

12-9-2015

# Multi-Modal Outcomes from Interpersonal Need (Un)Fulfillment: The Emotional, Cognitive and Behavioral Derivatives of Consecutive Social Contingencies

Kyle Steven Hull

University of Connecticut - Storrs, [Kyle.Hull@Aquinas.edu](mailto:Kyle.Hull@Aquinas.edu)

Follow this and additional works at: <https://opencommons.uconn.edu/dissertations>

---

## Recommended Citation

Hull, Kyle Steven, "Multi-Modal Outcomes from Interpersonal Need (Un)Fulfillment: The Emotional, Cognitive and Behavioral Derivatives of Consecutive Social Contingencies" (2015). *Doctoral Dissertations*. 976.  
<https://opencommons.uconn.edu/dissertations/976>

Multi-Modal Outcomes from Interpersonal Need (Un)Fulfillment:  
The Emotional, Cognitive and Behavioral Derivatives  
of Consecutive Social Contingencies

Kyle Steven Hull, PhD

University of Connecticut, 2015

Abstract

The current study assessed the relationship between the core dimensions of interpersonal communication and relationships, power and intimacy, on the activation of individualistic-prosocial affect systems and subsequent interpersonal outcomes. Despite extensive research examining each dimension, mixed findings are prevalent and few have investigated their potential interaction. This study addressed these issues based on current trends in interdisciplinary research. Specifically, manipulated social triumph-defeat was followed by social inclusion-exclusion to examine their combined effect on interpersonal outcomes. Results indicate that the power and intimacy manipulations were successful, however, the relationship between them was not interactive. The current findings contradict the logical expansion of interdisciplinary physiological research (dual-hormone hypothesis) to perceptual-only designs. Both power and intimacy successfully activated individualistic and prosocial affect systems, which directly influenced person perception processes, which then predicted behavioral enactment toward comparison others.

Multi-Modal Outcomes from Interpersonal Need (Un)Fulfillment:  
The Emotional, Cognitive and Behavioral Derivatives  
of Consecutive Social Contingencies

Kyle Steven Hull

B.A.A., Central Michigan University, 2008

M.A., Central Michigan University, 2011

A Dissertation  
Submitted in Partial Fulfillment of the  
Requirements for the Degree of  
Doctor of Philosophy  
at the  
University of Connecticut

2015

Copyright by  
Kyle Steven Hull

2015

APPROVAL PAGE

Doctor of Philosophy Dissertation

Multi-Modal Outcomes from Interpersonal Need (Un)Fulfillment:  
The Emotional, Cognitive and Behavioral Derivatives  
of Consecutive Social Contingencies

Presented by

Kyle Steven Hull, B.A.A., M.A.

Major Advisor \_\_\_\_\_  
Ross Buck

Associate Advisor \_\_\_\_\_  
Mark Hamilton

Associate Advisor \_\_\_\_\_  
Arthur VanLear

University of Connecticut  
2015

## ACKNOWLEDGEMENTS

This work represents the culmination of my educational experience, and the combined sacrifice of myself, and those I hold dear. This journey was both unimaginably difficult and rewarding. Without perseverance and the support of my professional, familial, and social network, this work would never have been fully realized. First, I would like to thank Dr. Ross Buck. Ross, I can never express the impact you have had on my thoughts and interests. You are a kind soul with a brilliant mind, and serve as a sterling example for all social scientists. Also, Dr. Mark Hamilton, you have astounded me with your ability to find patterns within quantitative data. Your objective insight is unmatched and has directly affected the way I appraise variable relationships. I will forever aspire toward your quantitative mastery. Third, Dr. Arthur VanLear, you are a pointed critic that consistently demands excellence for student development and the furthering of communication theory. Thank you for your help, advice, and encouragement. I also wish to thank: Drs. Christensen, Denes, McGloin, Nowak, Stifano, Miller, Buerkel-Rothfuss, Withers, Hinck, Renz, and Papa. For all of your influences, I am eternally grateful.

I would also like to thank my family. Mom and dad, thank you for the cognitive ability and determination to achieve such a difficult goal. Your love and unwavering support has enabled this achievement and stands as an example for who I hope to become. Most importantly, thank you Samantha, the love of my life. I can never remedy the sacrifice and struggle you have experienced as a result of this process. Your support, in times of good and bad, will never be forgotten. I could not ask for a more perfect life partner. You are my love, my life, and my better half. Finally, thank you to those who have significantly influenced my life: extended family, friends, and colleagues. I am the product of cumulative experience and without all of you listed above, this achievement could never have become reality. THANK YOU.

## TABLE OF CONTENTS

<b>Chapter 1: Introduction</b>	1
Environmental Negotiation	2
Situational Derivatives	3
Contradictory Findings	5
New Directions	6
Purpose of the Current Work	7
<b>Chapter 2: Literature Review</b>	9
Nature of Interpersonal Communication, Relationships, and Perception	9
Power	9
Intimacy	11
Power and Intimacy Perception	13
Underlying Meta-Theoretical Mechanisms	14
Evolutionary Theory	15
Communibiological Paradigm	17
Biosocial Perspective	19
Interpersonal Need (Un)Fulfillment Outcomes	23
Triumph/Defeat	23
Manipulating Triumph/Defeat	24
Hormonal Outcomes	26
Emotional Outcomes	29
Cognitive Outcomes	33
Behavioral Outcomes	37
Inclusion/Exclusion	41
Manipulating Inclusion/Exclusion	42
Hormonal Outcomes	43
Emotional Outcomes	45
Cognitive Outcomes	47
Behavioral Outcomes	49
Power/Intimacy Interaction	51
Dual-Hormone Hypothesis	52
Emotional Outcomes	54
Cognitive Outcomes	56
Behavioral Outcomes	57
Belief Systems Theory	59
Self-Beliefs Born from Cognitive Competencies	61
Affect Systems	62
Selfish Individualism	62
Prosocial Cooperation	62
Beliefs about Others	63
Behavioral Action	65
<b>Chapter 3: Methodology</b>	66
Participants	66
Procedure	67
Manipulations	68

Performance Task Manipulation .....	69
Intimacy Interaction Manipulation .....	71
Dependent Outcomes .....	71
Measures .....	72
<b>Chapter 4: Results</b> .....	75
Manipulation Checks .....	75
Homogeneity of Experimental Conditions .....	75
Analyses .....	76
<b>Chapter 5: Discussion</b> .....	91
Implications.....	99
Limitations .....	99
Future Directions .....	101
Conclusion .....	102
<b>Appendices</b> .....	104
<b>References</b> .....	123



## **Chapter 1: Introduction**

Humans are deeply embedded within a social milieu, coexisting within a web of complex interrelatedness. Individuals intuitively experience an innate connection to all conspecifics, while also simultaneously attempting to negotiate and redefine the strength and nature of those connections. At the heart of this struggle lie two dimensions, which characterize the vast majority of human associations: intimacy (relational closeness) and power (relative dominance). These dimensions characterize the core of interpersonal perception and interaction, modulating both spontaneous and symbolic communication processes, largely comprising what Leary (1957) proclaimed the “interpersonal reflex.” Humans are evolutionarily preattuned to intimacy and power fluctuation cues (Buck, 2014), as they are vital for both physical and social survival (Baumeister & Leary, 1995). These dimensions represent primary needs driven by underlying motivational systems, which are achieved through interpersonal interaction (Baumeister & Leary, 1995; Schutz, 1958).

Although both intimacy and power represent foundational forms of connectedness, the simultaneous satisfaction of both is often problematic (DeBono & Muraven, 2014). The development of intimacy increases relational integration between individuals, while power acts to promote hierarchical differentiation and social distance (Lammers, Galinsky, Gordijn, & Otten, 2012). Humans experience this dimensional struggle regularly as they traverse social interaction episodes. As Kemper (1990) argued, each interaction episode has two outcome possibilities; one may either gain or lose power and gain or lose status (intimacy).

Take for example a case of organizational restructuring. Those who once enjoyed a mutual friendship founded on shared organizational experience and rank may struggle to maintain the relationship after one is promoted. Regardless of the effort/skill required to attain

elevated levels of responsibility and power, those who remain subordinate are likely to experience jealousy, envy, and resentment for their now superior “friend.” This often results in a decreased level of intimacy that is constituted by altered interpersonal communication practices. Furthermore, the attainment of elevated status also increases the prevalence of social conflicts as others initiate challenges to redistribute resources (Goyman & Wingfield, 2004).

### **Environmental Negotiation**

Across the lifespan, the social implications of integration and differentiation are ingrained into individuals. Humans learn to negotiate both positive and aversive social situations by generating a variety of communicative/behavioral responses. Despite the prevalence with which these experiences are faced, communicative reactions are highly variable, ranging from the extremes of overt assault (i.e. physical/verbal aggression) and rapport building (i.e. social support/collaboration) to complete social withdrawal (i.e. avoidance and isolation).

Within the communication discipline, scholars often refer to these social derivatives as falling within a metaphorical continuum anchored by a “dark-side” and a “light-side” (Spitzburg & Cupach, 1994; 2007). The dark side is represented by destructive, disruptive, exploitive, unappreciative, and otherwise distasteful relationally communicative outcomes. Previous research classifies communicative acts such as bullying/exclusion (Galinsky & Salmond, 2002), the expression and experience of negative affect (Reynolds, 1996; Mullen & Martin, 1994), verbal and physical aggression, as well as a myriad of other consequents as representing the “dark-side.” Alternatively, the “light-side” is often represented by constructive acts such as: forgiveness, the experience and expression of positive affect, inclusion, and protective actions exhibited toward others. Light side behaviors act to support and show appreciation for others.

Similarly, resulting from the experience of interpersonal communicative events, resides a contentious battle between selfish/individualistic (agonistic competition) and prosocial (cooperative) motivational systems (Buck, 1985; 2014). MacLean (1973; 1993) described this duality as concerns for individual survival and the survival of one's species, respectively. In response to the social environment, humans make choices informed by both affective and rational systems to engage in communication behavior reflective of this tension. Both individualistic and prosocial systems are biologically based in hormonal and neurochemical systems, which evolved to perform the functions of both personal survival and social fluidity.

### **Situational Derivatives**

At the most basic level, hormonal changes are functional (van Anders & Watson, 2006), preparing individuals for behavioral and social action. Hormones act as messengers, carrying instructions based in neurologic activity that are released by glands and travel through the bloodstream for the purpose of delivering important biological messages via organ specific receptors (Schultheiss & Stanton, 2009; Goodman, 2009). Organ receptors decode hormonal instructions and react accordingly to prepare for and behave in relation to, environmental stimuli. While hormones do act to regulate behavioral reactions, some reactions hold primacy over others (Booth, Granger, Mazur, & Kivlighan, 2006). For example, hormones may influence short-term approach/avoidance tendencies when one perceives an external threat, but also control long-term processes that are engaged concurrently, such as the drive to reproduce or seek relative advantages. Despite often being described separately, human perceptual and homeostatic systems are fully integrated, which means that alterations to one's physical and social environment directly affect internal bodily states and vice versa (Wallen & Hassett, 2009), often within seconds (Michels & Hoppe, 2008). Although humans experience levels of cognitive control well

beyond that of other animal species, the effects of hormones on cognition and behavior cannot be ignored (Bos, Panksepp, Bluthé, & van Honk, 2012).

Neuropeptide systems are deeply intermingled with the subjective experience of social situations, yet social and behavioral scientists are only beginning to explore and understand these relationships. How internal mechanisms interact with environmental stimuli to produce cognitive and behavioral outcomes remains what Bos et al. (2012) refer to as “a big challenge” and van Honk, Terberg, and Bos (2011) describe as “the great challenge.”

Extensive interdisciplinary research has assessed the effect of intimacy and power fluctuations with regard to a variety of intra/interpersonal outcomes. Based in a biosocial approach to human relations, the effects of power and intimacy fluctuations begin at the physiological level, namely resulting in Testosterone (T) and Cortisol (C) secretions, among others, which act to modulate socio-relational communicative processes (Cohen, Booth, & Granger, 2003). T is an androgen managed by the hypothalamic-pituitary-gonadal (HPG) axis, responsible for the presence/development of primary/secondary sex characteristics and territorial dominance behavior. T secretion increases/decreases in correspondence with social environmental challenge outcomes, such as competition for desired resources. C is considered a stress hormone regulated by the human hypothalamic-pituitary-adrenal (HPA) axis. C is reactive to social environmental fluctuations in conspecific intimacy, such that being included and shown affection by others reduces C, while being excluded and rejected increases C. The specific nature of these hormonal responses will be detailed later with greater depth.

As a direct derivative of physiological systems, attaining power and achieving intimacy are also shown to result in numerous positive emotional outcomes, while the opposite effect is found for need un-fulfillment. Given that emotional experiences are constituted by changes in

neurochemical systems (Buck, 1985; 2014), situational contingencies that affect physiology are understood to affect emotional experiences. Furthermore, at the cognitive level, these experiences are shown to affect the way that one views him/herself as well as comparison others within the surrounding social environment. Finally, the behavioral outcomes of social encounters that involve power and intimacy are also known to fluctuate.

