed study, it is important to review the empirical evidence for the mechanism of reward sensitivity. Support for this explanation of the extraversion-positive affect relationship comes from studies showing that extraverts placed in a potentially rewarding situation experience a greater increase in positive affect than introverts placed in the same situation. Extraverts have been found to report greater positive affect than introverts after experiencing a positive mood induction, whether that induction is the result of false positive feedback (Larsen & Ketelaar, 1989), the imagining of positive scenes (Larsen & Ketelaar, 1991), or the viewing of positive films (Gross et al., 1998). Although two of the studies (Larsen & Ketelaar, 1989; Larsen & Ketelaar, 1991) measured only post-induction positive affect, such that extraverts' increased positive affect may have existed prior to the study, Gross et al. found extraversion to be positively correlated with change in positive affect. Research has shown extraversion to be related to propensity to laugh (Ruch & Deckers, 1993). Other research has found extraversion to be related to identification of homophones as positive words (e.g., piece-peace), completion of a story in a positive way (Rusting, 1999), and recall of affectively positive words (De Pascalis and Speranza, 2000; DesRosiers & Robinson, 1992; Mayo 1983, 1989; Rusting). In Rusting's work pre-task positive affect was also correlated with performance on these three cognitive tasks, suggesting that mood-congruency effects could explain the findings.

However, an interaction between extraversion and pre-task positive affect was found for task outcomes, indicating that a combination of high extraversion and high pre-task positive affect resulted in particularly powerful mood-congruency effects.

It is of note that a recent review found that whether there was support for reward sensitivity as an explanation for the extraversion-positive affect relationship depended on the operationalization of positive affect (Lucas & Baird, 2004). Studies that defined positive affect as affect that is both pleasant and activated tended to find the effect, whereas studies that defined positive affect as affect that is pleasant but with neutral activation tended not to find the effect. The proposed study addresses this issue via its third purpose, which is discussed in the next subsection.

Some research has gone so far as to contend that the defining characteristic of extraversion may be reward sensitivity, positing that extraverts try to put themselves into social situations not because they are social per se but because social situations offer opportunities for reward (Lucas et al., 2000). Extraversion appears to be related to increased affiliative sociability (spending time with others to whom one is close) rather than increased pure sociability (merely spending time with other people). Extraverts may not spend time with others because they value the experience in and of itself but because of the reward opportunities such situations offer. Lucas et al. found that the correlation between extraversion and positive affect is higher in individualistic countries than in collectivistic countries. In collectivistic countries, social activities are generally bound more by familial and conventional ties than they are in individualistic countries. Therefore, individuals may have less choice in their social activities and be less able to choose social activities that offer strong reward opportunities. If extraversion influences positive affect via the mechanism of

reward sensitivity, any decrease in reward opportunities should mitigate this relationship. Therefore, individuals with less choice of their social activities (and ultimately in their activities in general) may show less of a relationship between extraversion and positive affect.

Overall, the extant literature indicates that reward sensitivity is an integral part of dispositional extraversion and may help explain the relationship between dispositional extraversion and positive affect. By extension, this research suggests that state extraversion may influence positive affect through the same mechanism. However, to this point, there has been no test of whether state extraversion is related to positive affect via the mechanism of reward sensitivity. That is, although we know that dispositional extraverts process and/or respond to a number of positive stimuli more strongly than do dispositional introverts, we do not know whether this between-persons effect would hold within a person. Would an individual respond more strongly to positive stimuli while acting extraverted than while acting introverted? In other words, would reward sensitivity help explain the effect of state extraversion on positive affect that has been observed (McNiel & Fleeson, in press)?

Testing the mechanism of reward sensitivity in the relationship between state extraversion and positive affect. Testing the reward sensitivity model is the second purpose of the proposed study. This purpose was addressed by testing the model that acting extraverted causes increased sensitivity to reward, which in turn causes increased positive affect. This model of reward sensitivity as a mechanism explaining the state extraversion-positive affect relationship was tested through the use of two different moderators. That is, the situation was manipulated such that it is either higher or lower in reward potential. If the reward sensitivity model is correct, the manipulation of state extraversion (acting extraverted

versus introverted) should have more effect on positive affect when the situation is higher in reward potential than when it is lower in reward potential. In other words, acting extraverted as opposed to introverted should influence positive affect more when the situation is higher rather than lower in reward potential, because when the situation offers more opportunity for reward, differences in reward sensitivity can more strongly manifest themselves. The two stimuli that varied in terms of reward potential are (1) affectively evocative photos and (2) physical attractiveness of interaction partner. Each of these is described next.

Research has found dispositional extraversion to be related to responsiveness to a number of positive stimuli, which have been described above. To review briefly, these stimuli include positive films (Gross et al., 1998), positive imagined scenes (Larsen & Ketelaar, 1989), positive expectations for the future (Darvill & Johnson, 1991), false positive feedback (Larsen & Ketelaar, 1989), positive homophones, completion of a story in a positive way (Rusting, 1999), and recall of positive words (De Pascalis and Speranza, 2000; DesRosiers & Robinson, 1992; Mayo 1983, 1989; Rusting). Conceptually similar to the items therein are positive pictures (i.e., photographs), which were used in the proposed study. Thus, the affective quality of photos that individuals reviewed and discussed during the study was manipulated. Participants interacted in dyads, and they were asked to interact in a task that required attention to and evaluation of photos that were selected to be either higher or lower in reward potential. Each dyad was exposed to only positive or only neutral photos. These photos were taken from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2005), a database that has been standardized for the affective content of its photographs. These photos were the stimuli that individuals discussed and rated during their interaction with another individual. Based on the reward sensitivity model, it was

hypothesized that the manipulation of state extraversion would have more effect on positive affect when the stimuli were higher rather than lower in reward potential (i.e., when the photos were positively valenced rather than neutrally valenced). That is, an interactive effect of state extraversion and photos' affective quality on positive affect was predicted.

The second stimulus that varied in reward potential was physical attractiveness. Individuals prefer interacting with physically attractive rather than less attractive people (e.g., Feingold, 1990). A physically attractive face functions as a reward (O'Doherty et al., 2003; Rolls, 2000), and individuals have been shown to work harder to view attractive as opposed to less attractive faces (Aharon et al., 2001). This preference is present very early in humans, with infants age 3-8 months preferring attractive to unattractive adult faces (Langlois et al., 1987; Rubinstein, Kalakanis, & Langlois, 1999). Physical attractiveness is not arbitrary, as there is evidence that several particular features contribute to attractiveness, including youthfulness (Deutsch, Zaluski, & Clark, 1986; Zebrowitz, Olson, & Hoffman, 1993), facial compositeness (i.e., more resembling an "average face" determined by digitally superimposing many faces on one another) (Langlois & Roggman, 1990; Rhodes, Sumich, & Byatt, 1998), and symmetry (Gangestad, Thornhill, and Yeo, 1994; Mealey, Bridgstock, and Townsend, 1999). Additionally, neuropsychological research indicates that when males view attractive but not less attractive female faces (or any male faces), there is increased activity in the nucleus accumbens, an area of the brain associated with reward (Aharon et al., 2001). Based on this body of evidence, it seems reasonable to conclude that interacting with a physically attractive as opposed to less attractive other offers a greater opportunity for reward.

A recent study more specifically indicates that physical attractiveness is a reward stimulus relevant to extraversion. Male participants were put in groups and instructed to work on a group task under one of three conditions: while being evaluated by an attractive female, while being evaluated by an attractive male, or while being evaluated by no one (Campbell, Simpson, Stewart, & Manning, 2003). Only in the condition with the attractive female evaluator did males' dispositional levels of extraversion manifest themselves in terms of behavior. That is, only in the condition with the attractive female evaluator did males who had previously described themselves as dispositionally extraverted actually act significantly more extraverted. This finding suggests that the situation with the attractive female evaluator "pulled for" extraversion, and it is reasonable to believe that this occurred because of the reward potential present. Other research has found that how much both a male and female enjoy a conversation with an opposite-sex stranger is predicted by the female's physical attractiveness (Berry & Miller, 2001; Garcia et al., 1991). Taken together, these studies suggest that interaction with an attractive female presents a reward opportunity for males and to what degree this reward is capitalized on is related to the male's level of extraversion. The reverse may also be true, that interaction with an attractive male presents a reward opportunity for females and to what degree this is capitalized on is related to the female's level of extraversion. Thus, the present study tested both possibilities.

The present study aims to test whether reward sensitivity is a mechanism in the effect of state extraversion on positive affect. While acting extraverted or introverted, individuals interacted with a dyadic partner of the opposite sex. The reward sensitivity model predicts that because interaction with a physically attractive other has more potential for reward than does interaction with a less physically attractive other, acting extraverted should influence

positive affect to a greater extent the more attractive the dyadic partner is. Specifically, although it is predicted that for all individuals acting extraverted as opposed to introverted will be related to greater positive affect (because there should be reward opportunities regardless), this relationship should be stronger when the interaction partner is more attractive. The dyadic partner will be another research participant, and so the physical attractiveness of the partner will vary naturally.

The present study tests only opposite-sex dyads, because it is reasonable to believe that physical attractiveness is more relevant as a reward stimulus when the interaction partner is of the opposite sex. Evolutionary theory would predict the effect to exist in the case of opposite-sex interaction, because the physical attractiveness of a member of the opposite sex is argued to be correlated with that individual's reproductive fitness (Berry & Miller, 2001; Buss, 1998; Gangestad & Thornhill, 1997; Garcia et al., 1991). Additionally, evolutionary theory would expect this effect to exist more strongly for males, because physical attractiveness is considered to be more related to reproductive fitness for females than for males. That said, there is support for the reward potential of physically attractive males for females, and the present study tested this possibility (Buss; Gangestad & Thornhill).

What Other Types of Affect Are Influenced by State Extraversion?

Differing operationalizations of positive affect. A problem within the literature describing the extraversion-positive affect relationship is inconsistent operationalizations of positive affect. At first glance, what constitutes positive affect may seem intuitively clear. It is "good" emotion, or emotion most individuals would like to experience. However, this conceptual clarity disappears with researchers' different operationalizations of the positive affect construct. The PANAS (Watson, Clark, & Tellegen, 1988) and PANAS-X scales

(Watson & Clark, 1994), perhaps the most widely used measures of positive affect when relating it to extraversion (e.g., Fossum & Barrett, 2000; Gross et al., 1998; McNiel & Fleeson, in press; Watson & Clark, 1992), include markers of positive affect such as “enthusiastic,” “determined,” and “excited.” Other measures of positive affect include the markers “happy,” “joyful,” and “pleased” (e.g., Diener & Larsen 1984; Emmons & Diener, 1985; Pavot, Diener, & Fujita, 1990). Although both sets of adjectives have a clearly favorable connotation, they do not seem interchangeable. For example, although the terms “enthusiastic” and “excited” seem very similar, the terms “excited” and “happy” seem less similar to one another.

Using a circumplex model of affect. One way to address this issue is via a circumplex model of affect (see Figure 1). A circumplex is a two-dimensional, circular structure in which individual items have high positive correlations with those items proximate on the circumference of the circle, have nearly zero correlations with items 90 degrees around the circle, and have high negative correlations with those items 180 degrees around the circle. A circumplex model assumes that the domain of interest has two factors. One of these factors can be thought of as an axis running horizontally through the center of circle, with the other factor an axis running vertically through the center. Mathematically, the two axes could be at any two angles 90 degrees apart; however, it may be simplest to think of them as perfectly horizontal and vertical, respectively.

A large body of research is devoted to explaining affect in terms of two orthogonal factors, valence and activation (e.g., Barrett & Russell, 1999; Carroll, Yik, Russell, & Barrett, 1999; Russell, 1980; Watson, Wiese, Vaidya, & Tellegen, 1999; Yik & Russell, 2001); therefore, these two factors form the affect circumplex discussed here (Figure 1). The

valence dimension can be thought of as pleasantness independent of activation. At one end of the valence dimension are markers such as “happy” and “pleased,” with the other end of the dimension represented by markers such as “miserable” and “unhappy.” The activation dimension can be thought of as activation independent of valence. At one end of the activation dimension are markers such as “aroused” and “alert,” with the other end of the dimension represented by markers such as “still” and “quiet” (Barrett & Russell, 1998). These markers are presented as pure indicators of pleasantness and activation, respectively; however, markers can be conceptualized to fall anywhere on the circumference. For example, “bored” falls in the unpleasant/deactivated quadrant, whereas “distressed” falls in the unpleasant/activated quadrant (Barrett & Russell, 1999).

Testing the effect of state extraversion on different aspects of affect. For the sake of parsimony, the proposed study will consider only the eight points on the circumplex depicted in Figure 1. These eight points represent 45-degree rotations around the circumplex, and most measures of affect are located very close to one of these eight points (Yik and Russell, 2001). Moving counterclockwise from the right (0°), these points are: pleasant/neutrally activated affect (**pleasant**), pleasant/activated (**positive**), neutrally pleasant/activated (**activated**), unpleasant/activated (**negative**), unpleasant/neutrally activated, unpleasant/unactivated, neutrally pleasant/unactivated, and pleasant/unactivated. The four terms in bold in parentheses will be used for the remainder of this proposal, as these are the points on the circumplex that will be tested in the proposed study.