### **Contradictory Findings**

The interpersonal outcomes associated with both T and C are highly variable, resulting in either aggressive or prosocial behavioral action. Specifically, attaining relative power results in physiological boosts of T, while losing power results in the opposite effect. T is colloquially understood as aggression inducing, being associated with anger (Persky, Smith & Bassu, 1971), aggression (Archer, 1991), and violent dominance (Dabbs & Hargrove, 1997). While extensive research supports this weak, yet significant relationship, T should be understood as much more than simple aggression (Dabbs & Dabbs, 2000). T is involved in the ascension to increased status, prestige, and access to resources (van Honk & Schutter, 2007; Bos et al., 2011): in other words, relative dominance. While dominance can be sought with aggression as a means to an end, it need not be. Aggression is always an indicator of attempts at dominance, but dominance is not always expressed via aggression (Burgoon, Johnson, & Koch, 1998). As Dabbs and Dabbs (2000) described, elevated T levels often promote prosocial protectiveness toward in-group members, such as motivating public servants to rescue those in need (e.g. police, firefighters, etc.) or parents defending their children with territorial aggression (Moyer, 1968).

Similarly, the relationship between fluctuating intimacy and behavioral outcomes is no clearer. At the behavioral extremes of experiencing exclusion, previous research indicates that individuals may either lash out aggressively or engage in prosocial relational preservation

activities. Experiencing peaks of C directly affects behavioral and communicative outcomes. As a result of ostracism, Leary, Twenge, and Quinlivan (2006) described various problematic behavioral outcomes, such as aggression with the intent to do bodily harm, murder, and even mass murders (i.e. school shootings). Leary, Kowalski, Smith, and Phillips (2003) also found that rejection is often a major contributing factor to acts of mass aggression, such as shootings. However, Leary et al. (2006) argued that aggressive acts in response to social rejection are counterintuitive, given that communicative reactions should ameliorate hurt feelings and restore interpersonal connection as opposed to exacerbating it. Hence, a vast amount of research also indicates that those subjected to rejection respond in submissive and conforming ways in an attempt to reenter the good graces of their rejecter.

### **New Directions**

In light of the mixed outcome literature, it is important to understand that hormones are neither prosocial nor antisocial, but the social situation within which they are elicited modulates the way they communicatively present (Dabbs & Dabbs, 2000). Despite intimacy and power dimensions and their physiological consequents being inherently linked, little research has examined how simultaneous variation on both dimensions/hormones affect interpersonal communicative/behavioral outcomes. As such, recent research has suggested that moderators should be considered (Warburton, Williams, & Cairns, 2006). In response to these calls, Mehta and Josephs (2010) suggested a revolutionary turn in the intimacy/power literature with what they referred to as “the dual-hormone hypothesis” (DHH). Specifically, they argued that Testosterone and Cortisol interact to shape dominant/aggressive and prosocial/supportive behavioral outcomes. They argued that T and C systems are inhibitory, such that T is associated with aggressive dominance, but only when C is low. If C is high, then the combined outcome of

these systems is either nullified or reversed. Hence, this interactive hypothesis suggests that social stimuli that initiate the secretion of these hormones in close succession should predict various communicative and behavioral outcomes.

The linkage between biological emotions (physiological neurochemical systems) and higher-level emotions continues to intrigue social scientific scholars (Buck, 2014). Yet, drawing these linkages has proven to be difficult. Salvador and Costa (2009) stated that it is imperative for human competition research to account for complex interrelatedness between cognition and social organization. Similarly, McAndrew (2009) noted with respect to cultures of honor, “only through understanding the interactions among evolutionary predispositions, hormonal influences, and social/situational factors can we possibly make sense of the patterns of human aggression” (p. 330). Overall, exploring the combination of social contingencies is more representative of interpersonal *process* than static relational instances.

### **Purpose of the Current Work**

In light of this finding and the contradictory results found throughout the literature, the purpose of the current research is to contribute to the interdisciplinary trend of scientific inquiry by tying together a diverse body of literature to help explain how the core dimensions of interpersonal communication and relationships affect social outcomes spanning from emotional fluctuations to behavioral outcomes. Couched in belief systems theory (BST; Hamilton, Buck, & Chory-Assad, 2004; Hamilton & Mineo, 1996, 1999; Rokeach, 1956, 1958, 1960, 1968) and competing affect systems, the current study will manipulate both social hierarchical stance and inclusion/exclusion to explore the potential of the dual-hormone hypothesis. This research is meant to expand upon the growing trend of interdisciplinary interpersonal communication scholarship by addressing and extending upon the current state of biosocial research, specifically

with regard to the effects of T and C antecedents on interpersonal perception and relatedness. This work examines the DHH interaction for multiplicative potential and tests the rival hypothesis that intimacy and power function as two main effects.

Following previous work (Welker et al., 2013), the current study is a conceptual analysis of T and C systems. Social environmental stimuli designed to modulate these hormonal systems will be employed in lieu of exogenous administration. Specifically, participants first engage in a competitive communicative skill based challenge (CARAT; defined later) followed by manipulated feedback meant to affect T levels. This should engage hormonal reactions and positive/negative emotional systems associated with achievement, which as suggested by the broaden and build theory of emotion then affect perception and outward behavior (Fredrickson, 2001). Second, participant C levels are expected to change as a result of playing the well-established Cyberball social exclusion manipulation. Again, this should engage positive/negative emotional systems associated with feeling loved, which as suggested by the tend and befriend theory of emotion (Taylor, 2002) affect perception and behavior toward others. Given that environmental stimuli are the core antecedents to hormonal reactivity, the exogenous stimuli are considered to be representative of this modulation.

The following literature review will begin by describing the nature of interpersonal relationships, situating their core dimensions within the context of previously proposed typologies. Next, the meta-theoretical basis for assuming such dimensions will be discussed, building toward measureable physiological outcomes that support these models. Finally, physiological outcomes will be couched in human affective systems, which will be the basis for suggesting biosocial antecedents and consequents in a model of interpersonal perception and enacted communication outcomes.



## **Chapter 2: The Nature of Interpersonal Communication and Relationships**

Numerous relational typologies have suggested that a diverse array of core dimensions represent the nature of interpersonal communication and relationships (see Burgoon & Hale, 1984 and VanLear, Koerner, & Allen, 2006 for reviews). For example, Burgoon and Hale (1984) distinguish 12 distinct dimensions of relationships, while others have suggested less than five (Kemper, 1973; Leary, 1957; Schutz, 1958; Wish et al., 1976). Following the work of Leary (1957) and Kemper (1973), the following review organizes previous typological attempts into two parsimonious dimensions, designed to align closely with human evolutionary concerns. A dimensional approach is taken below, assuming that relationships are likely to vary on each of the suggested dimensions simultaneously; the dimensions are continua (Burgoon & Hale, 1984). For instance, a relationship is not either intimate *or* distant, it is likely to be a variation somewhere *between* highly intimate and highly distant.

### **Power**

Interpersonal connections are inherently defined by the degree to which power is distributed among members. As Russell (1938) famously stated, “the fundamental concept in social science is Power, in the same way that Energy is the fundamental concept in physics” (p.10). All interpersonal typologies contain a relative power dimension, yet many use different labels. Power, dominance, and control descriptors are often used interchangeably with one another and are present throughout previous models and research (Bateson, 1951; Bochner & Kaminski, 1974; Burgoon & Hale, 1984; Kemper, 1973; Lorr & McNair, 1963; Ruesch & Bateson, 1951; Watzlawick, Beavin, & Jackson, 1967).

Power is defined as a social construct that affords one the ability to influence another by bringing about some type of belief, attitude, or behavior change (French & Raven, 1959). Power

is attributed to those that have relative abilities that surpass other individuals within a social sphere. From a traditional evolutionary stance, power is often described as physical prowess. However, humans have an incredibly complex multidimensional ranking system (Floyd & Afifi, 2011) based both in evolutionarily primary concerns as well as progressive contemporary directions. While physical strength remains an influential factor in the perceived hierarchy of humans, the ability to attain and control resources through intellectual superiority is also highly regarded. This means that professional and social skills/abilities largely factor into hierarchical perception. In further support of this notion, researchers have found that physiological responses to intellectual challenges are akin to those of physical challenges (i.e. Mazur, Booth, & Dabbs, 1992), likely because both achieve the same goal of altering the implicit social hierarchy. Keltner, Gruenfeld, and Anderson (2003) agreed with this conception, arguing status, authority, and/or dominance are all determinants of perceived power, as they all indicate the allocation of resources.

Being afforded power also skews the dominance/submission ratio within social groups, favoring some and disadvantaging others. Dominance represents the expression of power/control, which is pervasive throughout the interpersonal and social-psychological literature (Burgoon, Buller, Hale, & deTurck, 1984; Millar & Rogers, 1987). “Dominance holds an indisputably primary place in understanding the actions of both humans and other species [because it represents] the very nature of interpersonal relationships” (Burgoon et al., 1998, p. 308). Dominance is found in the temporal exchange of messages, such that dominant behavior by one followed by submissive behavior by another indicates who retains power and control. Relationships are defined by the power dynamics present, which have implications for overall functioning, perception and individual member satisfaction.

Closely connected to the balance of power is the amount of equity that each member experiences. Grounded in social exchange theory (Thibault & Kelley, 1952) and equity theory (Adams, 1965), equity is generally conceptualized as the amount of fairness that occurs between relational members with regard to the distribution of resources and effort (Wicker & Bushweiler, 1970). When relational members experience contradicting levels of effort and reward through cost-benefit analysis, these theories suggest that members become distressed, which leads to relational dissatisfaction and potential deterioration (Wicker & Bushweiler, 1970). Equity can be considered in a range of domains encompassing both economic/resource and emotional/commitment bases. Perceptions of relational equity are based both with the relationship and also with regard to comparison with external relationships. Overall, equity is a common theme among relational considerations and typologies with the extremes of slave-master relationships (unequitable) and evenly-ranked coworkers (equitable). However, it must be acknowledged that equity is based not solely upon hierarchical differentiation, but the personal acceptance of the current structure by those involved.

### **Intimacy**

Intimacy is often considered a cornerstone of relationships, acting to simultaneously describe the quality of the bond and differentiate between social-public and private-personal forms (Kelley et al., 1983). All typologies embody considerations of interpersonal closeness, some at the basic level of connectedness and others at more emotional and/or evaluative levels. Typologies exist for all forms of relationships (e.g. marital, romantic, sibling, friend) (VanLear et al., 2006), yet they all contain an overarching dimension of intimacy ranging from most intimate (marital couples) to least intimate (simple awareness of another's existence).

Previous typologies have described intimacy as the range of depth to superficiality (Burgoon & Hale, 1984; Millar & Rogers, 1987) or superficial to intense (Wish et al., 1976). The emphasis on intensity hints toward an enmeshment between dyadic members that cannot easily be dissolved. Those with great intensity (e.g. married couples) are likely to experience much greater difficulty reducing intimacy than those with low intensity connections (e.g. professional acquaintances). On a similar note, Baxter and Montgomery (1996) describe one of the major relational dialectics as “autonomy-connection,” representing the simultaneous push and pull to become enmeshed but still retain unique personhood. The degree of intimacy in relationships should also be understood to subsume the dimension commonly referred to as connectedness-separateness (Baxter & Montgomery, 1996) or “interdependent-separate.” Interdependence is a key feature differentiating relationships from other less serious bonds (Knobloch & Solomon, 2003). Generally, interdependence refers to the reciprocal effects that actions of one relational partner also have on the other and vice versa (Kelley, 1979). Understanding the degree of interdependence is key to understanding how equity, emotionality, and power affect relational members (Kelley et al., 1983).

Others have emphasized a more affective linkage as representing forms of intimacy. Leary (1957) proposed that relationships fall on an affective continuum from love to hate. Similarly, others have suggested dimensions such as affection-hostility (Bochner & Kaminski, 1974; Burgoon & Hale, 1984), hostile-friendly (Wish et al., 1976), suspicious-affiliative (Lorr & McNair, 1963), and affection-dislike (Hinde, 1979). This dimension also subsumes others, such as emotional arousal (Burgoon & Hale, 1984), given that extreme (un)favorability suggests higher emotional arousal than moderate favorability or ambivalence.

Finally, all interpersonal interactions vary in the degree to which members behave competitively or cooperatively, which is subsumed by Burgoon and Hale's (1984) unique inclusion-exclusion dimension. This dimension also aligns closely with the considerations of Schutz (1958) who defined inclusion as one of the three primary interpersonal needs. Acting in cooperative ways not only smooths interaction, but also acts as an inclusion mechanism. Those who are cooperated with implicitly perceive regard, togetherness, and the potential for one to be included as a future relational partner. Conversely, when competition is present, either due to threat, unfriendliness, disregard, or simple disinterest, one is essentially excluded.

Intimacy embodies a rational and emotional enmeshment that varies from being completely positively connected and completely negatively disconnected. At its absolute core, intimacy should be understood as an inclusion-exclusion continuum. Previous research indicates that inclusion/exclusion serves a powerful modulator of social experience, such that the presence of an out-group alone increases intragroup cohesion (Tajfel & Turner, 1985). Even when inclusion cues are low and teammates have little knowledge of their compatriots, strong in-group allegiances exist (Tajfel, 1970). Inclusion/exclusion has also been found to be a powerful experimental manipulation (Williams, 2007) because it threatens the human need for inclusion and belongingness (Schutz, 1958).

### **Power and Intimacy Perception**

In alignment with the current two-dimensional framework, recent research on interpersonal perception indicates that cognitive (respect) and affective (liking) impressions of others represent the core of interpersonal attitude formation (Wojciszke, Abele, & Baryla, 2009). Furthermore, these perceptual dimensions are directly influenced by environmental contingencies, such as socially comparative events that constitute interpersonal threat (Montoya

& Horton, 2004). Wojciszke et al. (2009) claimed that liking-disliking reflects one's interest in connecting with another and subsequently enjoying that connection. As for the respect-disrespect dimension, this interpersonal response is couched in dominance/submission regarding one's relationship to the other. Wojciszke et al. (2009) found that liking (intimacy) is formed when the content of perception is based in communal qualities (being caring, considerate, and benevolent toward others), whereas respect is formed regarding agentic qualities (competence, ambition, status) of the other. Further work in social cognition claims a similar two-dimensional framework using the labels warmth and competence (Fiske, Cuddy, & Glick, 2006). Warmth is meant to embody the perception of friendliness and trustworthiness, while competence represents skill, ability, and intelligence. Interestingly, past research claims that up to 82% of the variance in the interpersonal perception of social behavior can be accounted for by warmth and competence alone (Wojciszke, 2005; Wojciszke, Bazinska, & Jaworski, 1998). However, the importance of these two dimensions for attitude formation is not always equal, and should depend on the social context (Wojciszke et al., 2009). The previously established two-dimensional framework will be highlighted throughout the remainder of the current work.

### **Underlying Meta-Theoretical Mechanisms**

The previously described interpersonal dimensions are to be considered primary due to their evolutionary underpinning. The current two-dimensional conceptualization aligns closely with that of Leary (1957), whose circumplex model used a vertical axis to represent hierarchical relations (status/rank) and a horizontal axis representing degrees of love/affiliation. Similarly, Kemper (1973) suggested that power and status are the core dimensions of social relationships due to evolutionary concerns. Kemper defined power as an influence (i.e. force, dominance, coercion, and manipulation) continuum along with status representing an intimacy (i.e.

appreciation, good-feeling, love, and inclusion) continuum. In direct application to social relationships, Schutz (1958) proposed fundamental interpersonal relations orientation theory (FIRO) to account for the motivational pull to form interpersonal bonds. FIRO is comprised of three interpersonal needs, inclusion, control and affection, which allegedly serve as the incentive to form bonds and behave/perform appropriately in relationships. These dimensions harken back to Maslow's (1943) hierarchy of needs, which prioritizes both power (access to survival resources) and intimacy (belongingness). These are considered *needs* because they offer the recipient a competitive advantage for survival. Furthermore, given the importance of these dimensions, norm violations and/or direct acts by another that restrict the ability to achieve these needs has been shown to evoke strong emotional reactions.

The following section reviews the evolutionary basis for the importance of power and intimacy as fundamental interpersonal relational dimensions. Then, physiology is considered as a driver for communication and behavioral action. Finally, biosocial considerations are presented to couch the assumptions of the current work, such that physiological systems react to environmental contingencies (Buck, 2014), which then predict human affect, perception, and communicative action.

## **Evolutionary Theory**

Evolutionary theory argues that favorable traits are passed through generations via natural selection processes, providing future offspring increased fitness (Darwin, 1859). Natural selection is a phylogenic process represented by grand trends in biological evolution that act to influence implicit social hierarchies. Over vast periods of time, individuals with favorable genes that enable beauty, strength, health, intelligence, and fertility are selected as mates for procreation. Mate selection allows for some lineages to extend while others are extinguished. As

suggested by Darwin (1859), offspring from the most favorable mating pairs contain genetic traits that allow for a greater attainment of resources in a given environmental niche, and therefore, better chance of future survival in that niche. Across generations this trend snowballs, promoting the propagation of environmentally favorable genes and the development of long-term mental and physical adaptations (fitness).

Underlying the formation and perpetuation of social hierarchies are battles for finite social and physically tangible resources. Species produce more offspring than the environment can sustain, compelling the competition for survival. Despite the human hierarchy system involving complex social perceptions that represent domains not found in other species, the distribution of resources remains as the basis for all competition. Those who enjoy power/dominance control valuable resources (Magee & Galinsky, 2008). Also, across social animal species, those who formed and maintained relationships with others and were strongly integrated into social systems were more likely to survive (Baumeister & Leary, 1995; Brewer & Caporael, 1990). Social integration enables resource sharing, mating opportunities, and the use of united physical force in the face of external threats. Humans behave in ways that fulfill ultimate needs often without conscious awareness (Floyd & Afifi, 2011; Kenrick & Simpson, 1997), which are primarily stimulated by evolutionarily primitive brain structures (MacLean, 1993).

Maclean's (1973; 1993) triune brain theory suggests that human brains evolved in three distinct stages that are hierarchically organized. The innermost layer of the human brain is often referred to as "reptilian," paying homage to prehistoric fish and reptiles. The reptilian brain acts to maintain homeostasis and regulate instinctive, reflexive, and survival/safety drives, such as aggression and sex concerned with self and species preservation. Over time, the limbic or "old-mammalian brain" developed as a new layer of cognitive tissue wrapped around the reptilian



complex. Primarily, limbic structures produce neurochemical signals resulting in enhanced emotional feelings and communicative acts (e.g., cues, behaviors). It allows for enhanced flexibility when reacting to environmental stimuli, especially those that are affect laden. Finally, the neocortex or “new mammalian brain” enveloped both of the prior regions allowing for deep cognitive processing, such as logic, creativity, abstract thought, and advanced language capabilities in response to complex stimuli. Taken together, evolutionarily primitive brain structures function at an instinctive level, processing information much faster than newer cognitive analytic systems because no decoding is necessary (Zajonc, 1980; LeDoux, 1996). These systems allow for spontaneous and symbolic communication to occur (Buck, 2014).

### **Communibiological Paradigm**

Interpersonal communication is one of the primary domains within the field of human communication research (Buley, Petronio, Hecht, & Alberts, 1993; Rogers, 1999) and has expanded dramatically over the past half-century. Originally based in the social psychological study of influence, interpersonal communication has grown to increasingly emphasize the interrelatedness among individuals (Greene & Burleson, 2003; Knapp & Daly, 2011; Perlman & Duck, 2006) at various levels of abstraction. The most recent advance seeks to eliminate abstraction by measuring the physiological antecedents and consequents of interpersonal communication and relational interaction (i.e. interpersonal contingencies).

Cappella (1991) argued for the importance of understanding the origins of human behavior from disparate perspectives, intertwining nature, nurture, environmental influences, and psychological rationalizations. Cappella (1991) claimed that examining biological underpinnings brings researchers closer to raw human experience than ever before. Physiological considerations cut across idiosyncratic differences to discover enduring characteristics that unite humans as a

species, while also connecting them to the surrounding social and physical ecosystem. Building upon this call and following trends from other disciplines, the 1990s featured what can now be considered the beginning of a paradigmatic shift in communication conceptualization, operationalization, and theory toward underlying biological mechanisms. Popularized largely by Beatty and McCroskey (1997, 2000; Beatty, McCroskey, & Heisel, 1998), the communibiological paradigm posits that biological mechanisms are foundational, underpinning what are often described as inherited traits, predispositions, and/or temperament, which partially constitute enacted communicative behavior and shape intra/interpersonal social perceptions (Beatty, et al. 1998). The power of this paradigmatic shift is evident considering Floyd and Afifi (2011) recently proposed a new law within the discipline, such that “all interpersonal communication acts are biological acts” (p. 87).

In the pursuit of understanding, explaining, and optimally predicting communication phenomena, the communibiological paradigm considers physiological and neurobiological systems to be largely inherited acting as the basis for all communicative action (Beatty, McCroskey, & Valencic, 2001; Beatty, McCroskey, & Pence, 2009). In other words, communibiology suggests that a great deal of human communication behavior is not learned, but is a result of in-born genetic temperament (Wrench & McCroskey, 2003). In support of this trend, journals featuring communication research have begun publishing communibiological work on a limited yet stable basis (see Boren & Veksler, 2011). Most notably, outlets concerned with social and personal relationships rank among the most frequently published applications of communibiological research.

Communibiology rests on four meta-theoretical propositions that direct theory development and its application to communication phenomena. Generally speaking, these

propositions claim that predominantly inherited neurologic activity underlies all communication behavior and that individual differences in brain chemistry (that are also affected by situational constraints) are responsible for the existence of unique communication styles (Beatty et al., 2009). Given that neurobiological systems are innate, they represent the underlying mechanism for the existence of communicator temperament or traits (Beatty et al., 2009). Originally applied to traits such as apprehension (Beatty, McCroskey, & Heisel, 1998) and verbal aggressiveness (Beatty & McCroskey, 1998), the communibiological paradigm has expanded to encompass numerous variable relationships in the realm of interpersonal communication.

### **Biosocial Perspective**

Expanding upon the consideration of inherited traits, numerous scholars throughout the social sciences have argued for the importance of “biosocial” approaches to human communication and behavior (Floyd & Afifi, 2011). Adopting a biosocial lens requires interpersonal scholars to employ interdisciplinary knowledge of human social and biological systems to better understand how their dynamic interplay affects communicative and behavioral outcomes. Despite having extensive knowledge about both biological and social processes independently, little is known about how these systems interact. Relatively recently, resistance toward adopting dynamic biosocial models has waned, replacing both outright opposition and overly simplistic biologically deterministic models (Booth, Carver, & Granger, 2000; Floyd & Afifi, 2011).

Shifting paradigms in individual differences research are now converging on biosocial models, suggesting that individual differences (genetics, temperament, and physiology) interact with environmental influences to predict changes in behavior, emotions, attitudes, and communication over time (Cicchetti & Dawson, 2002). Previous findings connecting

neurophysiological reactivity and human behavior suggest that social situations are dynamic frameworks that yield differing behavioral outcomes when paired with similar internal bodily states (Bos et al., 2012). With regard to communication episodes, numerous biosocial models exist to explain outcomes, such as gender roles (Wood & Eagly, 2012), dominance/submission (Mazur, 1985), and inclusion/exclusion (e.g. Dickerson, Gruenewald, & Kemeny, 2004).

Regarding power, Mazur (1985) proposed a theoretical biosocial model for understanding status negotiation and differentiation in human and nonhuman primate groups through face-to-face interaction. Mazur's biosocial status model suggests that social cues within dyads directly affect the short-term and long-term physiological responsiveness of both members. Mazur (1985) describes status negotiation as a contest, where one or both interactants attempt to induce unnaturally high stress levels in the other. This reciprocal stress production process, conveyed through actions or words, is maintained until one can no longer withstand the stress and decides to accept the other's assertion of how the hierarchy should be structured. This acceptance reduces the stress felt by both members because continuity has been restored. The individual, whom gives in to the stress, will then be regarded by both dyadic members and the surrounding community as submissive, in this context. Therefore, the dominant individual has risen above the submissive other in the social hierarchy, which allows him or her access to valuable resources no longer available to the submissive other. As a result, the dominant member should experience a surge of T, contributing to current and future dominance behavior.

Similarly, theorists have argued that humans have evolved intimacy mechanisms that are designed to detect rejection and ostracism (Leary et al., 1995; Spoor & Williams, 2007). The activation of this system is meant to cajole behavior toward restoring intimacy for the purposes of survival (Leary, 2005). Dickerson, Gruenewald, and Kemeny (2004) suggested that social-

evaluative threat (SET) arises from social situations where one is rejected, threatening one's fundamental need for intimacy and social acceptance. In response to this, stress hormones are released, which are capable of eliciting emotions and communicative/behavioral responses (Gruenewald, Dickerson, & Kemeny, 2007)

At an omnibus level, Buck (1985; 1999; 2014) has proposed developmental-interactionist theory (DIT), one of the most comprehensive biosocial meta-theories to date. This framework emphasizes the interaction between environmental influences and neurochemical systems resulting in emotional experience and rational thought. Buck (1985) suggests that individuals are reactive to numerous situational contingencies at three levels: physiological (Emotion I), display (Emotion II), and experiential (Emotion III). Environmental affective stimuli directly affect "primes" (primary motivational emotional systems), activating physiological special purpose processing systems that are necessary to maintain homeostasis in response to the contextual stimuli. The activation of homeostatic systems drive behavior and emotional displays, which have evolved to optimally negotiate social scenarios. Finally, one becomes aware of his/her internal emotional/motivational state (feelings and desires), which is then followed by appraisal to generate an appropriate coping response.

In an effort to cope with the surrounding environment, Gray (1977) suggested that the behavior of an organism is controlled by two opposing systems: the behavioral activation system (BAS) and the behavioral inhibition system (BIS). The BAS is associated with reinforcing the experience of reward by promoting approach toward any environmental stimulus with reward potential. Activation directly promotes approach toward evolutionarily valuable resources (food, shelter, sex) as well as social constructs, such as aggression and achievement that result in self-benefitting outcomes (DePue, 1995). In opposition, the BIS represents a negative feedback

system that acts to inhibit behavior that may result in negative outcomes, and is linked with vigilance, anxiety, fear, and heightened awareness of one's environment (attention to potential threats). BA and BI systems are activated and controlled through neurochemical systems, namely those associated with hedonic reward and anxiety avoidance. Terburg and van Honk (2013) have recently posited a multi-level neural framework that links the motivations of approach-avoidance with dominance-submission, suggesting that approach motivation is achieved through dominance and avoidance through submission.