Putting the findings of McNiel and Fleeson (in press) into this affect taxonomy, they found that the manipulation of state extraversion influences positive affect. They also found that there was no effect on negative affect. This pattern of findings is consistent with the

circumplex model, in which points 90 degrees apart on the circle are statistically unrelated. These findings are expected to be replicated in the proposed study. In addition to measuring affect at these two points (positive and negative affect), the proposed study will measure affect at two additional points, pleasant affect and activated affect. These two points are 45 degrees to either side of positive affect. Seeing how state extraversion influences affect at these four consecutive points will provide a fuller understanding of the effect of state extraversion on affect. Experimental research has found state extraversion to strongly influence positive affect and not influence negative affect (McNiel & Fleeson); correlational research has found dispositional extraversion to be most strongly related to positive affect, less strongly but significantly related to both pleasant and activated affect, and unrelated to negative affect (Yik & Russell, 2001). These patterns of findings are the same except that the experimental study (McNiel & Fleeson) did not measure affect at all four points. Doing so in the proposed study, it is expected that the experimental effects of state extraversion on affect will show the same pattern as the correlational associations between dispositional extraversion and affect. It is important to demonstrate this pattern empirically.

Understanding more specifically what types of affect are influenced by state extraversion would be important for at least two reasons. First, knowing to what degree, if any, the findings of McNiel and Fleeson (under review) that state extraversion influences positive affect can be extended to other types of affect would extend our knowledge of this causal relationship. At this point, we know that state extraversion has an impact on positive affect (e.g., “excited”), and it is important to know to what extent this finding is applicable to other types of affect. For example, do individuals feel increased pleasant affect (e.g., “happy”) when acting extraverted? Correlational research suggests that dispositional

extraversion is more strongly related to positive affect than to either pleasant affect or activated affect (Lucas & Baird, 2004; Yik & Russell, 2001), and determining whether this pattern is the same for state extraversion's effect on affect is an empirical question that the proposed study attempts to answer. Ultimately, knowing more specifically which types of affect are and are not influenced by acting extraverted and introverted would be meaningful.

Second, better understanding the degree to which state extraversion's causal effects on affect mirror the correlational associations between dispositional extraversion and affect would provide insight as to how isomorphic state extraversion and dispositional extraversion are. The more similar these two types of extraversion are in terms of their relationships to affect, the more confidence there can be that they have similar characteristics (aside from whether they are transient or lasting). And to whatever extent state extraversion and dispositional extraversion have similar characteristics, the causal findings of the proposed study could be generalized to dispositional (or trait-level) extraversion. For example, if acting extraverted for a short time causes increased pleasant affect for a short time, then perhaps the relationship between dispositional extraversion and pleasant affect is the result of dispositional extraverts on average acting more extraverted. In other words, perhaps acting extraverted is in a sense as beneficial as being extraverted (Fleeson, Malanos, & Achille, 2002).

Summary

There is a well-documented positive relationship between extraversion and positive affect (e.g., Charles, Reynolds, & Gatz, 2001; Costa & McCrae, 1980; Lucas & Baird, 2004; Watson & Clark, 1992). However, the direction of causality is unclear. The proposed study aims build on previous work testing the effect of state extraversion (i.e., acting extraverted or

introverted for a short time) on positive affect (McNiel & Fleeson, in press). One explanation for how extraversion may influence positive affect is the reward sensitivity model, which posits that more extraverted individuals are more sensitive to rewards in the environment and thus experience greater positive affect. The proposed study will test this model by manipulating the reward value present in the environment and seeing whether this moderates the effect of state extraversion on positive affect. The proposal also discussed the inconsistent operationalization of positive affect, and to address this issue the proposed study will test the effect of state extraversion on four kinds of affect as defined by a circumplex model of affect (pleasant, positive, activated, negative).

Purposes and Hypotheses

Thus, the proposed study has three purposes: (i) to replicate the finding that the manipulation of state extraversion influences positive affect; (ii) to determine whether reward sensitivity is a mechanism in the effect of state extraversion on positive affect; and (iii) to determine how the manipulation of state extraversion influences other types of affect. The first purpose will be tested with a format similar to the research of McNiel and Fleeson (in press), which had individuals act extraverted and introverted in two different short discussions. According to both self-reports and observer ratings, individuals experienced increased positive affect and no change in negative affect when acting extraverted as opposed to introverted. The second purpose will be tested by varying the reward potential in two different ways (affective quality of photos and physical attractiveness of interaction partner) to see whether the effect of state extraversion on positive affect varies according to the reward potential present. The affective quality of the photos will be an experimental manipulation, whereas the attractiveness of the interaction partner will vary naturally. The

third purpose will be tested by measuring affect at four points on the affect circumplex (pleasant, positive, activated, and negative affect) defined by valence and activation (Figure 1). Empirically testing how state extraversion influences affect at these four points will provide a fuller understanding of how state extraversion influences affect.

Following from these purposes are four hypotheses: (1) The manipulation of state extraversion (acting extraverted versus introverted) will influence positive affect, such that individuals will experience greater positive affect when instructed to act extraverted than when instructed to act introverted; (2) The effect of state extraversion on positive affect will be greater when the affective stimuli are positive rather than neutral photos; (3) The effect of state extraversion on positive affect will be greater when an individual interacts with a more attractive rather than less attractive partner; (4) State extraversion will have the greatest effect on positive affect, with weaker but significant effects on pleasant affect and activated affect, and no effect on negative affect.

CHAPTER II

STUDY METHODS

Design

The present study has three independent variables: state extraversion (act extraverted or act introverted), affective quality of photos (positive or neutral), and physical attractiveness of interaction partner (varying continuously). State extraversion is a within-subjects variable that was manipulated experimentally, and it was counterbalanced.

Participants

Participants were 192 students drawn from the UNC introductory psychology research pool in partial fulfillment of a course requirement. Because the study used a dyadic paradigm, there were 96 experimental sessions, meaning there were 96 targets and 96 observers. Five additional experimental sessions were conducted; however, these five sessions were excluded because of data collection problems.

Although demographic information was not collected, the vast majority of participants appeared to be of traditional undergraduate age (18-24). The majority were white, with African-American, Latino, and other ethnicities also represented.

Procedure

Each experimental session included two participants. The two participants were randomly assigned to seats at a table labeled “A” and “B” and also randomly assigned to the target or observer condition. Both the target and observer interacted as a dyad in each session, and with the exception of whether they received the experimental manipulation, they

were treated exactly the same. It was the target's affect and behavior that was most important. After giving informed consent and reading a set of general instructions (see Appendix A; note that appendices are presented in the order that participants saw them), the target and observer read instructions for the first dyadic discussion, which was to review and rank-order 10 photos according to how well they would sell as posters (Appendix C). Additionally, the target received instructions to act extraverted or introverted during the discussion, and the observer received no instructions on how to act (Appendix B).

After the first 10-minute discussion, the target and observer completed ratings of their own and the other's affect and behavior during the discussion. Then, both read the instructions for the second dyadic discussion, to jointly rank-order 10 new photos according to their artistic quality (Appendix G). The target, who was instructed to act either extraverted or introverted in the first discussion, was instructed to act the other way during the second discussion (Appendix F). The observer again received no instructions regarding how to act. After completing the second 10-minute discussion, the target and observer rated their own and the other's affect and behavior during the discussion.

Materials

Manipulation of state extraversion. Instructions to act extraverted instructed the target to act **bold, spontaneous, assertive, and talkative**; instructions to act introverted instructed the target to act **timid, withdrawn, inhibited, and unadventurous** (Appendices B and F). These extraversion markers have high loadings (positive or negative) on extraversion in Goldberg's work (1992), a gold standard for validation of markers for the Big Five traits.

Instructions for the observer included no reference to how to act nor to the fact that the target was instructed how to act.

Manipulation of affective quality of photos. All the picture stimuli in a given session were either positive or neutral. That is, whereas each target acted both extraverted and introverted in the two different discussions, each target-observer dyad was exposed to either only positive or only neutral photos. In the positive photos condition, the target and observer rank-ordered 10 positive photos in each discussion, for a total of 20 positive photos. In the neutral photos condition, the target and observer rank-ordered 10 neutral photos in each discussion, for a total of 20 neutral photos. All photos were from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2005), a database created and maintained by The Center for Research in Psychophysiology at the University of Florida for the purpose of providing a set of normative affective stimuli for scientific experiments. In order to be included in the IAPS, the photos have been rated on valence and activation on 1-9 scales. The positive photos for the present study all have mean valence ratings of at least 7.00 and mean activation ratings of at least 5.00 by both male and female raters. The neutral photos all have all have mean valence ratings of less than 5.00 and activation ratings of less than 4.00 (Appendices C and G include photos' IAPS numbers). Two positive and two neutral photos are provided as examples in Appendix J.

Physical Attractiveness. Each participant rated their interaction partner's physical attractiveness. Participants made these ratings in separate rooms after briefly meeting at the beginning of the experiment, and thus this rating was obtained before any other measures were taken. This rating served as the measure of the partner's physical attractiveness. Thus, physical attractiveness was not manipulated but varied naturally and was a correlational variable. Additionally, self-reports of physical attractiveness were also made at the same time. Both attractiveness ratings (partner and self) were made on 1-9 scales (Appendix H).

Additionally, photographs were taken of participants at the conclusion of the session and were rated by two independent raters, one male and one female graduate student. These ratings served as another measure of physical attractiveness.

Affect. Affect ratings consisted of 16 items, four corresponding to each of the four points on the affect circumplex previously described, and all affect items were drawn from either Feldman Barrett and Russell's work (1998) or from Larsen and Diener's work (1992). The items for pleasant affect (Feldman Barrett and Russell's Pleasant) were *happy, pleased, content* and *satisfied*; the items for positive affect (Larsen and Diener's Activated Pleasant) were *excited, peppy, elated* and *enthusiastic*, the items for activated affect (Feldman Barrett and Russell's Activated) were *aroused, alert, hyperactivated, and stimulated*; and the items for negative affect (Larsen & Diener's Activated Unpleasant) were *nervous, annoyed, anxious, and distressed*. All but two of these 16 items were tested by Yik and Russell (2001) and found to represent four points approximately 45 degrees apart around the affect circumplex shown in Figure 1. The items *satisfied* and *stimulated* were not tested by Yik and Russell but were included in the original scales of Feldman Barrett and Russell. These two items were added in the proposed study to increase the reliability of the measurement of pleasant and activated affect. All ratings were on 1-7 scales.

Both the target and observer self-reported on their affect and rated the other's affect after each 10-minute discussion. Self-reported affect was the mean of the ratings for the four items that corresponded to each type of affect (e.g., positive) when the target rated "to what extent **you felt this way** during" the discussion. Observer-rated affect was the mean of the ratings for the four items that corresponded to each type of affect when the observer rated the target (Appendix E).

Behavior. The target and observer also rated their own and the other's behavior during the preceding group task, using 1-7 scales and the instruction to "write the number that indicates how well the adjective describes **the way you acted** during the discussion." Included among other behavior items were six items for extraversion, which were *bold*, *talkative*, *assertive*, *out-going*, *inhibited*, and *reserved* (the last two reverse-scored). These extraversion markers were chosen because of their potential relevance to behavior during a short discussion and because all have high loadings on extraversion in Goldberg (1992). Self-reported extraversion was the mean of the ratings for these markers when the target rated his or her own behavior. Observer-rated extraversion was the mean of the ratings for these markers when the observer rated the target. The targets' self-reports and observers' ratings of extraversion served as a manipulation check, revealing whether the manipulation of state extraversion actually influenced how extraverted the target acted (Appendix D).

Dispositional extraversion. At the end of the experiment, the target and observer rated themselves according to their typical behavior (i.e., outside of the experimental session), on a number of items. Included among these were seven items measuring dispositional extraversion. These were *talkative*, *bold*, *spontaneous*, *adventurous*, *extraverted*, *timid*, and *quiet* (the last two reverse-scored) (Appendix I). All have high loadings (positive or negative) in Goldberg (1992).

CHAPTER III

RESULTS

Purpose

The purpose of the present study was threefold: (i) to replicate the finding that the manipulation of state extraversion influences positive affect; (ii) to determine whether reward sensitivity is a mechanism in the effect of state extraversion on positive affect; and (iii) to determine how the manipulation of state extraversion influences other types of affect.

Design

The present study had three primary independent/predictor variables: the within-subjects variable of state extraversion (act extraverted or act introverted), the between-subjects variable of affective quality of picture stimuli (positive or neutral), and the continuous variable of partner attractiveness. That is, state extraversion, picture stimuli, and partner attractiveness were used as predictors of each dependent variable.