Taken together, this approach suggests that “neurochemical systems constitute an irreducible essence of emotion,” serving as the basis for self and social regulation (Buck, 2014). However, Buck (2014) also suggests that in response to specific interpersonal contingencies, numerous neurochemical systems are likely to activate, forming a “cocktail” of blended emotional experience. As described in the introduction, the current work suggests that these cocktails represent the relationship between numerous contingencies experienced simultaneously, which should predict activation of the selfish-individualistic and/or prosocial-cooperative affect systems with greater accuracy than considering them individually, especially in instances that threaten evolutionary needs. As suggested by the biosocial literature, the following description will detail reactions to interpersonal power and intimacy fluctuations in a multi-level format. Acute hormonal fluctuations are vital to understanding and predicting communication outcomes, given that bodily functions shift rapidly to meet socio-environmental demands (Carré, McCormick, & Hariri, 2011), subsequently modulating communicative outcomes.

## **Interpersonal Need (Un)Fulfillment Outcomes**

The fulfillment of interpersonal needs is vital to physical and social survival, often leading the detrimental effects of negative life events to carry a greater toll for individual well-being than positive events (Rook, 1984). The following discussion describes the physiological, emotional, cognitive, and behavioral outcomes of interest with regard to power and intimacy need (un)fulfillment.

### **Triumph-Defeat**

Triumph and defeat are bipolar outcomes of socially comparative competitive events, closely linked with success/failure and dominance/submission, which serve to modulate the implicit social hierarchy. Conspecifics are consistently ranked, resulting in elevated (dominant) members being privileged in comparison to others (Mazur, 1985). Those who are considered dominant are often afforded authority, autonomy, prestige, and access to both financial and nutritional resources, due to success in a competitive confrontation (Kemper, 1990). Dominance is closely related to Kemper's (1990) concept of "eminence" where one is afforded increased social rank due to an accomplishment that is socially valued (p. 28). Therefore, one that accomplishes something socially valued through competitive confrontation should be guaranteed elevation. Once established, dominance hierarchies remain relatively stable and become socially normative, barring challenges from those in the lower strata (Mazur, 1985).

The characteristics of dominance contests are fairly consistent across species. Namely, dominance is conveyed through physical attributes, such as maleness, health, strength, size, and/or being closely associated with others who are endowed with similarly valuable social characteristics (Mazur, 1985). However, as species advance, the diversity of activities that are considered to signal dominance becomes increasingly varied and complex (Mazur, 1985). For

instance, while a bear may rise up on its hind legs and roar to display relative supremacy, a human may simply display elevated intelligence, credentials, or access to socially constructed valuables (e.g. currency, precious stones/metals, advanced technologies). Similarly, dominance is a highly contextual social construct, varying based on one's social environmental surroundings and interaction patterns at any given time. One who enjoys familial dominance by controlling resource allocation may in fact be the least dominant member of his/her workplace. These two contexts should lead to starkly different interaction patterns that contribute to the perception and allocation of dominance attributions accordingly. Hence, while the various social strata individuals are imbedded within may be reciprocally influential, all situations should be conceptualized as unique, contributing to self-concept both individually and conjointly.

**Manipulating triumph/defeat.** The vast majority of human behavior is infused with the subtle negotiation of dominance and submission, relatively rarely involving the infliction of harm (Bos et al., 2012; Mazur & Booth, 1998). Yet, with subtlety comes increased perceptual variability regarding power alteration. In order to avoid this issue, studies that manipulate triumph generally do so using tasks that have clear, objective, measureable outcomes (Mazur & Lamb, 1980). Similarly, the competitive episode should be sufficiently salient to the individual involved and success/failure must be perceived to have been due to his or her own efforts (Mazur & Lamb, 1980; van Anders & Watson, 2006). With regard to naturalistic field studies, this is usually achieved through game-based challenges. For instance, numerous studies have been conducted using sports competitions (See Archer, 2006), cognitive interpersonal challenges such as playing chess (Mazur et al., 1992), along with a varied host of others paradigms.

However, actual performance is likely a less important predictor than performance feedback. Simply perceiving that one has won, regardless of actual performance, has been shown



to result in hormonal changes commensurate with winning (Mehta & Josephs, 2006), which is argued to result from an increased perception of self-competence (Gladue, Boechler, & McCaul, 1989). Research examining success/failure often provide performance feedback to players, which may or may not represent their actual performance. Interestingly, participants reliably believe manipulated performance feedback messages (Lammers et al., 2012; McGloin, Hull, & Christensen, 2015). In fact, some claim that performance feedback is the single most important piece of information during socially comparative challenges (Velez, 2012), given that it is a marker of relative status (Mehta, Jones, & Josephs, 2008).

Power manipulations through task completion are suggested to work much the same way as being primed or given powerful roles to enact. The experience of power, broadly defined, should activate communicative and behavioral tendencies commensurate with past experiences (Bargh, 1997). For instance, simply writing about a past experience where one was power(ful/less) has been shown to engage power based cognitive processing (Galinsky et al., 2003; Smith & Trope, 2006).

In alignment with the historical trend of using manipulated feedback messages to elicit psychological states, the current study utilizes a deception-based performance feedback paradigm to manipulate triumph/defeat. The *perception* of one's performance has been shown to affect a wide array of self-reactive outcomes. Regardless of context, the end of every competitive interaction episode there are two possibilities, each individuals can either gain or lose power (Kemper, 1990). Finally, past research indicates that males and females are equally competitive regarding social stance (Cashdan, 1998), with few exceptions. Therefore, men and women are expected to perceive and react to social victory similarly, especially given the lack of adequate research on females (Kivlighan et al., 2005).

**Hormonal outcomes.** In accord with the assumptions of biosocial evolutionary perspectives, Wingfield, Hegner, Dufty, and Ball (1990) proposed what is known as “the challenge hypothesis” to account for physiological changes that occur when faced with conspecific social-emotional competition. Originally applied to the behavior of monogamous birds during mating season, Wingfield et al. (1990) suggested that socially contextual events lead to in a rise of hormones that support aggression and competitive behavior. Specifically, social challenges that involve the negotiation of attaining scarce resources, especially those that involve reproduction and sexual selection, directly increase T levels. The increase of T was suggested to drive avian species to behave dominantly by collecting and protecting scarce resources such as territory, food, and mating partners (Wingfield et al., 2000).

T is often considered the most important human androgen due to its deterministic influence on the development of primary sex characteristics (e.g. internal and external sex organs) and the maintenance of secondary male sex characteristics (e.g. facial hair) (Andersen, Alvarenga, Mazaro-Costa, Hachul, & Tufik, 2011). Despite these characteristics developing early in life, T remains important across the lifespan. T production is managed by the hypothalamic-pituitary-gonadal (HPG) axis, which is comprised of the joint functioning of the hypothalamus, pituitary, and gonadal glands. This axis plays an integral role in the regulation of reproductive hormonal systems, which hold widespread implications for general body functioning. Steroid hormones are responsible for sex differences, not due to the class of hormone produced, but the sheer amount (Wallen & Hassett, 2009). Despite males being the most common subjects for studies concerning T, it is important to note that even small changes can have profound effects (Wallen & Hassett, 2009).

At its core, the patterns of physiological responsiveness claimed by Wingfield et al., (1990; 2000) to affect avian species may be applied to nearly all mammals (Archer, 2006). Of utmost relevance for the application of the challenge hypothesis to humans, Muller and Wrangham (2004) assessed chimpanzees, finding that male status and proximity to females with proven fertility increased T levels. Interestingly, the effects of female state-fertility on human males has also been found to have direct effects on behavior, such that men are more economically generous toward women during times of peak fertility (Miller, Tybur, & Jordan, 2007). However, Archer (2006) suggests that an application of the challenge hypothesis to the inherently more complex social structure of humans requires some extensions of the basic principles.

Archer (2006) proposes three important hypotheses for human challenge hypothesis functioning. First, humans do not have a specified breeding season, therefore eliminating the need for increased T to directly result in increased aggression. Species that have mating seasons experience more sexual scarcity than those who do not, leading mating seasons to be a time for immense competition and rewarding the use of force. Simply beginning puberty and experiencing elevated T levels does not automatically induce aggressiveness in humans (Rowe, Maughan, Wothman, Costello, & Angold, 2004; Vermeersch et al., 2008a, 2008b). Second, the range of situations that affect physiology should be extended to any type of competitive scenario (sexual or otherwise) that threatens one's social image (Mazur, 1983). Damaging one's honor or reputation may adversely affect the ability for one to have sexual encounters from desirable mates and also reduce the likelihood of attaining resources, especially economically. Third, an increase in aggression from T may result in disputes over sexual partners or resources when they are of high personal salience.

Throughout the literature, experimental manipulations have been shown to significantly modulate endogenous T levels (van Anders & Watson, 2006). Status changes have direct effects on hormonal outcomes (Kemper, 1990; Mazur, 1985; Mazur & Lamb, 1980). Specifically, T has been shown to be reactive to episodes of social challenge, such as winning and losing competitive interactions. The preferred way of assessing this is through sporting competition (Bateup, Booth, Shirtcliff, & Granger, 2002; Booth, Shelley, Mazur, Tharp, & Kittok, 1989). However, status alterations need not involve actual physical exertion to elicit T. Winning cognitive challenges such as chess competitions have been found to elicit significant T increases (Mazur et al., 1992). Individuals watching videos of their previous victories have also been shown to result in increased T (Carré & Putnam, 2010). In fact, T is even reactive to the vicarious experience of sports fans. Both basketball and soccer fans who supported the winning team experienced significant increases in T, while a decrease in T was found for those who lost (Bernhardt et al., 1998). Further supporting the linkage between socially revered success and T, Mazur and Lamb (1980) found T increases the day following a man's official conferral of a medical degree (M.D.).

The common thread among all of these instances is the level to which the competition is salient and participants were invested. T findings are suggested to react to "ability-oriented" as opposed to "chance-oriented" competition outcomes (van Anders & Watson, 2006). Essentially, competitors must perceive their effort to be the cause for success in order for T to rise (Archer, 2006). While there are exceptions to this (McCaul, Gladue, & Joppa, 1992), sufficient evidence remains to claim a trend toward a personal-investment effect. Similarly, challenges that matter more to individuals are found to elevate T more so than those less salient, such as that found by Neave and Wolfson (2003) regarding home versus away sporting events.

Athletic competitions have frequently been used as a paradigm for assessing status effects on hormonal reactions due to the indisputable nature of quantifiable scores (Booth et al., 1989). Results borne out of this paradigm are mixed, but tend to generally support the notion that competitive success leads to elevated levels of T compared to pre-competition levels (see van Anders & Watson, 2006, for reviews). One of the major arguments against the athletic paradigm is that the nature of the physical exertion involved may act as a confounding variable. In response to this, many have used cognitive competitions as will be used in the current study. Together, given past research, it is assumed that those who experience triumph will experience a boost of endogenous T.

**Emotional outcomes.** Power levels have been suggested to directly affect emotional outcomes and the expectancy of emotional outcomes in social situations (Kemper, 1991; Tiedens, Ellsworth, & Mesquita, 2000). Kemper (1991) argued that, if given the power/intimacy outcomes of a situation, one should be able to predict the emotion experienced by group members with relative accuracy. Extensive research supports this claim, indicating that winning has a direct effect on mood, such that, winners report being in a better mood than losers following competition (less anxious, depressed and hostile) (Booth et al., 1989; McCaul et al., 1992). This finding has been replicated numerous times: pleasant emotions resulting from winning as opposed to losing a competitive rugby challenge (Wilson & Kerr, 1999); success at table tennis led players to be more satisfied, proud, confident, and grateful, while those that lost more angry, depressed, and feeling incompetent (McAuley, Russell, & Gross, 1983); and winners reporting positive affect following cognitive challenges as well, such as following a dyadic number tracking competition (Mehta & Josephs, 2006).

Keltner et al. (2003) suggested that, due to BAS activation, elevated power levels should result in increased positive affect and mood. Similarly, reduced power via BIS activation should result in negative mood and affect. Numerous studies have shown that elevated power is related to the experience and display of positive mood, amusement, enthusiasm, happiness, and pleasure. However, individuals of low power experience and display negative mood, guilt, depression, anxiety, embarrassment, fear, sadness, and shame (see Keltner et al., 2003 for a review). Using a two-dimensional interpersonal/relational framework similar to the current study, Kemper (1991) suggested that gaining power results in happiness and power loss results in fear. Moreover, Tiedens et al. (2000) found that emotional expectancies for individuals of differing power levels (status and skill) also vary. Using vignettes featuring negative outcomes, Tiedens and colleagues found that high-status characters were more likely to be perceived as angry and proud than low-status characters by a third party. Also, those of low-status were thought to experience more guilt, sadness, and appreciation than high-status individuals.

H1a: Triumph will predict positive mood state.

In an effort to organize past results, Buck (2014) proposed an ecological-systems theory of social and moral emotions, predicated on the combination of attachment needs and social environmental contingencies. Interpersonal contingencies are defined as “specific combinations of circumstances ecologically existent in the social-interaction environment with implications for the comparative well-being of self and others” (Buck, 2014). Attachment motives involve the need to be loved by others and the need to exceed expectations (Buck, 1988). Succeeding or failing to satisfy these needs result in strong self-conscious emotions (Lewis, 1993) that cajole behavioral outcomes based on one’s attribution of self with relation to others and social standards.