There were four dependent variables. The primary dependent variable was positive affect; the other dependent variables were pleasant affect, activated affect, and negative affect. Self-reports of these variables were considered most important. When significant effects were observed for self-reports, analyses for observer ratings are also reported.

In the following analyses, all three-way ANOVA models include state extraversion (as a within-subjects or repeated measures variable), picture stimuli, and partner attractiveness as predictor variables. [Note: Although the term ANOVA is typically used to describe analyses involving categorical predictors, whereas the term regression is used for

analyses involving continuous predictors, the analyses in the present study included both categorical and continuous predictors. Thus, all values provided for these models are F-values, even in the case of continuous predictors. These analyses are statistically equivalent to including all predictors in a simultaneous regression; although regression would yield beta values, the associated p-values would be identical to those used in the ANOVA models described.]

Each of these three-way ANOVA models reported in this section tested these three main effects and the four possible interactions.

Other analyses reported in this section will specify the effects tested. Only significant effects, and non-significant effects specifically relevant to this study's hypotheses, will be described in the text. Full results of the primary analyses are available in supplemental tables. Statistical significance was defined as $p = .05$ or less.

Assumptions of statistical analyses

Outliers (more than ± 3 SDs) on dependent variables were adjusted to 3 standard deviations from the mean.

Histograms of residuals were generated as tests of the assumption of normality. These histograms met the standard of normality upon visual inspection.

Levene's tests of homogeneity of variance were conducted for analyses. None was statistically significant (all p -values $> .05$).

Reliabilities of Dependent Variables

Cronbach's alpha coefficients were calculated for extraverted behavior, positive affect, pleasant affect, activated affect, and negative affect. There were two measures of each of these dependent variables (self-report and observer ratings), and each was measured twice

(once when the target was instructed to act extraverted and once when the target was instructed to act introverted). Therefore, 20 alphas were calculated.

Extraverted behavior alphas were: self-reported, .87 (when instructed to act extraverted) and .82 (when instructed to act introverted); observer-rated, .77 and .83.

Positive affect alphas were: self-reported, .81 and .85; observer-rated, .84 and .84.

Pleasant affect alphas were: self-reported, .78 and .87; observer-rated, .83 and .89.

Activated affect alphas were: self-reported, .67 and .72; observer-rated, .71 and .68.

Negative affect alphas were: self-reported, .76 and .64; observer-rated, .72 and .66.

Gender

Gender was not hypothesized to have a main effect or to interact with any of the three predictor variables (state extraversion, picture stimuli, partner attractiveness) to have an effect on any of the affect dependent variables. In fact, no such effects were observed when including gender in the models, and so no results involving gender are reported. However, it is important to note that because potential gender effects were not a focus of the study, it was not designed to have the power to test gender effects definitively, and therefore these null findings could be the result of inadequate power.

Extraversion Manipulation Check

The purpose of the following analyses was to determine whether the manipulation of state extraversion was effective. Two different dependent variables represented two different measures of extraverted behavior: extraverted behavior as self-reported by the target, and as rated by the observer.

With self-reported extraverted behavior as the dependent variable, a paired-samples t-test revealed an effect of state extraversion, $t(95) = 14.04, p < .001$. The effect of state

extraversion indicates that participants reported greater extraverted behavior when instructed to act extraverted ($M = 5.24$, $SD = .90$) than when instructed to act introverted ($M = 3.01$, $SD = 1.06$). With self-reported extraverted behavior as the dependent variable, a three-way ANOVA model that included picture stimuli and partner physical attractiveness as predictors also found the effect of state extraversion, but no other main effects or interactions were found (all p -values $> .05$) (see Table 1 for complete results). Therefore, the dependent variable of self-reported extraverted behavior was influenced by the state extraversion manipulation but by no other variable.

With observer-rated extraverted behavior as the dependent variables, a paired-samples t-test revealed an effect of state extraversion, $t(95) = 5.11$, $p < .001$. The effect of state extraversion indicates that observers rated the target as demonstrating greater extraverted behavior when the target was instructed to act extraverted ($M = 4.91$, $SD = .91$) than when instructed to act introverted ($M = 4.23$, $SD = 1.08$).

Additionally, a bivariate correlation revealed no significant relationship between self-reported dispositional extraversion and mean self-reported extraverted behavior, $r(96) = .15$, $p = .15$. However, a modest relationship between self-reported dispositional extraversion and mean observer-rated extraverted behavior was found, $r(96) = .24$, $p = .02$.

Summary. Self-reports and observer ratings indicate that individuals did in fact act more extraverted when instructed to do so.

The validity of the ratings is supported in that self-reported dispositional extraversion was positively correlated with extraverted behavior as rated by observers. That is, individuals who reported themselves as higher on dispositional extraversion were rated by observers to

be higher in extraverted behavior during the present study, suggesting that dispositionally extraverted behavior and extraverted behavior on demand are isomorphic to some degree.

Picture stimuli

Valence of picture stimuli (positive vs. neutral) was intended to serve as a reward stimulus in the present study, and the purpose of the following analyses was to determine whether the picture stimuli actually served this function.

With self-reported positive affect as the dependent variable, an independent-samples t-test revealed no effect of picture stimuli, $t(94) = -.49, p = .62$. Independent-samples t-tests also revealed no effects of picture stimuli on self-reports of pleasant affect, activated affect, nor negative affect. Thus, participants did not report experiencing any differences in affect whether they were handling positive or neutral picture stimuli.

Similarly, independent-samples t-tests revealed no effects of picture stimuli on observer ratings of positive affect, pleasant affect, activated affect, nor negative affect.

Summary. These results indicate that valence of picture stimuli (positive vs. neutral) did not serve as reward stimuli overall. That is, participants who handled positive picture stimuli did not experience more positive affect than participants who handled neutral picture stimuli.

Partner attractiveness

Partner attractiveness was intended to serve as a reward stimulus in the present study, and the purpose of the following analyses was to determine whether partner attractiveness actually served this function.

When considering the relationships between partner attractiveness as rated by the target and self-reported affect, significant relationships were found for positive affect, $r(96) =$

.39, $p < .001$; pleasant affect, $r(96) = .28$, $p = .005$; and activated affect, $r(96) = .34$, $p = .001$; but not for negative affect, $r(96) = .19$, $p = .06$.

When considering the relationships between partner attractiveness as rated by the target and observer-rated affect, no significant relationships were found.

In addition to subjective ratings of interaction partners by the targets, independent ratings of the partners' physical attractiveness were also obtained using photographs taken of the participants at the end of each session. Inter-rater reliabilities of independent photo raters were: for photos overall, $r(91) = .71$; for photos of males, $r(47) = .70$; and for photos of females, $r(44) = .72$.

Correlations between ratings of partner attractiveness by targets and partner attractiveness according to independent raters were all non-significant: overall, $r(91) = .14$, $p = .20$; when males were being evaluated, $r(47) = -.07$, $p = .64$; and when females were being evaluated, $r(44) = .26$, $p = .09$.

No significant correlations were found between ratings of interaction partner attractiveness by independent raters and any type of affect. Additionally, all analyses using partner attractiveness as a predictor variable were run a second time substituting the rating of independent raters. However, none of these effects was significant, and so none is presented in this paper. Thus, it appears that the target's rating was the most valid measure of partner attractiveness (in terms of the importance for the target), and so this measure was used as the measure of partner attractiveness.

Summary. These results indicate that when measuring partner attractiveness according to the target's evaluation of the partner, partner attractiveness served as a reward stimulus.

Affect

The purpose of the following analyses was to determine the effect of state extraversion, picture stimuli, and partner attractiveness on four different types of affect: positive, pleasant, activated, and negative. Two different dependent variables represented two different measures of each type of affect: as self-reported by the target, and as rated by the observer. All three-way ANOVA models include state extraversion (as a within-subjects or repeated measures variable), picture stimuli, and partner attractiveness as predictor variables. Each of these models tested these three main effects and the four possible interactions. Other analyses will specify the effects tested. Only significant effects, and non-significant effects specifically relevant to this study's hypotheses, will be described in the text. Full results of the primary analyses are available in supplemental tables.

Positive affect. With self-reported positive affect as the dependent variable, a three-way ANOVA model revealed significant effects of state extraversion, $F(1, 92) = 9.97, p = .002$; and partner attractiveness, $F(1, 92) = 16.28, p < .001$; but not of state extraversion \times picture stimuli, $F(1, 92) = .69, p = .41$; nor of state extraversion \times partner attractiveness, $F(1, 92) = 1.99, p = .16$; nor of state extraversion \times picture stimuli \times partner attractiveness, $F(1, 92) = .50, p = .48$ (see Table 2 for complete results). The effect of state extraversion indicates that participants reported greater positive affect when instructed to act extraverted ($M = 3.26, SD = 1.20$) than when instructed to act introverted ($M = 2.18, SD = 1.07$) ($d = .86$). The relationship between partner attractiveness and positive affect was described previously.

With observer-rated positive affect as the dependent variable, a paired-samples t-test revealed an effect of state extraversion, $t(95) = 4.97, p < .001$. The effect of state

extraversion indicates that observers rated the target as experiencing greater positive affect when the target was instructed to act extraverted ($M = 2.84$, $SD = 1.20$) than when instructed to act introverted ($M = 2.30$, $SD = 1.06$).

Additionally, the difference in self-reported extraverted behavior (from the extraverted condition to the introverted condition) predicted the difference in self-reported positive affect, $r(96) = .59$, $p < .001$.

The following analysis was limited to positive affect ratings from the first discussion, and it compared observer-rated positive affect of targets instructed to act extraverted versus targets instructed to act introverted during the first discussion. An independent-samples t-test revealed an effect of state extraversion, $t(94) = 3.72$, $p < .001$. This finding indicates that for the first discussion, observers rated positive affect as greater for targets instructed to act extraverted ($M = 2.86$, $SD = 1.05$) as opposed to introverted ($M = 2.10$, $SD = .96$). Thus, considering only the first discussion, observers rated targets instructed to act extraverted as experiencing greater positive affect than targets instructed to act introverted.

An additional analysis had as the dependent variable the difference in self-reported positive affect from the extraverted condition to the introverted condition. This completely between-subjects ANOVA model had two predictor variables, partner attractiveness and the difference in rating of partner attractiveness and self attractiveness. The ANOVA model revealed effects of difference of attractiveness rating,

$F(1, 92) = 5.30$, $p = .024$; of partner attractiveness, $F(1, 92) = 4.58$, $p = .035$; and of their interaction, $F(1, 92) = 4.16$, $p = .044$. The key finding of this analysis is that the more unfavorably targets rated their own attractiveness relative to that of their partner, the less the effect of the state extraversion manipulation on positive affect was related to partner

attractiveness. For example, for targets who rated themselves at least one point below their partner on attractiveness, the difference in self-reported positive affect from the extraverted condition to the introverted condition was negatively correlated with partner attractiveness, $r(31) = -.47, p = .007$. For targets who rated themselves at least equal to their partner on attractiveness, the difference in self-reported positive affect from the extraverted condition to the introverted condition was not correlated with partner attractiveness, $r(65) = -.09, p = .45$.

The pattern of findings in the previous ANOVA model is not explained by a difference in the effectiveness of the state extraversion manipulation. With the dependent variable of the difference in self-reported extraverted behavior from the extraverted condition to the introverted condition, a completely between-subjects ANOVA model revealed no effect of difference of attractiveness rating, $F(1, 92) = .76, p = .39$; nor of partner attractiveness, $F(1, 92) = 1.73, p = .20$; nor of their interaction, $F(1, 92) = 1.97, p = .17$.

Pleasant affect. With self-reported pleasant affect as the dependent variable, a three-way ANOVA model revealed significant effects of state extraversion, $F(1, 92) = 7.37, p = .008$; and partner attractiveness, $F(1, 92) = 9.10, p = .003$; but not of state extraversion \times picture stimuli, $F(1, 92) = .68, p = .41$; nor of state extraversion \times partner attractiveness, $F(1, 92) = 2.09, p = .15$; nor of state extraversion \times picture stimuli \times partner attractiveness, $F(1, 92) = .51, p = .48$ (see Table 3 for complete results). The effect of state extraversion indicates that participants reported greater pleasant affect when instructed to act extraverted ($M = 4.09, SD = 1.10$) than when instructed to act introverted ($M = 3.40, SD = 1.25$) ($d = .63$). The relationship between partner attractiveness and pleasant affect was described previously.

With observer-rated pleasant affect as the dependent variable, a paired-samples t-test revealed an effect of state extraversion, $t(95) = 4.68, p < .001$. The effect of state extraversion indicates that observers rated the target as experiencing greater pleasant affect when the target was instructed to act extraverted ($M = 4.15, SD = 1.08$) than when instructed to act introverted ($M = 3.70, SD = 1.20$).

Additionally, the difference in self-reported extraverted behavior (from the extraverted condition to the introverted condition) predicted the difference in self-reported pleasant affect, $r(96) = .45, p < .001$.

The following analysis was limited to pleasant affect ratings from the first discussion, and it compared observer-rated pleasant affect of targets instructed to act extraverted versus targets instructed to act introverted during the first discussion. An independent-samples t-test revealed an effect of state extraversion, $t(94) = 2.27, p = .025$. This finding indicates that for the first discussion, observers rated pleasant affect as greater for targets instructed to act extraverted ($M = 4.12, SD = .99$) as opposed to introverted ($M = 3.60, SD = 1.26$). Thus, considering only the first discussion, observers rated targets instructed to act extraverted as experiencing greater pleasant affect than targets instructed to act introverted.

Activated affect. With self-reported activated affect as the dependent variable, a three-way ANOVA model revealed significant effects of state extraversion, $F(1, 92) = 6.35, p = .013$; and of partner attractiveness, $F(1, 92) = 12.47, p = .001$; but not of state extraversion \times picture stimuli, $F(1, 92) = .47, p = .50$; nor of state extraversion \times partner attractiveness, $F(1, 92) = 1.45, p = .23$; nor of state extraversion \times picture stimuli \times partner attractiveness, $F(1, 92) = .35, p = .56$ (see Table 4 for complete results). The effect of state extraversion indicates that participants reported greater activated affect when instructed

to act extraverted ($M = 3.00$, $SD = .99$) than when instructed to act introverted ($M = 2.39$, $SD = .90$) ($d = .65$). The relationship between partner attractiveness and activated affect was described previously.

With observer-rated activated affect as the dependent variable, a paired-samples t-test revealed an effect of state extraversion, $t(95) = 3.73$, $p < .001$. The effect of state extraversion indicates that observers rated the target as experiencing greater activated affect when the target was instructed to act extraverted ($M = 2.86$, $SD = 1.01$) than when instructed to act introverted ($M = 2.52$, $SD = .92$).

Additionally, the difference in self-reported extraverted behavior (from the extraverted condition to the introverted condition) predicted difference in self-reported activated affect, $r(96) = .53$, $p < .001$.

The following analysis was limited to activated affect ratings from the first discussion, and it compared observer-rated activated affect of targets instructed to act extraverted versus targets instructed to act introverted during the first discussion. An independent-samples t-test revealed no significant effect of state extraversion, $t(94) = 1.96$, $p = .053$.

Negative affect. With self-reported negative affect as the dependent variable, a three-way ANOVA model revealed no significant effects, including no effect of state extraversion, $F(1, 92) = 2.02$, $p = .16$; nor of state extraversion \times picture stimuli, $F(1, 92) = .77$, $p = .38$; nor of state extraversion \times partner attractiveness, $F(1, 92) = 1.17$, $p = .28$; nor of state extraversion \times picture stimuli \times partner attractiveness, $F(1, 92) = 1.27$, $p = .26$ (see Table 5 for complete results).

Summary. The state extraversion manipulation influenced positive, pleasant, and activated affect. Negative affect was not significantly influenced. The effect on positive affect supports Hypothesis 1, that acting extraverted as opposed to introverted would cause greater positive affect. This effect replicates the finding of McNiel and Fleeson (in press). The effects of state extraversion on pleasant and activated affect extend the findings of previous work and will be described in more detail later in this section.

It is notable that all of these effects were found for both self-reports and observer ratings, increasing confidence in the effects. Additionally, the effects for positive and pleasant affect were found for observer ratings of only the first discussion (and a marginal effect was found for activated affect), increasing confidence that the effects were not the result of some kind of demand characteristic.

Additionally, partner attractiveness was positively related to positive, pleasant, and activated affect. This strongly suggests that partner attractiveness served as a reward stimulus. However, Hypothesis 3, that the state extraversion manipulation would interact with partner attractiveness, was not supported.

Finally, the valence of picture stimuli (positive or neutral) did not influence any type of affect, suggesting that the picture stimuli did not serve as reward stimuli. Hypothesis 2 was that the state extraversion manipulation would interact with the valence of the picture stimuli. Given the lack of the main effect of the valence of picture stimuli, it is not surprising that Hypothesis 2 was not supported.

Comparing the Effects of State Extraversion on the Different Types of Affect

As previously described, the state extraversion manipulation had significant effects on positive affect, pleasant affect, and activated affect. In each case, individuals reported

experiencing greater levels of each type of affect when acting extraverted than when acting introverted, and in each case this finding was supported by observer ratings. The following analyses tested whether these effects differed in magnitude according to the specific type of affect considered. That is, did the strength of the effect of state extraversion differ according to the type of affect considered?

A two-way ANOVA model including self-reported positive affect and pleasant affect as repeated measures factors revealed an interaction, $F(1, 95) = 13.07, p < .001$. State extraversion differed in its effect on positive as opposed to pleasant affect in terms of magnitude; specifically, the change in positive affect ($M = 3.26$ in the extraverted condition, $M = 2.18$ in the introverted condition) was greater than the change in pleasant affect ($M = 4.09$ in the extraverted condition, $M = 3.40$ in the introverted condition) (see Figure 2). This interaction was not found when comparing the effect of state extraversion on observer-rated positive and pleasant affect, $F(1, 95) = .91, p = .34$.

A two-way ANOVA model including self-reported positive affect and activated affect as repeated measures factors revealed an interaction, $F(1, 95) = 28.66, p < .001$. State extraversion differed in its effect on positive as opposed to activated affect in terms of magnitude; specifically, the change in positive affect ($M = 3.26$ in the extraverted condition, $M = 2.18$ in the introverted condition) was greater than the change in activated affect ($M = 3.00$ in the extraverted condition, $M = 2.39$ in the introverted condition) (see Figure 3). The interaction was also found when comparing the effect of state extraversion on observer-rated positive and activated affect, $F(1, 95) = 6.77, p = .011$. The pattern of the interaction was the same.

A two-way ANOVA including self-reported pleasant affect and activated affect as repeated measures factors revealed no interaction, $F(1, 95) = .54, p = .47$. Thus, the state extraversion manipulation did not significantly differ in the magnitude of its effect on pleasant and activated affect.

Summary. State extraversion had effects on positive, pleasant, and activated affect. However, these effects were not equally powerful. The effect on positive affect was statistically stronger than the effects on either pleasant or activated affect. The strength of the effects on pleasant and activated affect did not differ. This pattern of effects is consistent with Hypothesis 4.

Order Effects

Previous research (McNiel & Fleeson, in press) has found significant state extraversion by order (“extraverted first” or “introverted first”) interactions for the dependent variables of positive affect and extraverted behavior. Therefore, analyses were conducted to determine whether such effects occurred in the present study for all four affect dependent variables as well as extraverted behavior. However, no such effects were found, with all p -values $> .05$.

CHAPTER IV

DISCUSSION

Purpose and Hypotheses

The purposes of the present study were: (i) to replicate the finding that the manipulation of state extraversion influences positive affect; (ii) to determine whether reward sensitivity is a mechanism in the effect of state extraversion on positive affect; and (iii) to determine how the manipulation of state extraversion influences other types of affect.

Following from these purposes were four hypotheses: (1) The manipulation of state extraversion (acting extraverted versus introverted) would influence positive affect, such that individuals would experience greater positive affect when instructed to act extraverted than when instructed to act introverted; (2) The effect of state extraversion on positive affect would be greater when the affective stimuli were pictures of positive rather than neutral valence; (3) The effect of state extraversion on positive affect would be greater when an individual interacted with a more attractive rather than less attractive opposite-sex partner; (4) State extraversion would have the greatest effect on positive affect, with weaker but significant effects on pleasant affect and activated affect, and no effect on negative affect.

Effect of State Extraversion on Positive Affect

Hypothesis 1 was supported in that individuals did in fact experience more positive affect when instructed to act extraverted than when instructed to act introverted, with this effect evident in both self-report and observer ratings. Additionally, results showed that when asked to do so, individuals actually acted more extraverted and introverted, respectively.

Therefore, the manipulation of state extraversion influenced positive affect in the present study. This replicates previous research showing that acting extraverted causes positive affect (McNiel & Fleeson, in press). Replication of this effect is important because it provides incremental evidence that the finding is veridical. The present study was an iterative replication in that the paradigm was changed to an opposite-sex dyadic interaction (from a three-person interaction of varying gender combinations). Although modest, these changes may increase confidence that the finding that extraverted behavior causes positive affect is generalizable. Finally, the finding of an effect size similar in magnitude to that found in the previous study (approaching 1 standard deviation) may increase confidence that the effect is powerful.

Also, the present study found that acting extraverted also influences pleasant affect and activated affect. These findings add further to the confidence that acting extraverted has a bona fide effect on positive affectivity. More specific implications of these findings are discussed later in this section.

Additionally, it is notable that all of these effects were found for both self-reports and observer ratings, increasing confidence that the findings are genuine.

Reward Sensitivity Model

Having demonstrated that extraverted behavior causes positive affect, the present study sought to test one potential explanatory mechanism for this effect, that of reward sensitivity.

Background. The reward sensitivity model posits that the relationship between dispositional extraversion and positive affect is at least partly explained by the greater reward sensitivity of dispositional extraverts. That is, this model holds that more dispositionally

extraverted individuals are more sensitive to rewarding stimuli in the environment. If so, more extraverted individuals would garner more affective benefit from any given environment (assuming it has at least some reward potential) than would less extraverted individuals. There is a body of research indicating that more dispositionally extraverted individuals are in fact higher in reward sensitivity (e.g., De Pascalis & Speranza, 2000; DesRosiers & Robinson, 1992; Gross et al., 1998; Larsen & Ketelaar, 1989, 1991; Mayo 1983, 1989; Ruch & Deckers, 1993; Rusting, 1999).

The present study sought to determine whether the reward sensitivity model can be extended to the effect of state extraversion on positive affect. That is, is reward sensitivity a mechanism in the state extraversion-positive affect causal pathway? In other terms, does the between-persons role of reward sensitivity in the dispositional extraversion-positive affect link also hold within a person? The present study was designed to examine the reward sensitivity hypothesis via two different potential reward stimuli: affectively-valenced pictures and the physical attractiveness of an individual's interaction partner.

Picture stimuli. The use of picture stimuli did not appear to serve as an effective manipulation of reward potential. An effective manipulation would be one that differed in reward value according to experimental condition, and this effect was not observed for the differing picture stimuli in the present study. Specifically, independent of any other factor, individuals exposed to positive pictures did not experience greater positive affect than those exposed to neutral pictures. Additionally, Hypothesis 2 was not supported, which was that acting extraverted as opposed to introverted would have more effect on positive affect for individuals exposed to positive pictures as opposed to neutral pictures (i.e., an interaction of state extraversion and picture stimuli).

Given that positive and neutral picture stimuli did not influence positive affect (and also neither pleasant nor activated affect) differentially, it may be that the reward sensitivity hypothesis was not tested via the picture stimuli manipulation. That is, although the study was operationally designed to test this hypothesis, this test could not be conducted because the pictures did not function to manipulate reward potential. Given that these pictures were chosen because they had been empirically shown to be positive or neutral (International Affective Picture System; Lang, Bradley, & Cuthbert, 2005), it is important to consider why the manipulation may have failed. There are at least three possible reasons. One possibility is that picture stimuli can serve as effective reward stimuli but that the specific pictures chosen for this study did not accomplish this goal. The positive pictures chosen were rated highly by both males and females in the IAPS standardization data. Still, other available pictures were rated higher if considering only one gender. For example, the pictures rated highest by males were erotic pictures of women, but these pictures were not rated highly by females. Similarly, some of the pictures rated highest by females were babies, which were not rated as highly by males. Thus, it is possible that picture stimuli can serve as effective reward stimuli and that the pictures used in the present study were just not positive enough (i.e., pictures chosen for their positivity for only one gender may be more powerful in their reward potential). However, given that the effect of which pictures were handled (positive or neutral) on positive affect did not approach statistical significance, this possibility seems unlikely.

A second possibility is that picture stimuli are simply not adequately rewarding, at least in a brief dyadic interaction. It may be that viewing positive pictures as a solo task influences positive affect but that this influence is mitigated in a dyadic task, as attention may be divided such that there is less attention to the pictures. A third possibility is that viewing

positive pictures in a dyadic task may in fact influence positive affect but that this effect may be extremely brief and not readily tapped in self-report and observer ratings obtained even immediately following the task. Whatever the case, future research considering the construct of reward sensitivity should be cautious in the use of pictures as reward stimuli.

Physical attractiveness of interaction partner. In contrast to the case with picture stimuli, partner physical attractiveness appears to have served as an effective reward stimulus. An individual's rating of his/her partner's physical attractiveness was positively related to positive affect (as well as to pleasant and activated affect), and this effect was not moderated by gender. This finding is consistent with a body of research indicating that physical attractiveness is a reward stimulus (e.g., Aharon et al., 2001; Gangestad & Thornhill, 1997; Langlois et al., 1987; O'Doherty et al., 2003; Rolls, 2000; Rubinstein, Kalakanis, & Langlois, 1999). Although there was an effect of physical attractiveness on positive affect, Hypothesis 3 was not supported in that acting extraverted did not influence positive affect more when an individual was interacting with an attractive rather than less attractive opposite-sex partner.