***Social emotions.*** Social emotions are predispositions to respond to social environmental stimuli for the purposes of developing and maintaining social structure. Given that these emotions are “social,” they exist in relation to other conspecifics. Humans do not feel ashamed or envious in a vacuum, these emotions (along with other social emotions) are experienced with respect to others. Individuals experience shame if they believe they are perceived to be a bad person, just as envy is experienced when a comparison other is perceived to have some (in) tangible resource that one would like to also have, but does not.

Social emotions belong to a family of “self-conscious emotions” (Lewis, 1993) that require lived experience to appropriately interpret as they exist in relation to social standards and expectations (Tangney, 1999). These emotions exist at two levels of abstraction: evaluating one’s behavior and holistically evaluating one’s self (i.e. behaving good/bad vs. being a good/bad person). Buck’s ecological systems theory of emotions encompasses both, considering emotions related to one’s behavior as situation specific (exceeding social expectations), whereas holistic evaluation is based in the need to be loved (Buck, 1988). Essentially, emotions are elicited because individuals care about how others perceive their relative competence and the degree to which others want to form social relationships.

As such, and in alignment with the previously described results, Buck (2014) argues that when an individual succeeds at exceeding expectations, s/he should experience pride toward the self and pity toward the comparison other. Alternatively, one who fails to competitively exceed expectations with a comparison other should experience guilt toward self and envy toward the other.

H1b: Triumph will positively predict the emotional experience of self-pride.

H1c: Triumph will positively predict the emotional experience of other-pity.

H1d: Triumph will negatively predict the emotional experience of self-guilt.

H1e: Triumph will negatively predict the emotional experience of other-envy.

***Moral emotions.*** Moral emotions are less understood (dis)gust mechanisms acting as a motivational force, provoking action to maintain an optimal distribution of justice for all. Moral emotions can be used as interpersonal equalizers, punishing others for poor performance/behavior and inducing compensatory action to restore relational status (Baumeister, Stillwell, & Heatherton, 1994). Overall, these emotions allow for interpersonal problems to be addressed for the betterment of dyadic and group functioning, substantively enabling “social survival” (Kim, Thibodeau, & Jorgensen, 2011, p. 69). Based in the ecological systems theory, moral emotions analogous to the previously described social emotion (i.e. triumph, humiliation, admiration, contempt) exist, but differ in their contingency underpinnings, such that they are based in relative comparisons of fairness.

Given the identical logic of the previously described social emotions, moral emotional outcomes should function accordingly: When an individual succeeds at exceeding expectations, s/he should experience triumph toward the self and contempt toward the comparison other. Alternatively, one who fails to competitively exceed expectations with a comparison other should experience humiliation toward self and admiration toward the other.

H1f: Triumph will positively predict the emotional experience of self-triumph.

H1g: Triumph will positively predict the emotional experience of other-contempt.

H1h: Triumph will negatively predict the emotional experience of self-humiliation.

H1i: Triumph will negatively predict the emotional experience of other-admiration.

The overarching implication of power attainment via these experiences can best be understood through the broaden-and-build theory (BBT) of positive emotions (Fredrickson,



1998, 2001). BBT suggests that the experience of positive emotion broadens the thought-action repertoire of an individual, subsequently leading to the pursuit of creative thought allowing for one to gain resources (e.g. tangible, social, and intellectual). Therefore, the experience of positive outcomes associated with power are likely to be self-reinforcing, enabling power attainment to instigate future challenges that allow power to be continually compounded. Emotional outcomes associated with (un)successful power attainment will be discussed in more detail later.

**Cognitive outcomes.** Power (or lack thereof) has been shown to directly affect the way that individuals perceive and interact with others (Fiske, 1993, Gruenfeld, Inesi, Magee, & Galinsky, 2008) and generally interpret themselves as well as the social environment (Keltner et al., 2003). At the core of power perception is a distancing effect, where individuals who enjoy elevated power levels perceive themselves as psychologically distant (less close and independent) from their surrounding social group (Lammers, et al., 2010; Smith & Trope, 2006). Previous theorizing concerning the connection between power and information processing has generated two models that support this distancing effect: “power as control” (PAC; Fiske, 1993) and the “approach/inhibition theory of power” (Keltner et al., 2003). The PAC model suggests that people with elevated power are likely to stereotype less powerful others, grouping them together under a common category representing low power. Keltner et al. (2003) argued that this effect is due to the activation of the BAS and BIS systems. Elevated perceived power levels should activate the BAS, which directs behavioral action toward rewards, whereas lower power activates the BIS, orienting attention and behavior toward dealing with potential threats. Together, the distancing effect of power indicates that those with higher power should be less inhibited and view their environment as stereotypically less threatening, while those with lower

power will experience the opposite perceptual effect. Essentially, this should engage an automaticity effect (Bargh, 1994; 1997), where power reduces the effort devoted to attending to environmental stimuli (Smith & Trope, 2006), except for threat cues. Previous research indicates that testosterone is correlated with increased sensitivity to social threats from surrounding others (i.e. vigilance) (Archer, 2006; Bos, Terberg, van Honk, & McEwen, 2010; van Honk et al., 2011; Van Wingen et al., 2009). Vigilance is important for fending off physical and social attacks from others, which are likely to occur following hierarchical shifts. Based on the previous findings, one who experiences triumph/defeat should perceive themselves as well as social environmental others differently than before the competitive event.

***Self-esteem.*** Self-esteem is generally defined as an evaluative component of self-concept (Rosenberg, 1965). Success and achievement are inherently linked to how one perceives the self in relation to others. Leary (2005) proposed the sociometer theory of self-esteem as a way of understanding the dynamics between social events and self-esteem. He posited that self-esteem works as a gauge, similar to a fuel gauge on a motor vehicle. When an individual receives negative feedback during social interactions, self-esteem should fall and their sociometer should indicate social risk. Traditionally, the sociometer perspective has been applied to interpersonal rejection; yet, Kirkpatrick and Ellis (2001) argued that individuals have numerous sociometers, including one that is sensitive to relative status. This relationship also aligns with predictions made by belief systems theory, which will be detailed later. Therefore, the relationship between task performance and self-esteem should be positive.

H2: Triumph will positively predict state-self esteem.

***Competence.*** Competence is defined as the degree to which an individual is able to complete tasks well due to specialized intelligence, skills, or expertise (McCroskey & Teven,

1999). Proficiently completing tasks should raise one's level of self-perceived competence. Deci & Ryan (1985) posited that competence is a primary need and acts as a driver for intrinsic motivation, which determines future behavior. Therefore, as the perception of one's competence increases, so should their confidence in engaging in a similar task again.

Based on the previous description of hormonal outcomes, winning or being successful in comparison to others has been shown to result in elevated levels of endogenous T. Previous research has found that increases in T resulting from social success increases an individual's willingness to engage in future competitive events (Carré & McCormick, 2008; Gleason, Fuxjager, Oyegbile, & Marler, 2009; Mazur & Booth, 1998; Mehta & Josephs, 2006). Essentially, triumph activates the BAS, resulting in future approach behavior focused on continually obtaining rewards. Previous research also suggests that individuals who succeed generally report having a more positive self-concept and are more likely to embody desirable personality traits (Kassarjian, 1963). Given that competence is a socially comparative construct, one's belief concerning self-competence should be negatively related to the belief of another's competence. In other words, as one's perception of self-competence increases in a competitive domain, the perception of other's competence should reduce. If this did not occur, a state of uncomfortable dissonance may arise (Festinger, 1954).

H3: Triumph will positively predict confidence.

H4: Self-confidence will negatively predict the perceived competence of others.

Furthermore, feeling positively about one's self has been shown to be an effective buffer against feelings of anxiety. Extensive research on child development suggests that children associate being perceived as good with positivity and security, while bad behavior results in anxiety (Sullivan, 1953). Greenberg et al. (1992) found that receiving positive false feedback

about one's personality deadened the impact of an anxiety producing video at both the self-report and physiological (skin conductance) levels. The notion that positive feelings toward self buffer against anxiety is also noted in the study of terror management theory. Therefore, it is hypothesized that:

H5: Triumph will negatively predict anxiety.

***Trustworthiness.*** Dating back to Hovland, Janis, & Kelley (1953), trustworthiness has been considered a primary element of ethos perception. Trustworthiness is generally defined as one's character, honesty, and reliability (McCroskey & Teven, 1999). Those who are considered trustworthy behave in relatively predictable ways and can be turned to at times of personal weakness for support. Interestingly, social success and subsequent T release has been shown to have interesting effects on trustworthiness perception. Bos et al. (2010) argue that T functions as an adaptive mechanism to increase vigilance and reduce the degree to which one trusts others. Acting in opposition to the peptide hormone Oxytocin, Bos and colleagues found that exogenously administered T reduced the degree to which individuals perceived others in photographs to be trustworthy.

From an evolutionary perspective, interpersonal trust is a risky proposition, leaving those who trust others to be more susceptible to betrayal. Furthermore, those who attain elevated social rank are more likely to be engaged in future rank challenges by others (Goyman & Wingfield, 2004). Therefore, vigilance and reduced trustworthiness act adaptively to protect the resources that one has already attained, while also using the increased surveillance to be prepared for other forms of social attack. van Honk et al. (1999) concur with this idea, arguing that T increases selective attention to threat. These findings are further supported by fMRI data that indicated T administration increased female amygdala activity when viewing emotional faces. Given that

emotional displays are the primary mechanisms through which threat is communicated it is not surprising that T “strengthens neural responsiveness toward emotional stimuli, and even more towards stimuli with specific emotionally salient features,” (see Bos et al., 2012, p. 26 for a review) especially those conveying social threat (Hermans, Ramsey, & van Honk, 2008).

H6: Triumph will negatively predict the perceived trustworthiness of others.

**Behavioral outcomes.** Across the literature, T is associated with achieving and/or maintaining elevated social status, dominance, power and/or prestige (Christiansen & Knusmann, 1987; Mazur & Booth, 1998; Tremblay et al., 1998). However, the enacted methods for achieving these outcomes vary according to situational constraints. A great body of literature suggests that elevated T increases the likelihood that one will pursue rewards with aggression. However, T has also been found to increase prosocial behavioral outcomes. In response to this disparity, Dabbs and Dabbs (2000) argued that T is generally misunderstood, stating that it is largely dependent on situational constraints, namely, one’s preexisting or subsequent relationship with others. Boksem et al. (2013) claimed that “testosterone may mediate competitive and potentially aggressive and antisocial behavior when social challenges and threats need to be confronted, but it can also induce prosocial behavior in the absence of these threats, when high status and good reputation are best served by positive behavior.” Further, Keltner et al. (2003) suggested that when one experiences elevated power, she or he tends to “construe others as a means to one’s own ends”, but “view the self as a means to other’s ends” during times of low power (p. 272). The following section will detail both aggressive and prosocial outcomes.

**Aggression.** Aggression is the intent to harm another (e.g. physically, psychologically, socially) through verbal or physical action (Leary et al., 2006), while dominance is the attempt to gain status, power, and influence. Aggression is always dominance, but dominance is not always

aggression (Mazur, 1985; Mazur & Booth, 1998). Yet, regardless of operationalization, both acts of dominance and aggression are evolutionarily beneficial, putting one's self in a place to access resources.

With that said, the connection between T and aggressive communicative/behavioral outcomes has had a long and complex past. While this relationship is often strong in many animal species (Kemper, 1990), the debate with regard to humans continues (Eisenegger, Haushofer, & Fehr, 2011). Based largely in research assessing non-human vertebrate species, T has become colloquially known as the hormone that causes aggressive and violent behavior. Substantial evidence supports a positive causal linkage between testosterone and aggression in animals (Archer, 1988). However, outcome aggression is largely modulated by past experience and directly interacts with the social environment, leaving this linkage inconclusive in primates who are more human-like (Archer, 1991; 2006). Consequently, copious amounts of research and numerous meta-analyses have been devoted to understanding the degree to which this linkage is present in humans, especially males (Archer, 1991; Archer, 2006; Archer, Graham-Kevan, & Davies, 2005; Book, Starzyk, & Quinsey, 2001). Yet, previous reviews have often contradicted each other, some stating that T facilitates aggression (Donovan, 1985; Rubin, Reinisch, & Haskett, 1981), while others are more skeptical. The variation among studies may be due to the fact that, unlike animals, human aggression can be assessed in myriad ways involving psychological, behavioral (Booth et al., 2006), and other communicative outcomes (i.e. verbal aggression).

An initial assessment of work focusing on both male and female violent and non-violent criminals revealed a general positive trend with salivary and/or plasma T levels being higher in those that enact increasingly violent crimes (See Archer, 1991 for a review). Furthermore, T

levels are frequently shown to positively correlate with various measures of self-report aggressive tendencies (Christiansen & Knussman, 1987; Dabbs, Frady, Carr, & Besch, 1987; Gladue, 1992), including verbal aggression and physical violence (Soler, Vinayak, & Quadagno, 2000). However, Archer, Birring, and Wu (1998) later found no such relationship. Even re-analyses of past meta-analytic works are not in agreement (see Archer et al., 2005). Other curious meta-analytic findings are also abound in the Archer et al. (2005) reanalysis, such as the T-aggression correlation being higher for women than men. Overall, findings generally report a small yet inconsistent T-aggression linkage. Due to widely varying study characteristics, small sample sizes, and occasional contradictory findings, the general trend should be treated as tenuous. This is likely the result of idiosyncratic situational differences. Given that T is a social hormone, context should result in variation.

More recent research suggests that the linkage between testosterone release and aggressive behavior prompted by competitive victory should be supported (Carré, Campbell, Lozoya, Goetz, & Welker, 2013). Specifically, Carré et al. (2013) found testosterone to mediate the effect of victory on behavioral aggression, supporting previous findings. On a similar note, Bos et al. (2012) claims that in instances where T is not shown to increase aggressiveness, it is likely to increase the intention and motivation to behave aggressively.

Motivation to behave aggressively has often been operationalized as willingness to engage in future competitive events. Using the point subtraction aggression paradigm (PSAP), numerous studies indicate that increases in T predict the choice to subsequently compete against others (Carré & McCormick, 2008; Mehta & Josephs, 2006). In the PSAP, aggression is more dominant than violent, operationalized as punitive point subtraction that limits the potential success of others. However, this motivation is likely only to exist when winners are given the

chance to compete against new high-status opponents. Competing against those who one has just triumphed over does not represent an opportunity for increased status (Mehta & Josephs, 2006).

Taken together, despite the range of outcomes considered and the mixed meta-analytic results, it is argued that T stemming from competitive success generally leads individuals to behave in ways that are self-serving (Zak et al., 2009). However, recent research is beginning to detect a trend toward a T-prosocial behavior linkage. These findings are described below.

***Prosocial.*** Despite being less popularly represented, some have argued that T has the potential to increase prosocial outcomes. Dabbs and Dabbs (2000) offered examples of prosocial effects by highlighting how T may be vital for public servants (e.g. firefighters, police, etc.) to aid those in danger. Similarly, others have argued that the effects of T are dependent on social context, in some instances increasing prosocial behavior and decreasing selfishness (van Honk et al., 2012). A recent experimental T administration study found that elevated T levels reduced lying in men (Wibral, Dohmen, Klingmüller, Weber, & Falk, 2012). Using a die-rolling paradigm, participants were asked to self-report their roll which directly corresponded to a monetary payout. The experiment was designed to eliminate the chance of participants being caught lying. Surprisingly, those who received exogenous T were less likely than the placebo group to engage in self-serving lies. Given that T increases approach behavior toward resource rewards, this result supports the notion that T may be associated with prosocial outcomes in certain circumstances.

Recent research has also found that T may be linked with increased cooperation, especially toward in-groups (Boksem et al., 2013; Van Honk et al., 2012; Wibral et al., 2012). Eisenegger, Naef, Snozzi, Heinrichs, and Fehr (2010) found that exogenous T lead to increased fair bargaining in an ultimatum game. Similarly, van Honk, Montoya, Bos, van Vugt, and



Terberg (2012) support this claim finding that participants who received exogenous T during a public goods game behaved more fairly.

While the evidence for the prosocial effects of T are sparse, this fresh perspective is gaining steam and continues to grow (Eisenegger, Naef, & Fehr, 2012), instigating calls for future research (Wibral et al., 2012). Eisenegger et al. (2012) claimed that future studies addressing this disparity will provide substantive fuel for furthering this interdisciplinary effort.

Taken together, the previous section described the physiological, emotional, perceptual, and behavioral outcomes associated with triumph-defeat. The following sections will perform an identical function, by linking the experience of variable intimacy (inclusion-exclusion) to each level of outcome described earlier.

### **Inclusion-Exclusion**

As described earlier, the need for affiliation with others is at the core of humanness (Baumeister & Leary, 1995). Extensive research indicates that social exclusion and interpersonal rejection have profoundly negative physiological and psychological consequences for those excluded (Maner, Miller, Schmidt, & Eckel, 2010; Leary et al., 2006; Williams, 2009). Inclusion and exclusion are synonymous with experiences of interpersonal acceptance/rejection and in/out-grouping, such that inclusion represents being accepted into a social relationship, signifying some degree of mutual respect and affection. Alternatively, those who are excluded experience differentiation from others, signifying disdain and dislike. At an even more troubling level, Bastian and Haslam (2010) found that experimental participants who had been excluded regarded themselves as less human.

Exclusion is a common form of social punishment that is omnipresent across one's lifespan. Leary (2005) considers inclusion/exclusion as bipolar opposites on a continuum of

“relational evaluation.” Those who feel they are undervalued, based on subjective perception, are likely to feel rejected and communicate/ behave accordingly; as opposed to experiencing a relationship that fulfills their need. Following Williams (2001) need threat model, Leary and Zardo (2001) suggested that ostracism simultaneously threatens belongingness, self-esteem, and control needs (intimacy and power), which drives physiological, emotional, cognitive, and behavioral action to rectify deficiency (Baumeister & Leary, 1995).

**Manipulating inclusion/exclusion.** Research on social interaction indicates that relatively minor cues are enough to result in strong inclusionary/exclusionary behavior between individuals and/or groups (Tajfel & Turner, 1985). Competitive group conflict can result in intergroup discrimination, even in situations where group membership is defined by minimal cues or in situations where no previous intergroup hostility existed (Brewer, 1979). Furthermore, Tajfel and Turner (1985) suggested that even when individuals do not explicitly know their teammates, strong intragroup allegiance exists. Research on interpersonal interaction has shown that social bonds can develop quickly, even if the connection is based solely on arbitrary distinctions (Brewer, 1979). Interestingly, these minimal cues are often all that is necessary to develop a perceived social bond (Tajfel, 1970), which often result in increased intragroup cohesion and intergroup antagonism (Tajfel & Turner, 1985).

A common manipulation of inclusion/exclusion involves a pseudo team-based online interaction known as the “Cyberball paradigm” (Williams, Cheung, & Choi, 2000). In alignment with the media equation and computers as social actors paradigm (Reeves & Nass, 1996), studies created in the Cyberball tradition find that human participants experience emotional reactions in response to a computer simulation in the same way emotions are elicited during interpersonal interaction. Specifically, participants are placed into a team with two or more computer-

generated players. The purpose of the game is to engage with one's teammates by clicking on their avatar, which results in a ball being passed back-and-forth between each player's avatar. Each time the participant receives the ball they can choose to pass the ball to any one of their teammates. In the inclusion condition, the game involves an equal number of passes to each player, signaling respect, camaraderie and affection for the participant. The exclusion condition allows the participant to begin with the ball, which he/she passes to one of the simulated-teammates, but a problem arises with regard to sharing. Once the participant has relinquished the ball, the simulated players proceed to play catch amongst themselves, thereby almost entirely excluding the participant, implicitly signaling disrespect, antagonism, and dislike.

Despite being a simple manipulation, a great number of studies indicate that this type of exclusion results in the experience of aversive physiological and emotional consequences as noted above, as well as aggressive and prosocial behavioral outcomes (Coyne, et al., 2011; Ruggieri et al., 2013). Some suggest that exclusion via Cyberball represents a "strong situation," holding powerful effects that are relatively un-moderated by individual differences (McDonald & Donnellan, 2012). Zardo, Williams, and Richardson (2004) found that even when informing experimental participants that they were playing Cyberball against computer intelligence and that the computer behavior was scripted, the aversive self-evaluative outcomes remained. Furthermore, other manipulations of exclusion have found similar results (Twenge, Baumeister, Rice, & Stucke, 2001), but focus more on future implications and disassociation from afar as opposed to real-time active rejection.

**Hormonal outcomes.** Those who have been rejected, ostracized or experienced the loss of a close relational partner often indicate that they feel physiological pain. Utilizing the Cyberball paradigm, Eisenberger, Lieberman, and Williams (2003) found that fMRI scans during

exclusionary play activated the same brain structures as those of individuals experiencing physical pain. Both social and physical pain share neurological and neurochemical systems (see Eisenberger, 2015 for a review) that place an individual in a distressful state that results from the secretion of C. Across the literature, C is considered the primary physiological response to exclusion. Often referred to as the stress hormone, C is produced and controlled by the hypothalamic-pituitary-adrenal (HPA) axis. C activation occurs in response to physical and/or psychological stress.

A great body of literature supports the notion that social-evaluative threat is strongly correlated with C secretion (e.g. Dickerson et al., 2004). In response to socially stressful situations, the HPA activates resulting in maladaptive behavioral action and emotional distress (Lundberg & Frankenhaeuser, 1980). Blackhart, Eckel, and Tice (2007) found that simply informing an experimental participant that others had chosen not to work with him/her during a group discussion was enough to elevate and maintain significantly greater C levels for up to an hour post-manipulation. Even further, some research indicates that physical presence may not even be necessary for the beneficial effects of affection. Floyd, Mikkelsen, Hesse, and Pauley (2007) found that simply imagining the affection received from a relational partner through writing, positively affects health outcomes due to C reduction. Affection received from others has a direct negative effect on stress and positively influences emotional well-being (Floyd, Hesse, & Haynes, 2007; Floyd & Riforgiate, 2009). While these effects have been substantiated, a small body of literature remains that exhibit null findings (e.g. Geniole et al., 2011; Seidel et al., 2013). Taken together, given past research, it is assumed that those who experience exclusion will experience a boost of endogenous C.

**Emotional outcomes.** MacDonald and Leary (2005) suggest that exclusion results in emotional reactions of social pain that are physiologically generated much in the same way as physical pain. Specifically, the authors argue that core physiological systems (i.e. triune brain theory) have endured across evolutionary shifts, which are responsible for the experience of both physical and social pain. Exclusion cues activate social pain threat-defense responses that are mediated by neurochemical and hormonal systems meant to indicate physical injury. Williams (1997) suggests that the emotional reactions to exclusion have the potential to be so aversive that injury due to physical violence may be preferable.

Across the literature, experiencing exclusion has been shown to result in a variety of negative emotional outcomes (Williams, 1997, 2001; Leary, Koch, & Hechenbleikner, 2001); such as anger (Buckley, Winkel, & Leary, 2004), sadness (Buckley et al., 2004), shame (Dickerson, Gruenewald, & Kemeny, 2004; 2009), hurt (Leary & Springer, 2000; MacDonald & Leary, 2005), and embarrassment. Similarly, Kemper's (1991) two-dimensional interpersonal framework described earlier, suggests that those experiencing exclusion should experience shame, anger, and sadness-depression, while those who are included should enjoy pride and happiness. The effect for anger remains even when individuals believe that they are interacting with a computerized artificial intelligence (Cyberball; Williams et al., 2000; Zardo, Williams, & Richardson, 2004). Furthermore, simply observing someone else experiencing exclusion appears to be enough of a prime to result in negative affect and perceived need threat (Wesselmann, Bagg, & Williams, 2009).

Additionally, some indicate null findings regarding this relationship. For instance, Twenge, Catanese, and Baumeister (2003) found no significant difference in self-reported anger between included and excluded participants. Some have suggested that this effect may be due to

emotional withdrawal from the interaction (Williams & Zardo, 2001). Given the anonymity involved in the Cyberball paradigm, emotional withdrawal could be an easy remedy for emotional distress stemming from social exclusion. Especially if this is the only experimental manipulation involved in a study, the lack of prior relational reality may reduce participant buy-in. Therefore, in order to increase participant emotional investment, in the present study a two-stage connection design will be employed whereby a relational reality is specified with regard to power and is followed by inclusion/exclusion.

H7a: Social exclusion will negatively predict emotional mood state.

Based on the previously established ecological-systems theory of emotion (Buck, 2014), specific social and moral emotions will be related to the degree of inclusion one experiences.

H7b: Exclusion will positively predict the emotional experience of self-shame.

H7c: Exclusion will positively predict the emotional experience of other-jealousy.

H7d: Exclusion will negatively predict the emotional experience of self-arrogance.

H7e: Exclusion will positively predict the emotional experience of other-scorn.

H7f: Exclusion will positively predict the emotional experience of self-indignation.

H7g: Exclusion will positively predict the emotional experience of other-resent.

H7h: Exclusion will negatively predict the emotional experience of self-modesty.

H7i: Exclusion will negatively predict the emotional experience of other-sympathy.

Expanding upon the previous theoretical framework, Taylor (2002) offered the tend-and-befriend (TAB) theory of emotional experience, suggesting that males and females react differently in response to stress. Taylor and colleagues suggest that stressful conditions lead to befriending activities at least as much as the traditionally considered fight/flight outcomes. Based in physiological literature, women are more likely to act prosocially and men are more likely to

become hostile following stressful social situations (Tamres, Janicki, & Helgeson, 2002; Taylor, 2002). Cyberball is considered a “strong situation,” and has been suggested to be impervious to sex/gender differences, despite this, the following hypotheses are predicted:

H8: Masculinity will positively predict hostility toward others.

H9: Masculinity will negatively predict goodwill toward others.

**Cognitive outcomes.** As a consequence of emotional reactions, rational processing of the self and other in response to rejection is likely to vary. Receiving positive or negative reactions from others affects how individuals feel about themselves, others, and the overarching relational reality that exists between the two (Buckley et al., 2004; Downey & Feldman, 1996; Williams et al., 2000). Exclusion has been found to result in numerous maladaptive self-defeating behaviors (e.g. choosing unhealthy eating options, procrastination, irrational risks) (Twenge et al., 2002). Furthermore, cognitive performance (Baumeister et al., 2002) and self-regulation (Baumeister et al., 2005) have been shown to deteriorate following exclusion. Numerous experimental studies have assessed these outcomes when dealing with rejection by strangers (see Baumeister & Leary, 1995; Leary et al., 2001; Williams, Forgas, von Hippel, 2005 for reviews). A general trend that results from being rejected is the derogation of self and others (Leary et al., 2006).