There are at least two possibilities for why the reward sensitivity model was not supported in this specific test. The first possibility is that reward sensitivity is not a mechanism in this causal pathway. There is considerable evidence that increased reward sensitivity is one reason dispositional extraverts experience more positive affect than do dispositional introverts (e.g., Gross et al., 1998; Larsen & Ketelaar, 1989, 1991; Ruch & Deckers, 1993; Rusting, 1999). However, the present study is the first to have tested reward sensitivity as a mechanism for the effect of state extraversion on positive affect, and it is possible that the reward sensitivity model applies between-persons but not within-persons.

That is, differences in dispositional extraversion among individuals may be associated with differences in reward sensitivity, but differences in extraverted behavior across time within an individual may not be similarly associated with differences in sensitivity to reward. Still, it is important to note that this would mean that dispositional extraversion and state extraversion are not isomorphic in the way they influence positive affect, and there are reasons to question this conclusion. First, until a recent study (McNiel & Fleeson, in press), it was not generally believed that acting extraverted on demand would have an effect on positive affect, and in fact that effect resembles the relationship between dispositional extraversion and positive affect. Second, time-sampling research has found that most individuals vary considerably from hour to hour in terms of how extraverted they act (Fleeson, 2001), and that such changes are positively correlated with changes in positive affect (Fleeson et al., 2002). Taken together, these findings suggest that acting extraverted may be a large part of being extraverted, particularly in terms of extraversion's effect on positive affect. It is certainly possible that dispositional extraversion is related to positive affect via the mechanism of reward sensitivity, whereas state extraversion causes positive affect as well, but not through the reward sensitivity mechanism. However, such an explanation is unparsimonous, and therefore it may not be appropriate to dismiss at this time the possible role of reward sensitivity in the state extraversion-positive affect pathway.

An alternative possibility is that although partner attractiveness functioned as a reward stimulus, it did not interact with state extraversion in the specific way that was expected because of something about the present study. That is, reward sensitivity may be a mechanism explaining why acting extraverted causes positive affect, and although partner attractiveness appears to have served as an effective reward stimulus, the reward sensitivity

mechanism did not manifest via this particular reward stimulus for a reason specific to this study. Potential support for this line of reasoning comes from the finding that for individuals who rated themselves as less attractive than their partner, the effect of acting extraverted as opposed to introverted on positive affect actually decreased as the partner's attractiveness increased (and this effect was not accounted for by the state extraversion manipulation being less successful in these individuals). By contrast, for individuals who rated themselves at least equally attractive to their partners, the effect of acting extraverted as opposed to introverted on positive affect was unrelated to the partner's attractiveness. This pattern of findings indicates that the state extraversion-positive affect causal pathway was dampened by interacting with an attractive partner, at least if one does not consider oneself at least equally attractive. Putting forward a satisfying theoretical explanation for this finding is difficult. If an individual actually acted less extraverted when interacting with a partner perceived as more attractive than oneself, it could be argued that individuals have more difficulty acting extraverted on demand when interacting with an attractive other, and this lower level of extraverted behavior explains why less positive affect is experienced. However, the finding was that extraverted behavior per se influenced positive affect less when interacting with a partner perceived as more attractive than oneself. It may be that individuals in this situation evoked less positive feedback for their extraverted behavior, leading to less positive affect. Such an explanation suggests that extraverted behavior may influence positive affect by creating a more positive environment for oneself via evocative processes (Ashton, Lee & Paunonen, 2002), and the success of these depends on contextual factors (e.g., whether an individual is at least equally attractive to an interaction partner). This model of how state extraversion may influence positive affect is different from, but not exclusive of, the reward

sensitivity model. The current study was designed to utilize partner attractiveness as a static reward sensitivity stimulus, and it may be that the contextualized nature of this variable does not lend itself to such an experimental conceptualization.

Implications for future research on reward sensitivity. Given that the present study did not find support for the reward sensitivity model as a mechanism in the state extraversion-positive affect pathway, future research testing this mechanism should attempt to utilize more powerful reward-relevant stimuli. For example, pictures may be less powerful as reward stimuli than moving images (i.e., movie clips) (Morrone-Strupinsky & Depue, 2004), which have been effectively used in studying the relationship of dispositional extraversion and positive affect (e.g., Gross et al., 1998; Larsen & Ketelaar, 1991; Morrone et al., 2000). However, using such material in the context of the manipulation of state extraversion may be challenging, as individuals would need to act extraverted while watching film material. Regardless, creative methodologies are needed to utilize effective reward stimuli that are static (i.e., not evocative) to more definitively test the potential role of reward sensitivity in the effect of acting extraverted on positive affect.

The Effect of Acting Extraverted on Different Types of Affect

The present study found strong support for Hypothesis 4. The expectation was that state extraversion would have the strongest effect on positive affect, with weaker but significant effects on pleasant affect and activated affect, and no effect on negative affect. This pattern of results is exactly what was observed. The effect size on positive affect was largest ($d = .86$), with the effect sizes on pleasant affect ($d = .63$) and on activated affect ($d = .65$) nearly equal. Statistical analyses found the difference between the effects on positive

and pleasant affect, and between the effects on positive and activated affect, to be well beyond what is reasonable to expect by chance.

This pattern of findings is important for at least two reasons. First, it addresses an important potential criticism of the finding that acting extraverted causes positive affect, namely that the finding is tautological rather than meaningful. This explanation for the finding contends that state extraversion and positive affect (as well as dispositional extraversion and positive affect) are statistically related because the constructs of extraversion and positive affect overlap. For example, the extraversion marker “energetic” (Goldberg, 1992) seems quite similar to the positive affect marker “excited” (PANAS-X, Watson & Clark, 1994) and it is important to determine if the relationship is tautological rather than veridical. The present study sought to do so empirically, in the context of state extraversion. An affect circumplex defined by the axes of valence and activation was used (see Figure 1). By testing the effect of state extraversion at positive affect and also at the two points 45 degrees to each side of it (pleasant affect and activated affect), the present study was able to test what is “pulling” the effect of state extraversion on positive affect. If the construct overlap argument is correct, the effect should be stronger on activation than on pleasantness, and thus there should be a strong effect on activated affect (e.g., “alert,” “aroused”) and a weak effect on pleasant affect (e.g., “happy,” “pleased”). In fact, these effects were found to be almost identical in magnitude (both approximately 2/3 of a standard deviation). Thus, although it is still possible that construct overlap accounts for some of the effect, the finding is veridical.

The second reason the pattern of findings on affect is important is that it adds to the evidence that state extraversion and dispositional extraversion are isomorphic in important

ways. Previous work has found that dispositional extraversion is most strongly related to positive affect, with smaller (but still strong) relationships with pleasant affect and activated affect (e.g., Yik & Russell, 2001). The present study has found the same pattern of results for state extraversion, providing evidence that acting extraverted may yield some of the same benefits as being extraverted (Fleeson et al., 2002). The pattern of effects that state extraversion has on affect mirrors the pattern of correlations between dispositional extraversion and affect. Additionally, individuals vary considerably from hour to hour in terms of how extraverted they act (Fleeson, 2001), and these fluctuations in extraverted behavior are associated with fluctuations in positive affect (Fleeson et al.). Thus, it may be reasonable to say that an important part of what it means to be extraverted—particularly in terms of its relevance to one’s experience of positive affectivity—is acting extraverted frequently.

Applied Relevance of Findings

The finding that state extraversion causes positive affect has important potential implications for mental health. One principle of the affect circumplex is that points 180 degrees apart are highly negative correlated. Thus, if acting extraverted as opposed to introverted causes the experience of more affect that is pleasant and activated (positive affect), then such behavior should also cause less affect that is unpleasant and unactivated (see Figure 4). Affect that is unpleasant and unactivated is sometimes described as depressed affect (e.g., Yik & Russell, 2001), and in fact the markers used to measure this type of affect (e.g., “sluggish” and “bored,” Larsen & Diener’s Unactivated Unpleasant Affect, 1992) are consistent with the fatigue or loss of energy that is a codified symptom of depression (DSM-IV-TR, American Psychiatric Association, 2000). Additionally, research has found low

energy to be the most frequently endorsed symptom of dysthymia (Serretti et al., 1999). Therefore, it appears that the experience of affect that is both unpleasant and unactivated is a typical feature of depressive disorders, and the present study strongly suggests that acting extraverted decreases the experience of such affect, at least for a short period of time.

Taken together, an intriguing possibility is that encouraging individuals to act extraverted may have applications in treating depressive symptoms. A treatment for depression that is at least related to acting extraverted is behavioral activation. A behavioral activation treatment for depression is generally tailored to an individual's goals and life situation (e.g., a lonely individual joining organizations, a sedentary individual beginning to exercise) (e.g., Jacobson et al., 1996; Martell, Addis & Dimidjian, 2004), and yet it is probably the case that most of the behaviors encouraged are extraverted behaviors. To map such behavioral activation interventions more specifically onto the present study, such interventions often involve individuals acting more "bold," "spontaneous," "assertive," and "talkative." However, to this point the research on the relationship between behavioral activation and depression, and between extraversion and positive affect, has not overlapped. Perhaps this is because one body of research is from the applied field of clinical psychology, whereas the other body of research is from the basic field of personality psychology. Regardless of the reason, understanding how these two bodies of research do and do not overlap would likely extend our understanding of these phenomena.

Limitations and Additional Directions for Future Research

There are at least three important limitations of the current study. First, there remains no empirical evidence as to the mechanism or mechanisms explaining the effect of acting extraverted on positive affect. The present study investigated one potential mechanism,

namely reward sensitivity, that may be a mechanism in this causal pathway. However, the present study did not find support for this mechanism, either because of inadequate methodology or because the reward sensitivity model is not applicable to state extraversion. Future research should try other ways to test the reward sensitivity model and also test other potential mechanisms for this effect. Given previous research (McNiel & Fleeson, in press) and the present study demonstrating that acting extraverted causes positive affect, and given that the effect is powerful (effect size approaching 1 standard deviation), a current challenge is to explain why this effect exists.

The second limitation is that the sample was relatively homogeneous in that it was drawn from students in an introductory psychology class at an academically selective university. As such, it is unclear how generalizable the findings are to the general population. Individuals in such a sample may be unlike people in general in any number of ways. For example, given that the undergraduate years are often thought of as a time of experimentation wherein a broad range of behavior is tried and condoned, it may be that college students will “take to” the extraversion manipulation more readily than others. In other words, acting extraverted on demand may be something that is more difficult for people in general, and so the application of this finding generally may be limited. Research using diverse samples is needed, including individuals of different ages, education levels, and ethnicities. That said, the present study found that college-aged males and females are able to act similarly extraverted on demand and that this effect has a similar effect on positive affect, suggesting that the effect is generalizable across genders.

The third limitation is that although it is clear that acting extraverted as opposed to introverted for a short time (about 10 minutes) causes increased positive affect, it is unclear

whether this effect would hold over a longer period of time. For example, could the current finding be extended to acting extraverted for an hour? Or a week or longer? Given time-sampling research finding that fluctuations in extraverted behavior are related to fluctuation in positive affect (Fleeson, 2001; Fleeson et al., 2002), it seems reasonable to believe that the affective benefits of acting extraverted would extend longer than 10 minutes. However, this hypothesis needs to be demonstrated empirically, and so future experimental research in both lab and naturalistic settings should seek to answer this question.

Conclusion

This study had three purposes: (i) to replicate the finding that the manipulation of state extraversion influences positive affect; (ii) to determine whether reward sensitivity is a mechanism in the effect of state extraversion on positive affect; and (iii) to determine how the manipulation of state extraversion influences other types of affect. The first purpose was accomplished in that acting extraverted as opposed to introverted was found to influence positive affect. Regarding the second purpose, two tests of the reward sensitivity model failed to find support for this mechanism. However, that the findings were not as predicted may be the result of methodological shortcomings, and reward sensitivity remains a credible potential mechanism explaining the effect of acting extraverted on positive affect. The third purpose was accomplished in that a clear pattern of effects was observed in terms of how state extraversion influences affect. Acting extraverted had the strongest effect on positive affect, and it also had smaller (but still strong) effects on pleasant and activated affect, with these latter two effects being almost equal in magnitude.

Table 1

Analysis of Variance for Dependent Variables of Self-Reported Extraverted Behavior

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i> -value
Within subjects					
State extraversion	27.54	1	27.54	23.03	.001
State extraversion x picture stimuli	.746	1	.746	.624	.43
State extraversion x partner attractiveness	4.05	1	4.05	3.38	.07
State extraversion x picture stimuli x partner attractiveness	1.01	1	1.01	.85	.36
Error	110.04	92	1.20		
Between subjects					
Picture stimuli	.04	1	.04	.06	.81
Partner attractiveness	.08	1	.08	.11	.74
Picture stimuli x partner attractiveness	.01	1	.01	.02	.89
Error	65.64	92	.71		

Table 2

Analysis of Variance Model for Dependent Variable of Self-Reported Positive Affect

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i> -value
Within subjects					
State extraversion	7.92	1	7.92	9.97	.002
State extraversion x picture stimuli	.55	1	.55	.69	.41
State extraversion x partner attractiveness	1.58	1	1.58	1.99	.16
State extraversion x picture stimuli x partner attractiveness	.40	1	.40	.50	.48
Error	73.05	92	.794		
Between subjects					
Picture stimuli	.62	1	.62	.40	.53
Partner attractiveness	25.41	1	25.41	16.28	.001
Picture stimuli x partner attractiveness	.62	1	.62	.40	.53
Error	143.56	92	1.56		

Table 3

Analysis of Variance Model for Dependent Variable of Self-Reported Pleasant Affect

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i> -value
Within subjects					
State extraversion	4.42	1	4.42	7.37	.008
State extraversion x picture stimuli	.41	1	.41	.68	.41
State extraversion x partner attractiveness	1.25	1	1.25	2.09	.15
State extraversion x picture stimuli x partner attractiveness	.31	1	.31	.51	.48
Error	55.22	92	.60		
Between subjects					
Picture stimuli	0	1	0	0	.99
Partner attractiveness	18.21	1	18.21	9.10	.003
Picture stimuli x partner attractiveness	.26	1	.26	.13	.72
Error	184.24	92	2.00		

Table 4

Analysis of Variance Model for Dependent Variable of Self-Reported Activated Affect

<i>Source</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p-value</i>
Within subjects					
State extraversion	2.86	1	2.86	6.35	.013
State extraversion x picture stimuli	.21	1	.21	.47	.50
State extraversion x partner attractiveness	.65	1	.65	1.45	.23
State extraversion x picture stimuli x partner attractiveness	.16	1	.16	.35	.56
Error	41.41	92	.45		
Between subjects					
Picture stimuli	2.04	1	2.04	1.70	.20
Partner attractiveness	15.04	1	15.04	12.47	.001
Picture stimuli x partner attractiveness	2.85	1	2.85	2.36	.13
Error	110.94	92	1.206		

Table 5

Analysis of Variance Model for Dependent Variable of Self-Reported Negative Affect

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i> -value
Within subjects					
State extraversion	.83	1	.83	2.02	.16
State extraversion x picture stimuli	.32	1	.32	.77	.38
State extraversion x partner attractiveness	.48	1	.48	1.17	.28
State extraversion x picture stimuli x partner attractiveness	.52	1	.52	1.27	.26
Error	37.98	92	.41		
Between subjects					
Picture stimuli	2.14	1	2.14	1.38	.24
Partner attractiveness	5.34	1	5.34	3.45	.07
Picture stimuli x partner attractiveness	2.35	1	2.35	1.52	.22
Error	142.56	92	1.55		

Figure 1

Affect circumplex, with the horizontal axis of valence and the vertical axis of activation. In

bold are the four points that were measured

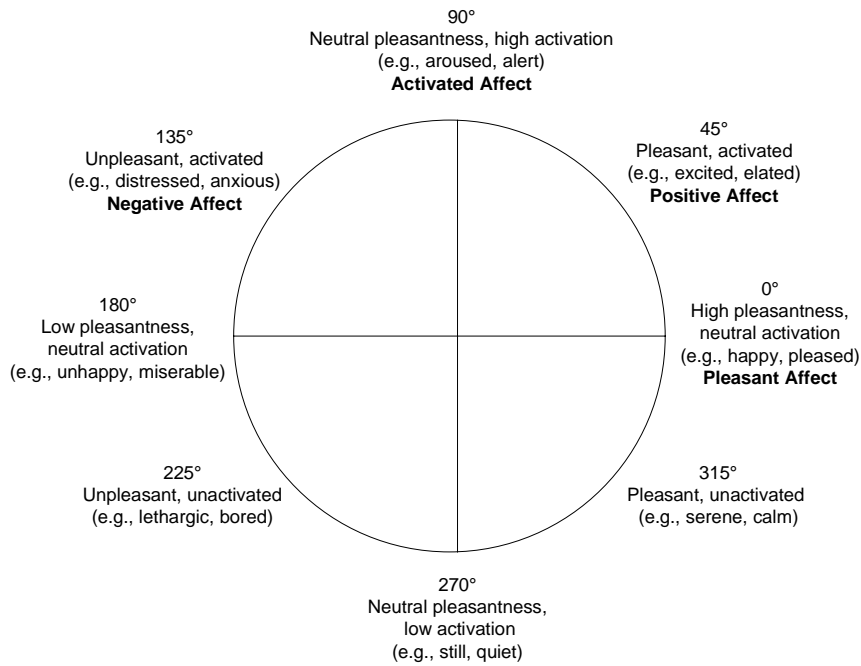


Figure 2

Effect of state extraversion on self-reported positive and pleasant affect. Acting extraverted as opposed to introverted caused greater levels of both types of affect, but this change was greater for positive affect

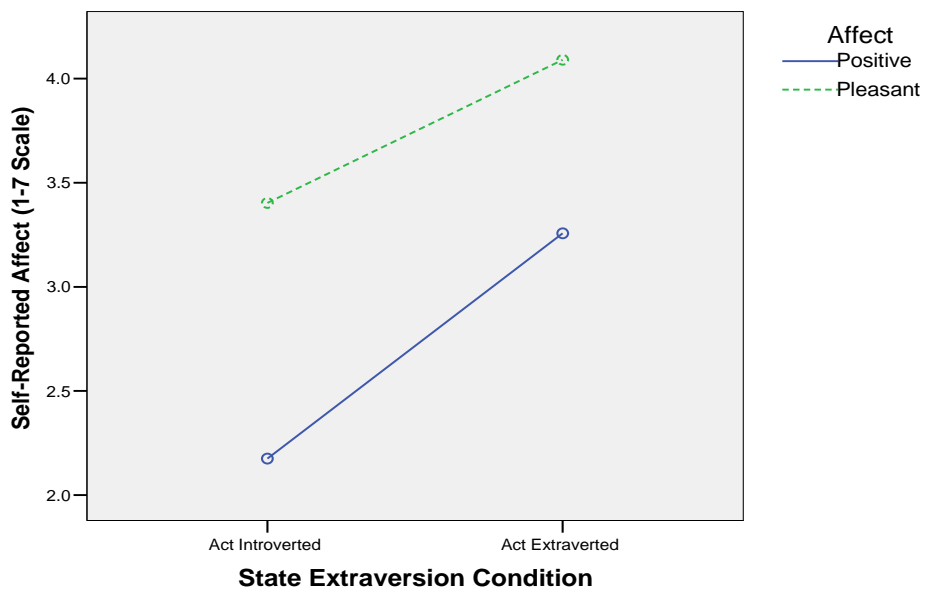


Figure 3

Effect of state extraversion on self-reported positive and activated affect. Acting extraverted as opposed to introverted caused greater levels of both types of affect, but this change was greater for positive affect

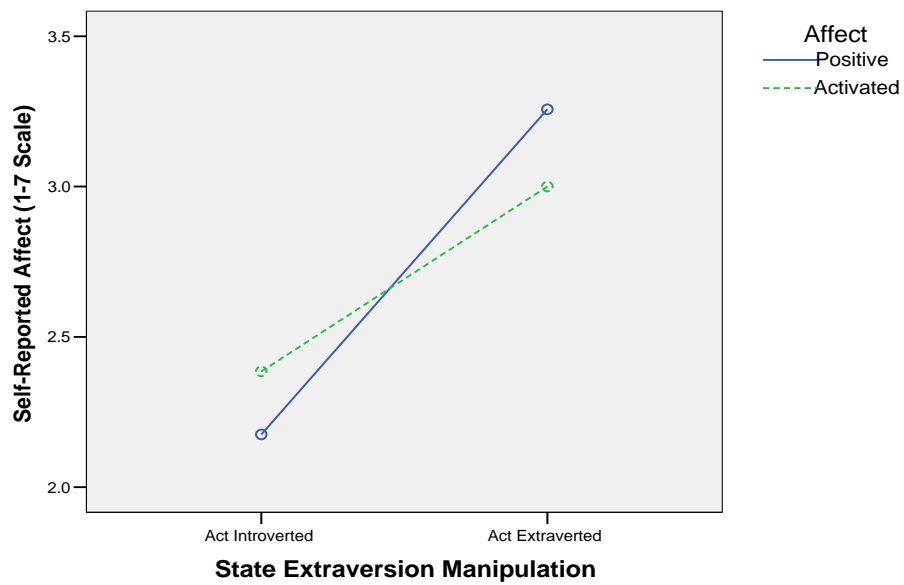
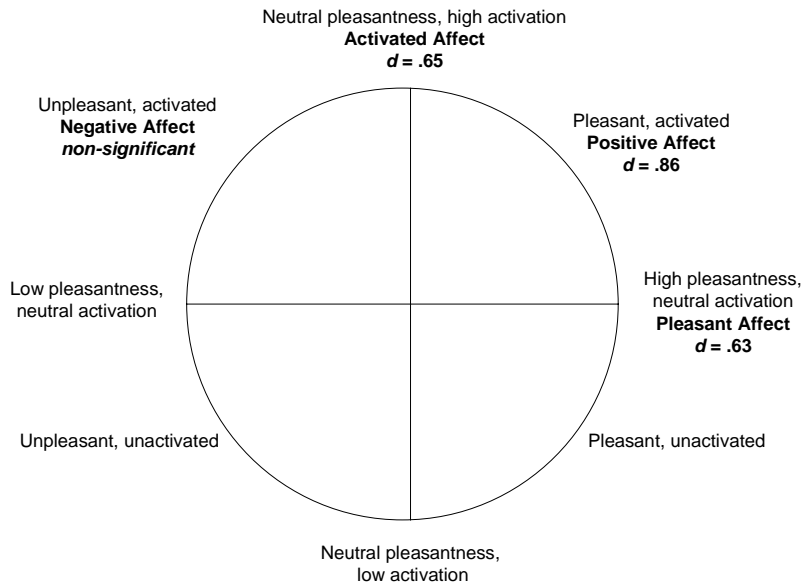


Figure 4

*Affect circumplex with effect sizes of state extraversion on the four types of affect measured
(effect on negative affect was non-significant, and so no effect size is listed)*



Appendix A
General Directions

Discussion Effects Packet – Participant A

Instructions

When answering questions in this packet, please:

- (i) remember that there is no right or wrong answer – all answers are equally important and interesting;
- (ii) answer as honestly as you can;
- (iii) answer every question if possible;
- (iv) do not answer a question if you prefer not to – you have the option to skip any questions for any reason you want;
- (v) know that these answers are completely confidential – no one will connect you with your answers.

Appendix B

Part One Task Instructions

Participant Letter (circle one) A B

Instructions for Part One Discussion

You will start this experiment by discussing a topic with another participant. You will need to come to agreement in rank-ordering 10 pictures. The topic will be described to you on a separate sheet of paper.

You will have 10 minutes to discuss this topic. You must come to an agreement as a pair.

During this discussion, we would like you to act in a particular way. Please try your best to act in this way.

Specifically, we would like you to be bold, spontaneous, assertive, and talkative. During the entire discussion, please try to act in those ways.

This may or may not be the way you normally act – that is OK. Just please try to act in those ways as much as possible during the entire discussion. You may not act exactly that way the whole time, just try to be as close as possible.

PLEASE DO NOT TURN THE PAGE UNTIL YOU ARE TOLD

Participant Letter (circle one) A B

Instructions for Part One Discussion

You will start this experiment by discussing a topic with another participant. You will need to come to agreement in rank-ordering some pictures. The topic will be described to you on a separate sheet of paper.

You will have 10 minutes to discuss this topic. You must come to an agreement as a pair.

During this discussion, we would like you to act in a particular way. Please try your best to act in this way.

Specifically, we would like you to be timid, withdrawn, inhibited, and unadventurous. During the entire discussion, please try to act in those ways.

This may or may not be the way you normally act – that is OK. Just please try to act in those ways as much as possible during the entire discussion. You may not act exactly that way the whole time, just try to be as close as possible.

PLEASE DO NOT TURN THE PAGE UNTIL YOU ARE TOLD

Participant Letter (circle one) A B

Instructions for Part One Discussion

You will start this experiment by discussing a topic with another participant. You will need to come to agreement in rank-ordering 10 pictures. The topic will be described to you on a separate sheet of paper.

You will have 10 minutes to discuss this topic. You must come to an agreement as a pair.

The topic should be easy to understand. It is described in some detail on a separate sheet of paper.

We hope that the two of you can come to an agreement about how to rank-order the pictures.