**Self-esteem.** As previously described, the traditional conceptualization of Leary’s (2005) sociometer theory was to act as a gauge that recognizes social exclusion. When an individual is excluded, one’s state self-esteem level should drop (e.g. Leary, 2006; Leary & Baumeister, 2000), resulting in reflective thought about the previous interaction and subsequent alterations to communicative actions devoted to rectifying the social problem. This effect is so pervasive that Heatherton and Polivy (1991) found social threat to reduce self-esteem, regardless of one’s trait level. In addition, several studies have found that rejection positively influences depression (e.g.

Hock & Lutz, 2001; Nolan et al., 2003), anxiety, and negatively affects self-confidence.

Together, these lead to what Baumeister (1990) described as a deconstructed state. Laboratory experiments using a variety of rejection manipulations have found these effect (e.g. Boyes, & French, 2009; Leary et al., 2001, Williams et al., 2002, Zardo et al., 2005).

H10: Exclusion will negatively predict state-self esteem.

H11: Exclusion will positively predict state-anxiety.

H12: Exclusion will negatively predict confidence.

**Competence.** When rejected, individuals are likely to derogate those who had rejected them. For instance, previous research has indicated that rejected individuals report liking their rejecters less and hold generally less favorable attitudes toward them following exclusion (Geller et al., 1974; Pepitone & Wilpizeski, 1960). However, little research has addressed this relationship.

H13: Exclusion will negatively predict the perceived competence of the others.

**Trustworthiness.** Williams et al. (2002) found those rejected to evaluate their rejecters as less honest and friendly than those included. Kramer (1994) offered an interesting framework for understanding the reduction of trust, suggesting that rejection may result in a sinister attribution error. An individual who feels they are being evaluated by another is likely to overestimate the degree to which they believe they are absorbing the others' attention. This is suggested to result in personalistic attribution leading the excluded to attribute their exclusion to the other's hostility and ill will. Given that trustworthiness is based on honesty and character, exclusion should reduce the degree to which one trusts their excluder(s) due to the anxiety that it generates.

H14: Anxiety will negatively predict the perceived trustworthiness of the others.



**Behavioral outcomes.** Much in the same way that behavioral outcomes were mixed for triumph/defeat, the behavioral outcomes associated with inclusion/exclusion are no clearer. Richman & Leary (2009) described rejection to provoke behavioral response, but the type of behavior remains the question. Some find exclusion to result in aggression via contempt and hostility held for others (e.g. Buckley et al., 2004). Warburton et al. (2006) described this type of aggression as attempts to regain control over the social situation. Alternatively, it is well documented that those excluded seek to salvage and repair relations with their excluders (see Richman & Leary, 2009), often achieved through conformity (Williams et al., 2000) or even generosity toward new potential friends (Maner, DeWall, Baumeister, & Schaller, 2007). However, others have found the opposite, suggesting that exclusion reduces prosocial behavior (Twenge, Baumeister, DeWall, Ciarocco, & Bartels, 2007). Leary et al. (2006) argued that the divide between aggressive and prosocial behavior directed at rejecters seems counterintuitive. Given that rejection implicitly communicates one's low relational evaluation of another, it seems logical that being rejected should result in prosocial communication and behavior designed to improve the rejecter's opinion of the rejected. However, as Leary et al. (2006) describe at length, antisocial outcomes are frequently engaged that act to distance one from their rejecters.

**Aggression.** Across the literature, the linkage between the experience of social exclusion and aggression is consistently present (see Gerber & Wheeler, 2009 for a review). Leary et al. (2006) suggest that interpersonal rejection is a common antecedent to aggressive outcomes. The related experience of exclusion is also directly associated with aggressive behavioral outcomes (see Leary & Quinlivan, 2006 for a review). This effect has been supported by numerous experimental paradigms, such that, those excluded are more likely than those included to subject others to excessive noise blasts (Twenge et al., 2001), disparage others through negative

evaluation (Twenge et al., 2001), and require others who dislike spicy food to consume large amounts of hot sauce after being rejected during an online chat session (Ayduk, Gyurak, & Luerssen, 2008). Aggression has also been shown to be an indiscriminant interpersonal outcome, such that it may be directed at surrounding others regardless if they were the cause of the exclusion or not (Buckley et al., 2004; Williams, 2001).

Some have suggested that experiences of rejection, exclusion, and ostracism result in ego-depletion, limiting the ability for one regulate their behavior and control inappropriate behavioral impulses (Twenge et al., 2001). Others suggested that rejection leads to aggression because it involves the cognitive derogation of the rejecters (Leary et al., 2006). A common thread across studies is that exclusion threatens the basic needs of participants, namely the needs of belongingness and control (Williams, 2001). Further investigating the threats to control, Warburton et al. (2006) found that those who were able to restore control following a socially exclusionary episode were less aggressive than those who lost further control. However, as DeBono and Muraven (2014) argue, suggesting a linkage between rejection and aggression is a misstep; the antecedent to aggression is actually caused by what rejection communicates to the individual about their identity and how they are integrated into the surrounding social sphere. Specifically, rejection is synonymous with negative relational evaluation, leading to aggression as a counter measure. Therefore, aggression should stem from how one views the other in relation to the self, not simply from being hostile alone.

***Prosocial.*** Despite acts of aggression commonly resulting from exclusion, prosocial consequents have also been noted throughout the literature (Bernstein et al., 2008; Maner et al., 2007; Williams, 2009). Specifically, those who are excluded may behave in submissive ways to increase their likelihood of being accepted, such as via conformity (Williams et al., 2000).

DeWall and Richman (2011) argued that when future social acceptance is possible, rejection may motivate behavior to strengthen the likelihood of that acceptance. For instance, Maner et al. (2007) found excluded individuals to award their rejecters more money than included individuals. However, the effect was moderated by likelihood of future reconnection, such that, those who believed they would interact with their rejecters in the future acted more prosocial than those who did not. Other research has revealed similar effects, such as Carter-Sowell, Chen, and Williams (2008) finding that experiencing ostracism increases one's compliance with requests.

Williams (2009) argued that prosocial responses to ostracism are likely dependent upon the needs that one is attempting to fortify. Prosociality should act to bolster belongingness and self-esteem, while aggression should be linked more with re-establishing control. Warburton et al. (2006) supported this argument, finding that reinstating control leads to reduced aggressiveness.

### **Power/Intimacy Interaction**

As evidenced by the previous reviews, fluctuations regarding both power and intimacy hold the potential to systemically affect those involved, spanning from physiological to behavioral outcomes. Previous research indicates that warmth (intimacy) and competence (power) lie at the core of interpersonal perceptual processes (e.g., Fiske et al., 2006). Although these two dimensions are theoretically independent of one another, interpersonal situations are composed of a complex blend of the two. Hence, recent research is beginning to examine the unique interplay of these dimensions at a basic level. Warburton et al. (2006) claimed that very little research has examined moderators of social exclusion, which may clarify the mixed behavioral outcomes evidenced earlier. Furthermore, Harris, Rushton, Hampson, and Jackson

(1996) suggested that understanding how T is linked with behavior will be challenge, given the interaction of hormones, and societal influences. This evidence suggests that, those that obtain null physiological findings (e.g. Zoller, Maroof, Weik & Deinzer, 2010), may be limited regarding the salience of their experimental designs.

Celik et al. (2013) argued that stand-alone experimental exclusion paradigms are inherently flawed, because they fail to represent the actual complexity of a rejection experience (i.e. context). Despite the methodological clarity gained by examining only one phenomenon, individuals who are excluded without reason are destined to react based solely on personality and/or the need to attribute reason (Kelley, 1973). This is further justified by the myriad outcomes listed earlier, some of which reveal contradictory results. Welker et al. (2013) specifically stated that a perception of self-supremacy followed by social exclusion may hurt even more than if one views the self in a more negative manner. This differentiation is also likely to modulate behavioral outcomes. The following literature will review the limited research regarding the proposed power-intimacy interaction at the physiological, emotional, cognitive, and behavioral levels.

**Dual-hormone hypothesis.** Expanding upon the direct effects models previously described, Mehta and Josephs (2010) suggested a revolutionary turn in the consideration of these two social phenomena: a dual-hormone hypothesis (DHH). The authors argue that inconsistent results linking T with dominance and aggression is likely due to C, suggesting that two neuroendocrine systems (HPG and HPA) interact to regulate behavior. The DHH directly aligns with the arguments of Buck (1984, 2014) that emotional reactions to stimuli are constituted by neurochemical “cocktails” each uniquely blended based on encounters with various interpersonal contingencies. This suggests that how one views the self in relation to comparison others prior to

social inclusion/exclusion, is likely to affect the way that individuals react. For example, these situations may occur in educational environments where one is excluded after performing significantly better/worse than peers on an exam. Essentially, comparative success should boost T levels, but the communicative expression of this modulation will be based on how the surrounding social system reacts (inclusion/affection or exclusion/punishing).

Despite most studies examining T and C separately as unique mediators of experience on behavioral outcomes, early hormonal studies hinted at the potential for such an interaction to exist. Dabbs, Jurkovic, and Frady (1991) discovered a trait TxC interaction when examining violent crime data, such that, T was linked with violence more strongly in those with low C than high C. They suggested the behavioral inhibition function of C limits the potential for T to affect behavior to its fullest potential. Other past research indicates that low cortisol levels and variability have been linked to aggressive and antisocial behavior in incarcerated and/or mentally ill individuals (Virkkunen, 1985; Woodmann, Hinton, & O'Neil, 1978). More recently, Popma et al. (2007) also found that C moderates the effect of T on aggressive behavior in delinquent males. Together, with Mehta and Josephs (2010) the DHH posits that a TxC interaction should exist on behavioral action, such that, elevated T levels should be positively related to dominance, but only when C is low.

Mehta and Josephs (2010) found a significant salivary TxC interaction on leadership behavior during a task with assigned leader and follower roles. Of importance is the lack of support for a three-way interaction with biological sex on dominance behavior. As argued earlier, male and female physiological systems function extremely similarly and should react in an equivalent manner when faced with specific interpersonal contingencies. Of direct relevance to the current research goals, Mehta and Josephs' reanalysis of their 2006 data set also found the

suggested interaction. Using a rigged interpersonal competition, the same interactive effect was found. Together, this suggests that T and C regulate dominance in concert with one another. Low C and high T are related to behaving dominantly, with the potential for aggression. However, when one has a high concentration of C (elevated stress) the relationship between T and dominance is either nullified or reversed (submissive behavior).

At the hormonal level, Mehta and Josephs (2010) argue that when the HPA (stress axis) is underperforming (low C), the likelihood that T will result in dominance oriented behavior increases because the physiological pathway between T and outcome behavior functions efficiently. Yet when C output is high, the effect of T on behavior is suppressed. Therefore, the HPA and HPG have mutual inhibitory effects (Vlau, 2002). Based on this research triumph/defeat is expected to interact with inclusion/exclusion on each level of interpersonal outcomes emotional, cognitive, and behavioral. These interactions will be hypothesized throughout the following three sections.

**Emotional Outcomes.** While often considered independent, the emotional outcomes described earlier exist within an interrelated system, such that receiving relative esteem and receiving relative affection are interrelated. By combining the achievement/failure to exceed expectations and the achievement/failure of being loved, along with the perspective of the self in relation to a comparison other, eight primary and distinct social-emotional experiences can be elicited and predicted (Buck, 1988; 2014). Specifically, given an interpersonal contingency, one is likely to feel the reciprocal of emotional experience toward the comparison other that he/she is feeling toward the self. Those who are proud/arrogant should pity/scorn an envious/jealous other who feels guilty/ashamed and vice versa. These emotional experiences occur naturally in a relationship based in dominance/submission (Buck, 2014). Given this framework, similar

relationships should hold true for moral emotional experiences as well, such that, those who are triumphant/modest should have sympathy/contempt for an admiring/resentful other who feels humiliation/indignation and vice-versa.

***Related evidence.*** Together this evidence suggests that the experience of triumph/defeat and inclusion/exclusion elicits a blend of primary, social, and moral emotions. In the only known study to examine a form of this interactive relationship on emotional outcomes, Welker, Oberleitner, Cain, & Carré (2013) explored the moderating role that physical posture plays for the effects of social exclusion on emotional and intrapersonal perceptual outcomes. Following the work of Carney, Cuddy, & Yap (2010), participants were instructed to hold “power poses” (upright dominant posture), which have been shown to elevate levels of state T and self-perceived power, followed by a round of Cyberball. In agreement with the dual hormone hypothesis, a Posture x Cyberball interaction was found to be significant at the physiological level across two experiments on outcome mood. Their analysis for experiment one revealed that those who held a dominant posture (high T) and were subsequently excluded (high C) reported significantly more negative mood than those who were in the dominant/inclusion condition. The dominant/exclusion condition also had significantly more negative mood than the submissive/excluded individuals. However, mood did not significantly differ between being included or excluded following a submissive pose. Beyond the interaction, it is important to note that no three-way interaction with participant sex occurred, indicating that males and females responded with similar emotional mood states following the previously described interaction of social contingencies.