PLEASE DO NOT TURN THE PAGE UNTIL YOU ARE TOLD

Appendix C

Part One Task

Ranking posters

You and the other participant have an envelope in front of you containing 10 pictures (photographs). We would like you all to together rank the pictures according to how well you think they would sell as posters. For example, imagine that these 10 pictures are available as posters at a store in this area, and rank-order them in terms of how many of each would be sold. For example, the picture you think would sell the most would be ranked “1,” the picture would sell second best would be ranked “2,” and so on. The picture you think would sell worst should be ranked “10.”

You and the other participant must come to an agreement on the rankings. Therefore, please look at all the pictures and discuss the reasons why each would sell well or poorly. You may want to consider how interesting each picture is, what kind of people would want to buy it, etc.

When you all have agreed on the rankings, write them down in the blank next to each picture below.

_____ sailing	(IAPS #8080)
_____ space shuttle	(#5450)
_____ skier	(#8190)
_____ money	(#8501)
_____ fireworks over city	(#5910)
_____ waterfall	(#5260)
_____ chocolate bar	(#7400)
_____ puppies	(#1710)
_____ beach	(#5833)
_____ man holding baby	(#2160)

Ranking posters

You and the other participant have an envelope in front of you containing 10 pictures (photographs). We would like you all to together rank the pictures according to how well you think they would sell as posters. For example, imagine that these 10 pictures are available as posters at a store in this area, and rank-order them in terms of how many of each would be sold. For example, the picture you think would sell the most would be ranked “1,” the picture would sell second best would be ranked “2,” and so on. The picture you think would sell worst should be ranked “10.”

You and the other participant must come to an agreement on the rankings. Therefore, please look at all the pictures and discuss the reasons why each would sell well or poorly. You may want to consider how interesting each picture is, what kind of people would want to buy it, etc.

When you all have agreed on the rankings, write them down in the blank next to each picture below.

- | | |
|--------------------------------|--------------|
| _____ mug | (IAPS #7009) |
| _____ abstract art (cylinders) | (#7186) |
| _____ abstract art (squares) | (#7185) |
| _____ cemetery | (#9001) |
| _____ mushrooms | (#5534) |
| _____ hammer | (#7034) |
| _____ empty pool | (#9360) |
| _____ pine needles | (#5120) |
| _____ woman’s face | (#2830) |
| _____ boots | (#2446) |

Appendix D

Behavior Ratings

Your Participant Letter (circle one) A B

Adjective Ratings

Next to each adjective, please write the number that indicates how well the adjective describes **the way you acted** during the discussion about poster sales.

Describes the way you acted during the discussion:	1	2	3	4	5	6	7
	Not at all			somewhat			Very well

- _____ 1. bold
- _____ 2. cooperative
- _____ 3. thorough
- _____ 4. intelligent
- _____ 5. out-going
- _____ 6. insecure
- _____ 7. inhibited
- _____ 8. assertive
- _____ 9. demanding
- _____ 10. open-minded
- _____ 11. reserved
- _____ 12. kind
- _____ 13. serious
- _____ 14. talkative

Your Participant Letter (circle one) A B

Adjective Ratings

Next to each adjective, please write the number that indicates how well the adjective describes **the way the other participant acted** during the discussion about poster sales

Describes the way the other participant acted during the discussion:	1	2	3	4	5	6	7
	Not at all			somewhat			Very well

- _____ 1. bold
- _____ 2. cooperative
- _____ 3. thorough
- _____ 4. intelligent
- _____ 5. out-going
- _____ 6. insecure
- _____ 7. inhibited
- _____ 8. assertive
- _____ 9. demanding
- _____ 10. open-minded
- _____ 11. reserved
- _____ 12. kind
- _____ 13. serious
- _____ 14. talkative

Appendix E

Affect Ratings

Your Participant Letter (circle one) A B

Emotion Ratings

This scale consists of a number of words that describe different feelings and emotions. Indicate to what extent **you felt this way** during the discussion about poster sales.

Describes the way you felt during the discussion:	1	2	3	4	5	6	7
	very slightly or not at all			moderately			a lot

- _____ 1. excited
- _____ 2. nervous
- _____ 3. happy
- _____ 4. alert
- _____ 5. annoyed
- _____ 6. peppy
- _____ 7. pleased
- _____ 8. aroused
- _____ 9. elated
- _____ 10. hyperactivated
- _____ 11. content
- _____ 12. anxious
- _____ 13. stimulated
- _____ 14. satisfied
- _____ 15. enthusiastic
- _____ 16. distressed

Your Participant Letter (circle one) A B

Emotion Ratings

This scale consists of a number of words that describe different feelings and emotions. Indicate to what extent you think **the other participant felt this way** during the discussion about poster sales.

Describes the way the other participant felt during the discussion:	1	2	3	4	5	6	7
	very slightly or not at all			moderately			a lot

- _____ 1. excited
- _____ 2. nervous
- _____ 3. happy
- _____ 4. alert
- _____ 5. annoyed
- _____ 6. peppy
- _____ 7. pleased
- _____ 8. aroused
- _____ 9. elated
- _____ 10. hyperactivated
- _____ 11. content
- _____ 12. anxious
- _____ 13. stimulated
- _____ 14. satisfied
- _____ 15. enthusiastic
- _____ 16. distressed

Appendix F

Part Two Task Instructions

Participant Letter (circle one) A B

Instructions for Part Two Discussion

You will discuss a topic with the other participant. You will need to come to agreement in rank-ordering 10 different pictures, although the ranking criteria are different than in the first discussion. The topic will be described to you on a separate sheet of paper.

You will have 10 minutes to discuss this topic. You must come to an agreement as a pair.

During this discussion, we would like you to act in a particular way. Please try your best to act in this way.

Specifically, we would like you to be bold, spontaneous, assertive, and talkative. During the entire discussion, please try to act in those ways.

This may or may not be the way you normally act – that is OK. Just please try to act in those ways as much as possible during the entire discussion. You may not act exactly that way the whole time, just try to be as close as possible.

PLEASE DO NOT TURN THE PAGE UNTIL YOU ARE TOLD

Your Participant Letter (circle one) A B

Instructions for Part Two Discussion

You will discuss a topic with the other participant. You will need to come to agreement in rank-ordering 10 different pictures, although the ranking criteria are different than in the first discussion. The topic will be described to you on a separate sheet of paper.

You will have 10 minutes to discuss this topic. You must come to an agreement as a pair.

During this discussion, we would like you to act in a particular way. Please try your best to act in this way.

Specifically, we would like you to be timid, withdrawn, inhibited, and unadventurous. During the entire discussion, please try to act in those ways.

This may or may not be the way you normally act – that is OK. Just please try to act in those ways as much as possible during the entire discussion. You may not act exactly that way the whole time, just try to be as close as possible.

PLEASE DO NOT TURN THE PAGE UNTIL YOU ARE TOLD

Your Participant Letter (circle one) A B

Instructions for Part Two Discussion

You will discuss a topic with the other participant. You will need to come to agreement in rank-ordering 10 different pictures, although the ranking criteria are different than in the first discussion. The topic will be described to you on a separate sheet of paper.

You will have 10 minutes to discuss this topic. You must come to an agreement as a pair.

The topic should be easy to understand. It is described in some detail on a separate sheet of paper.

We hope that the two of you can come to an agreement about how to rank-order the pictures.

PLEASE DO NOT TURN THE PAGE UNTIL YOU ARE TOLD

Appendix G

Part Two Task

Ranking Pictures #2

You and the other participant have an envelope in front of you containing 10 pictures (photographs). Like in the first discussion, we would like you all to together rank the pictures. However, this time we would like you to rank them according to their artistic quality. For example, you may want to consider yourself and the other participant as judges in a photo contest, and you need to decide the quality of each photo. You may want to consider things such as symmetry of the picture, lighting in the picture, or the angle from which the picture was taken. However, the criteria are up to you and the other participant. But remember that you must rank-order the pictures together.

Like before, rank the picture with the highest artistic quality “1,” the second-best as “2,” and so on.

You and the other participant must come to an agreement on the rankings. Therefore, please look at all the pictures and discuss the artistic quality of each before making the rankings.

When you all have agreed on the rankings, write them down in the blank next to each picture below.

_____ rafting	(IAPS #8370)
_____ fireworks	(#5480)
_____ bride and girl	(#2209)
_____ ski jumper	(#8030)
_____ waterfall	(#5270)
_____ castle	(#7502)
_____ mountain	(#5700)
_____ ferris wheel	(#7508)
_____ ice cream sundae	(#7330)
_____ sailboat on water	(#8170)

Ranking Pictures #2

You and the other participant have an envelope in front of you containing 10 pictures (photographs). Like in the first discussion, we would like you all to together rank the pictures. However, this time we would like you to rank them according to their artistic quality. For example, you may want to consider yourself and the other participant as judges in a photo contest, and you need to decide the quality of each photo. You may want to consider things such as symmetry of the picture, lighting in the picture, or the angle from which the picture was taken. However, the criteria are up to you and the other participant. But remember that you must rank-order the pictures together.

Like before, rank the picture with the highest artistic quality “1,” the second-best as “2,” and so on.

You and the other participant must come to an agreement on the rankings. Therefore, please look at all the pictures and discuss the artistic quality of each before making the rankings.

When you all have agreed on the rankings, write them down in the blank next to each picture below.

_____ basket	(IAPS #7010)
_____ traffic	(#7595)
_____ key ring	(#7059)
_____ shipyard	(#7036)
_____ bar stool	(#7025)
_____ office	(#7700)
_____ elderly man	(#2480)
_____ chess	(#2840)
_____ woman	(#9190)
_____ clothes rack	(#7217)

Appendix H

Physical Attractiveness Ratings

Your Participant Letter (circle one) A B

Rate **the other participant** on physical attractiveness. Circle your response.

1	2	3	4	5	6	7	8	9
not at all attractive					average attractiveness		very attractive	

Rate **yourself** on physical attractiveness. Circle your response.

1	2	3	4	5	6	7	8	9
not at all attractive					average attractiveness		very attractive	

Appendix I
Typical Behavior

Your Participant Letter (circle one) A B

Next to each adjective, please write the number that indicates how well the adjective describes **the way the you act in day-to-day life**.

Describes the way you act in day-to-day life:	1	2	3	4	5	6	7
	Not at all			somewhat			Very well

- _____ 1. talkative
- _____ 2. reliable
- _____ 3. contented
- _____ 4. warm
- _____ 5. bold
- _____ 6. perceptive
- _____ 7. analytical
- _____ 8. cautious
- _____ 9. timid
- _____ 10. rude
- _____ 11. adventurous
- _____ 12. tense
- _____ 13. cultured
- _____ 14. quiet
- _____ 15. irresponsible
- _____ 16. generous
- _____ 17. spontaneous
- _____ 18. emotional
- _____ 19. extraverted
- _____ 20. high-strung

Appendix J

Examples of IAPS pictures (two positive and two neutral)









REFERENCES

- Aharon, I., Etcoff, N., Ariely, D., Chabris, C.F., O'Connor, E., & Breiter, H.C. (2001). Beautiful faces have variable reward value: fMRI behavioral evidence. *Neuron*, *32*, 537-551.
- Allik, J., & Realo, A. (1997). Emotional experience and its relation to the five-factor model in Estonian. *Journal of Personality*, *65*, 625-647.
- Ashton, M.C., Lee, K., & Paunonen, S.V. (2002). What is the central feature of extraversion? Social attention versus reward sensitivity. *Journal of Personality and Social Psychology*, *83*, 245-252.
- Barrett, L.F., & Russell, J.A. (1999). The structure of current affect: Controversies and emerging consensus. *Current Directions in Psychological Science*, *8*, 10-14.
- Berry, D.S., & Miller, K.M. (2001). When boy meets girl: Attractiveness and the five-factor model in opposite-sex interactions. *Journal of Research in Personality*, *35*, 62-77.
- Buss, D.M. (1998). Sexual strategies theory: Historical origins and current status. *Journal of Sex Research*, *35*, 19-31.
- Campbell, L., Simpson, J.A., Stewart, M., & Manning, J. (2003). Putting personality in social context: Extraversion, emergent leadership, and the availability of rewards. *Personality and Social Psychology Bulletin*, *29*, 1547-1559.
- Carroll, J.M., Yik, S.M. M., Russell, J.A., & Barrett, L.F. (1999). On the psychometric principles of affect. *Review of General Psychology*, *3*, 14-22.
- Charles, S.T., Reynolds, C.A., & Gatz, M. (2001). Age-related differences and change in positive and negative affect over 23 years. *Journal of Personality and Social Psychology*, *80*, 136-151.
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences*. 3rd Edition. Lawrence Erlbaum Associates.
- Costa, Jr., P.T., & McCrae, R.R. (1980). Influence of extraversion and neuroticism on subjective well-being: Happy and unhappy people. *Journal of Personality and Social Psychology*, *38*, 668-678.
- Costa, Jr., P.T., & McCrae, R.R. (1988). Personality in adulthood: A six-year longitudinal study of self-report and spouse ratings on the NEO Personality Inventory. *Journal of Personality and Social Psychology*, *54*, 853-863.
- Darville, T.J., & Johnson, R.C. (1991). Optimism and perceived control of life events as

- related to personality. *Personality and Individual Differences*, 12, 951-954.
- David, J.P., Green, P.J., Martin, R., & Suls, J. (1997). Differential roles of neuroticism, extraversion, and event desirability for mood in daily life: An integrative model of top-down and bottom-up influences. *Journal of Personality and Social Psychology*, 73, 149-159.
- De Pascalis, V., & Speranza, O. (2000). Personality effects on attentional shifts to emotional charged cues: ERP, behavioural and HR data. *Personality and Individual Differences*, 29, 217-238.
- DeNeve, K.M., & Cooper, H. (1998). The happy personality: A meta-analysis of 137 personality traits and subjective well-being. *Psychological Bulletin*, 95, 542-575.
- DesRosiers, G., & Robinson, D. (1992). Memory and hedonic tone: "Personality" or "mood" congruence? *Psychological Medicine*, 22, 117-129.
- Deutsch, F.M., Zalski, C.M., & Clark, M.E. (1986). Is there a double standard of aging? *Journal of Applied Social Psychology*, 16, 771-785.
- Diener, E., & Larsen, R.J. (1984). Person * Situation interactions: Choice of situations and congruence response models. *Journal of Personality and Social Psychology*, 47, 580-592.
- Diener, E., & Lucas, R.E. (1999). Personality and subjective well-being. In D. Kahneman, E. Diener & N. Schwarz (Eds.), *Well-being: The foundations of hedonic psychology* (pp. 213-229). New York: Russell Sage Foundation.
- Diener, E., Oishi, S., & Lucas, R. E. (2003). Personality, culture, and subjective well-being: Emotional and cognitive evaluations of life. *Annual Review of Psychology*, 54, 403-425.
- Emmons, R.A., & Diener, E. (1985). Personality correlates of subjective well-being. *Personality and Social Psychology Bulletin*, 11, 89-97.
- Feldman Barrett, L., & Russell, J.A. (1998). Independence and bipolarity in the structure of current affect. *Journal of Personality and Social Psychology*, 74, 967-984.
- Fleeson, W. (2001). Toward a structure- and process-integrated view of personality: Traits as density distributions of states. *Journal of Personality and Social Psychology*, 80, 1011-1027.
- Fleeson, W., Malanos, A.B., & Achille, N.M. (2002). An intraindividual process approach to the relationship between extraversion and positive affect: Is acting extraverted as "good" as being extraverted? *Journal of Personality and Social Psychology*, 83, 1409-1422.

- Fossum, T.A., & Barrett, L.F. (2000). Distinguishing evaluation from description in the personality-emotion relationship. *Personality and Social Psychology Bulletin*, *26*, 669-678.
- Feingold, A. (1990). Gender differences in effects of physical attractiveness on romantic attraction: A comparison across five research paradigms. *Journal of Personality and Social Psychology*, *59*, 981-993.
- Gangestad, S.W., & Thornhill, R. (1997). The evolutionary psychology of extrapair sex: The role of fluctuating asymmetry. *Evolution and Human Behavior*, *18*, 69-88.
- Gangestad, S.W., Thornhill, R., & Yeo, R.A. (1994). Facial attractiveness, developmental stability, and fluctuating asymmetry. *Ethology and Sociobiology*, *15*, 73-85.
- Garcia, S., Stinson, L., Ickes, W., Bissonnette, V., & Briggs, S. (1991). Shyness and attractiveness in mixed-sex dyads. *Journal of Personality and Social Psychology*, *61*, 35-49.
- Goldberg, L.R. (1992). The development of markers for the Big-Five factor structure. *Psychological Assessment*, *4*, 26-42.
- Gray, J.A. (1970). The psychophysiological basis of introversion-extraversion. *Behaviour Research and Therapy*, *8*, 249-266.
- Gray, J.A. (1981). A critique of Eysenck's theory of personality. In H.J. Eysenck (Ed.), *A Model for Personality* (pp. 246-276). New York: Springer Verlag.
- Gross, J.J., Sutton, S.K., & Ketelaar, T. (1998). Relations between affect and personality: Support for the affect-level and affective-reactivity views. *Personality and Social Psychology Bulletin*, *24*, 279-288.
- Hamid, P.N., & Cheng, S.T. (1996). The development and validation of an index of emotional disposition and mood state: The Chinese Affect Scale. *Educational and Psychological Measurement*, *56*, 995-1014.
- Headey, B., & Wearing, A. (1989). Personality, life events, and subjective well-being: Toward a dynamic equilibrium model. *Journal of Personality and Social Psychology*, *57*, 731-739.
- Jacobson, N.S., Dobson, K., Truax, P.A., Addis, M.E., Koerner, K., Gollan, J.K., Gortner, E., & Prince, S.E. (1996). A component analysis of cognitive behavioral treatment for depression. *Journal of Consulting & Clinical Psychology*, *64*, 295-304.
- Lang, P.J., Bradley, M.M., & Cuthbert, B.N. (2005). *International affective picture system (IAPS): Instruction manual and affective ratings*. Technical Report A-6, The Center for Research in Psychophysiology, University of Florida.

- Langlois, J.H., & Roggman, L.A. (1990). Attractive faces are only average. *Psychological Science, 1*, 115-121.
- Langlois, J.H., Roggman, L.A., Casey, R.J., & Ritter, J., Rieser-Danner, L.A., & Jenkins, V.Y. (1987). Infant preferences for attractive faces: Rudiments of a stereotype? *Developmental Psychology, 23*, 363-369.
- Larsen, R.J., & Diener, E. (1992). Promises and problems with the circumplex model of emotion. In M.S. Clark (Ed.), *Review of personality and social psychology: Emotion* (Vol. 13, pp. 25-59). Newbury Park, CA: Sage Publishing.
- Larsen, R.J., & Ketelaar, T. (1989). Extraversion, neuroticism and susceptibility to positive and negative mood induction procedures. *Personality and Individual Differences, 10*, 1221-1228.
- Larsen, R.J., & Ketelaar, T. (1991). Personality and susceptibility to positive and negative emotional states. *Journal of Personality and Social Psychology, 61*, 132-140.
- Lucas, R.E. (2000). Pleasant affect and sociability: Toward a comprehensive model of extraverted feelings and behaviors. Unpublished doctoral dissertation, University of Illinois at Urbana-Champaign.
- Lucas, R.E., & Baird, B.M. (2004). Extraversion and emotional reactivity. *Journal of Personality and Social Psychology, 86*, 473-485.
- Lucas, R.E., & Diener, E. (2000). Personality and subjective well-being across the life span. In V.J. Molfese & D.L. Molfese (Eds.), *Temperament and personality development across the life span* (pp. 211-234).
- Lucas, R.E., Diener, E., Grob, A., Suh, E.M., & Shao, L. (2000). Cross-cultural evidence for the fundamental features of extraversion. *Journal of Personality and Social Psychology, 79*, 452-468.
- Lucas, R.E., & Fujita, F. (2000). Factors influencing the relation between extraversion and pleasant affect. *Journal of Personality and Social Psychology, 79*, 1039-1056.
- Martell, C., Addis, M., & Dimidjian, S. (2004). Finding the action in behavioral activation: The search for empirically-supported interventions and mechanisms of change. In S.C. Hayes, V.M. Follette & M.M. Linehan (Eds.), *Mindfulness and acceptance: Expanding the cognitive-behavioral tradition* (pp. 152-167).
- Matthews, G., & Gilliland, K. (1999). The personality theories of H.J. Eysenck and J.A. Gray: A comparative review. *Personality and Individual Differences, 26*, 583-626.

- Mayo, P.R. (1983). Personality traits and the retrieval of positive and negative memories. *Personality and Individual Differences, 4*, 465-471.
- Mayo, P.R. (1989). A further study of the personality-congruent recall effect. *Personality and Individual Differences, 10*, 247-252.
- McCrae, R.R., & Costa, P.T. (1991). Adding *Liebe und Arbeit*: The full five-factor model and well-being. *Personality and Social Psychology Bulletin, 17* (2), 227-232.
- McNiel, J.M., & Fleeson, W. (in press). The causal effects of extraversion on positive affect and neuroticism on negative affect: Manipulating state extraversion and state neuroticism in an experimental approach. *Journal of Research in Personality*.
- Mealey, L., Bridgstock, R., & Townsend, G.C. (1999). Symmetry and perceived facial attractiveness: A monozygotic co-twin comparison. *Journal of Personality and Social Psychology, 76*, 151-158.
- Morrone, J.V., Depue, R.A., Scherer, A.J., & White, T.L. (2000). Film-induced incentive motivation and positive activation in relation to agentic and affiliative components of extraversion. *Personality and Individual Differences, 29*, 199-216.
- Morrone-Strupinsky, J.V., & Depue, R.A. (2004). Differential relation of two distinct, film-induced positive emotional states to affiliative and agentic extraversion. *Personality and Individual Differences, 36*, 1109-1126.
- O'Doherty, J., Winston, J., Critchley, H., Perret, D., Burt, D.M., & Dolan, R.J. (2003). Beauty in a smile: The role of medial orbitofrontal cortex in facial attractiveness. *Neuropsychologia, 41*, 147-155.
- Pavot, W., Diener, E., & Fujita, F. (1990). Extraversion and happiness. *Personality and Individual Differences, 11*, 1299-1306.
- Rhodes, G., Sumich, A., & Byatt, G. (1999). Are average facial configurations attractive only because of their symmetry. *Psychological Science, 10*, 52-58.
- Rolls, E.T. (2000). The orbitofrontal cortex and reward. *Cerebral Cortex, 10*, 284-294.
- Rubenstein, A.J., Kalakanis, L., & Langlois, J.H. (1999). Infant preferences for attractive faces: A cognitive explanation. *Developmental Psychology, 35*, 848-855.
- Ruch, W., & Deckers, L. (1993). Do extraverts "like to laugh"? An analysis of the Situational Humor Response Questionnaire (SHRQ). *European Journal of Personality, 7*, 211-220.
- Russell, J.A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology, 39*, 1161-1178.

- Rusting, C.L. (1999). Interactive effects of personality and mood on emotion-congruent memory and judgment. *Journal of Personality and Social Psychology*, *77*, 1073-1086.
- Rusting, C.L., & Larsen, R.J. (1998). Personality and cognitive processing of affective information. *Personality and Social Psychology Bulletin*, *24*, 200-213.
- Sandvik, E., Diener, E., & Seidlitz, L. (1993). Subjective well-being: The convergence and stability of self-report and non-self-report measures. *Journal of Personality*, *61*, 317-342.
- Serretti, A., Jori, M.C., Casadei, G., Ravizza, L., Smeraldi, E., & Akiskal, H. (1999). *Journal of Affective Disorders*, *56*, 17-25.
- Steel, P., & Ones, D. S. (2002). Personality and happiness: A national-level analysis. *Journal of Personality and Social Psychology*, *83*, 767-781.
- Stelmack, R.M. (1990). Biological bases of extraversion: Physiological evidence. *Journal of Personality*, *58*, 293-311.
- Suls, J., Green, P., & Hillis, S. (1998). Emotional reactivity to everyday problems, affective inertia, and neuroticism. *Personality and Social Psychology Bulletin*, *24*, 127-136.
- Watson, D., & Clark, L.A. (1994). The PANAS-X: Manual for the Positive and Negative Affect Schedule – Expanded Form. The University of Iowa.
- Watson, D., & Clark, L.A. (1992). On traits and temperament: General and specific factors of emotional experience and their relation to the five-factor model. *Journal of Personality*, *60*, 441-476.
- Watson, D., Clark, L.A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*, 1063-1070.
- Watson, D., Wiese, D., Vaidya, J., & Tellegen, A. (1999). The two general activation systems of affect: Structural findings, evolutionary considerations, and psychobiological evidence. *Journal of Personality and Social Psychology*, *76*, 820-838.
- Weiss, A., King, J.E., & Enns, R.M. (2002). Subjective well-being is heritable and genetically correlated with dominance in chimpanzees (*Pan troglodytes*). *Journal of Personality and Social Psychology*, *83*, 1141-1149.
- Williams, P.G., Surwit, R.S., Babyak, M.A., & McCaskill, C.C. (1998). Personality predictors of mood related to dieting. *Journal of Consulting and Clinical Psychology*, *66*, 994-1004.

- Wilson, K., & Gullone, E. (1999). The relationship between personality and affect over the lifespan. *Personality and Individual Differences, 27*, 1141-1156.
- Yik, S.M.M., & Russell, J.A. (2001). Predicting the Big Two of affect from the Big Five of personality. *Journal of Research in Personality, 35*, 247-277.
- Yik, S.M.M., Russell, J.A., & Barrett, L.F. (1999). Structure of self-reported current affect: Integration and beyond. *Journal of Personality and Social Psychology, 77*, 600-619.
- Zebrowitz, L.A., Olson, K., & Hoffman, K. (1993). Stability of babyfacedness and attractiveness across the life span. *Journal of Personality and Social Psychology, 64*, 453-466.