Although Welker and colleagues offer preliminary insight into the emotional outcomes of consecutive interpersonal contingencies, little is gained regarding specific emotional experience.

The positive-negative mood measure includes six items that measure different domains (e.g. anger, happiness, rejection, confidence, etc.). Given the complexity of emotional experience, the operationalization of emotional outcomes as simply *generally positive* or *generally negative* is problematic. Therefore, the current study suggests that the interaction of power and intimacy related interpersonal contingencies should result in blends of the previously described social and moral emotions, explaining more variance than the conditions alone. For example, those who triumph and are subsequently excluded should experience self-pride/triumph/shame/indignation, as well as other-pity/contempt/jealousy/resentment. Therefore, in accord with Welker et al. (2013), it is hypothesized that:

H15: A power/intimacy interaction will occur, significantly predicting general emotional mood state, such that, the most positive emotional state will arise in the triumph/inclusion condition, followed by the defeat/inclusion, the defeat/exclusion, and the triumph/exclusion condition, in that order.

H16: The power/intimacy interaction will explain significantly more variation, above and beyond the main conditional effects, for each of the previously listed emotional outcomes: a) pride, b) pity, c) guilt, d) envy, e) triumph, f) contempt, g) humiliation, h) admiration, i) shame, j) jealousy, k) arrogance, l) scorn, m) indignation, n) resent, o) modesty, p) sympathy.

**Cognitive Outcomes.** No known research has assessed person perception variables, such as competence and trustworthiness, with regard to the current interaction. The direct effects of goodwill and hostility on person perception will be discussed in the following section on Belief Systems Theory. However, competence and trustworthiness are analogous to the previously



described emotional reactions and should also be influenced by the combined individual physiological effects previously described. Therefore, it is hypothesized that:

- H17. The power/intimacy interaction will significantly predict perceptions of other competence, such that, the highest ratings of other competence will be found in the defeat/exclusion condition, followed by the defeat/inclusion condition, followed by the triumph/inclusion condition, and ending at the lowest point in the triumph/exclusion condition.
- H18. The power/intimacy interaction will significantly predict perceptions of other trustworthiness, such that, the highest ratings of other trustworthiness will be found in the defeat/inclusion condition, followed by the triumph/inclusion condition, followed by the defeat/exclusion condition, and ending at the lowest point in the triumph/exclusion condition.

**Behavioral Outcomes.** A growing body of research now supports the argument that T and C collectively modulate aggressive, dominant, and antisocial behaviors (Carré & Mehta, 2011). Based in the DHH literature, aggression is specified to occur when T levels are high and C levels are low. Granted, many of these studies are assessing trait endogenous levels, newer studies that are assessing real-time fluctuations of endogenous hormones in response to interpersonal contingencies are growing (Welker et al., 2013; Geniole, Carré, & McCormick, 2011). Geniole et al. (2011) explored reactive aggression following a social exclusion manipulation (Cyberball). They found that state T fluctuations were positively related to reactive aggression in the point subtraction aggression paradigm (PSAP), however, it was stronger for those in the social inclusion condition (low C) than the social exclusion condition (high C).

Based on their analysis of trait versus state neuroendocrine predictors, they suggest that state-related fluctuations are the best predictor of aggressive responses.

Despite limited research on the combined effect of the sequential interpersonal contingencies emphasized in the current study, others have revealed interesting results in related studies. Wesselmann et al. (2010) sought to assess “unexpected rejection,” whereby confederates treated an experimental participant in either a friendly or unfriendly manner to set relational expectations. This was then followed by either an acceptance/rejection manipulation. The researchers found the traditional main effect for rejection, such that those who were rejected aggressed significantly more than those who were accepted. Wesselmann and colleagues also found the expected interaction between relational expectation and relational outcome, such that, those who were unexpectedly excluded aggressed significantly more than the other three groups. Although different from the current study, having a preconceived notion concerning the implicit social hierarchy prior to a social inclusion/exclusion experience may mimic these results. Those who believe they are superior to others should expect inclusion. Therefore, when contradicting expectations and outcomes occur (i.e. Triumph/Exclusion, Defeat/Inclusion), one may rely on an expectancy violating reward value heuristic to formulate cognitive and behavioral reactions (Burgoon, 1978; Burgoon & Hale, 1988; Burgoon & LePore, 1993).

On a similar vein, Baumeister, Bushman, and Campbell (2000) claimed that aggression often results from threatened egotism. Those that have inflated egos and are subsequently provoked in some way are likely to respond in anger (Bushman & Baumeister, 1998; Kirkpatrick, Waugh, Valencia, & Webster, 2002) with the potential for physical violence. Furthermore, DeBono and Muraven (2014) claim that being disrespected significantly mediated the effect of exclusion on outcome aggression. They found that dislike is also related to

aggression, but the effect of disrespect is far larger. Finally, Welker et al. (2014) examined the DHH finding that T is positively linked with psychopathy when C levels are also high, hinting at the potential for aggressive outbursts.

H19: The power/intimacy interaction will significantly predict a) supportive and b) aggressive behavioral outcomes above and beyond the main effects alone.

### **Belief Systems Theory**

Belief Systems Theory (BST; Hamilton, Buck, & Chory-Assad, 2004; Hamilton & Mineo, 1996, 1999; Rokeach, 1956, 1958, 1960, 1968) claims that belief systems are interconnected and fall on a continuum from central to peripheral. Central belief systems are those that represent an individual's unique personhood (i.e. physiology and personality), derived from one's interaction with the environment, holding pervasive influence on subsequent derivatives. Behavioral outcomes are suggested to be the most peripheral of BST. Within this progression, cognitive competencies along with situational contingencies (such as stressors and achievements) are suggested to influence beliefs about the self, with self-concept subsequently affecting beliefs about others.

Recent applications of BST (Hamilton, Buck, Chory, Beatty, & Patrylak, 2009), in alignment with the communibiological paradigm (Beatty et al., 2001; Beatty et al., 2009) and developmental interactionism (Buck, 1988), suggest that neurochemical systems beget selfish-individualistic (negative; SI) and prosocial-cooperative (positive; PC) affect systems, which in turn create affectively valenced communicative outcomes. Given the permanence of baseline neurochemicals, these affective systems are theorized to be foundational components for all communicative behavior. Previous meta-analytic research indicates the SI and PC systems function independently, yet also interact with one another to produce one's unique temperament

and subsequent reactions to environmental stimuli, namely interpersonal contingencies (Buck, 1999).

Based in a combination of BST and DIT, Hamilton et al. (2009) proposed processes that represent how both the SI and PC systems result in specific communicative outcomes. Each system is represented by a causal chain, which ultimately ends in aggressive or collaborative message enactment, respectively. Generally, these two streams of emotion are moderately inversely related and operate in parallel, such that “egocentrism will be inversely related to empathy, hostility inversely related to attachment, verbal aggressiveness inversely related to verbal collaborativeness, and aggressive message selection inversely related to collaborative message selection” (Hamilton et al., 2009, p. 230). The correlation between the two dimensions of the verbal aggressiveness scale (VAS; Infante & Rancer, 1982; Infante & Wigley, 1986) is generally considered large and negative (Levine, et al., 2004), which is reflective of collaborative or aggressive message enactment. Message choice ultimately depends on which system takes primacy given all factors involved.

Encountering environmental stimuli that provoke negative affect should suppress the PC causal chain, just as the provocation of positive affect should result in the opposite effect. Many contexts result in obvious outcomes, for instance, being cut-off while driving should result in aggressive message selection in the same way that being allowed to cut in line at a supermarket checkout should result in the enactment of collaborative message strategies. However, the resulting message choice becomes blurred when considering more complicated and potentially conflicting stimuli. BST is sufficiently equipped to handle conflicting situational stimuli, making it an excellent fit for the current study. The following sections will detail the major applicable

areas of BST for this study, namely, cognitive competencies, self-concept, other-concept, and the two affect systems.

### **Self-Beliefs Born from Cognitive Competencies**

According to Rokeach (1960) beliefs about the self are considered secondary primitives. Self-beliefs emerge from experience with the physical and social environment, acting to orient the self both physically and perceptually (identity and self worth). Self-perceptual beliefs are considered *zero consensus* (Rokeach, 1968), as they arise from idiosyncratic experiences and can be derived from internal and/or external sources. BST suggests that the two main experiences impacting self-beliefs are achievements and stressors. Achievements have been consistently shown to increase self-esteem, while social stressors are generally believed to have an opposing effect. BST suggests that beliefs develop from infancy to adulthood, beginning with the formation of cognitive competencies (aptitude, motivation, and activity). Cognitive competencies form the basis for self-concept development and subsequent other-concept formation. These three aspects could be thought of as a causal chain beginning with personal competencies and ending with the affective orientation one has toward others. Aptitude is the emphasis of the current study considering it most closely aligns with the construct of power and relative abilities. Self-worth is a direct function of achievement abilities. In alignment with the literature previously describing the linkage between triumph and perceived self-competence, triumphing over others should indicate relative abilities, resulting in increased self-esteem and subsequent confidence.

In a similar domain, past research using BST has also assessed the effect of significant negative life events (i.e. stressors) on perceptions of self, finding effects opposite of abilities (e.g. Hamilton, Tafoya, & Veksler, 2013). Specifically, stressors have been shown to negatively

predict self-esteem, while also positively predicting anxiety. Other past research outside the realm of BST also supports these effects. Levinson, Langer, and Rodebaugh (2013) used Cyberball as an operationalization of peer victimization, finding that the state experience is predictive of anxiety and depression better than experiences of past teasing and current relational victimization. These findings support the previous hypotheses that exclusion (i.e. stressor) will be negatively predicting of self-esteem and positively predictive of anxiety.

### **Affect Systems**

**Selfish individualistic (SI).** The SI system begins with egocentrism, the degree to which a person is self-involved, couching the perception of all situational contingencies with regard to how it relates to the self. This self-focus results in beliefs about others laden with negative affect. Egocentrism is theorized to predict aggressive behavioral action via hostility and aggressive cognition. There is evidence to suggest that the emotional state induced by social exclusion is representative of hostility (e.g. DeWall et al., 2009; Twenge et al., 2001). Past BST research suggests that there should be a large positive effect of anxiety on hostility, as hostility beliefs are initiated in response to anger.

H20: Anxiety will positively predict hostility.

H21: Hostility will positively predict behavioral aggression.

**Prosocial cooperative (PC).** The PC system begins with empathy, the ability to perceive, interpret, and prospectively understand the emotions and experiences of others. Empathy is a foundational component of communicating competently with others. Those who are empathetic hold generally positive beliefs about others, promoting collaborative behaviors. Masten et al. (2010) found that empathetic neural responses promote the prosocial treatment of others. The inability to empathize contributes to a host of negative interpersonal outcomes (Ronay & Carney,

2013). Hence, Hamilton et al. (2009) found through a reanalysis of data sets that empathy decreased verbal aggressiveness and increased verbal collaborativeness. Empathy is suggested to result in collaborative message choice via elaboration on caring (attachment) for others.

Attachment should be understood to represent a general bonding to others through processes such as social preference. Attachment represents overarching goodwill toward others that are born out of elaborations on caring.

H22: Self-confidence will positively predict goodwill toward to others.

H23: Goodwill will positively predict behavioral support.

### **Beliefs about Others**

Directly resulting from the secondary primitives (self-perceptions) and the affective systems described earlier is the concept of the “generalized other.” Growing out of self-perception are beliefs about other people, specifically, whether one will be treated well by others and also the degree to which others can be trusted (Rokeach, 1960). These outcomes are largely constructed on cognitive and emotional elaboration. BST allows for “others” to be conceptualized at various levels of abstraction. At the least differentiated level, individuals may hold beliefs about a “generalized other,” which represents a prototypical other. At the most specific level, beliefs about others can alternatively be formulated based on interpersonal interactions with others, representing a “specific other.”

Hamilton and Stewart (1993) suggested a four-variable sequence that encompasses most basic person perception processes. Specifically, they argue that perceptions of source dynamism increase perceptions of source competence, which then increases perceptions of trustworthiness, resulting in increases in liking. Individuals who are dynamic garner the attention of observers, resulting in increased attention to further messages communicated by the source. In addition,

dynamic communicators also appear to be more passionate about their messages, therefore appearing to have more credibility or competence (McGuire, 1985). Competent individuals are inherently trustworthy, based on the idea that the more skill or expertise one has, the greater the likelihood that the information they communicate is believable. The resulting attitude toward the message source is dependent on the prior sequence, such that dynamism increases perceptions of competence, which in turn directly influences perceptions of trustworthiness, and the degree to which one can be trusted primarily determines source perception (liking of the source) (Hamilton, 1997).

H24: Perceptions of other-dynamism will positively predict perceptions of other-competence.

H25: Perceptions of other-competence will positively predict perceptions of other-trustworthiness.

H26: Perceptions of other trustworthiness will positively predict other-liking.

Based in self-perception and the activation of affect systems, it is hypothesized that goodwill will have a globally positive influence on three facets of other perception: dynamism, trustworthiness, and liking.

H27: Goodwill will positively influence a) other dynamism, b) other trustworthiness, and c) liking of the other.

In direct opposition, hostility is hypothesized to have a globally negative effect on three facets of other perception: dynamism, competence, and liking.

H28: Hostility will negatively influence a) other dynamism, b) other competence, and c) liking of the other.



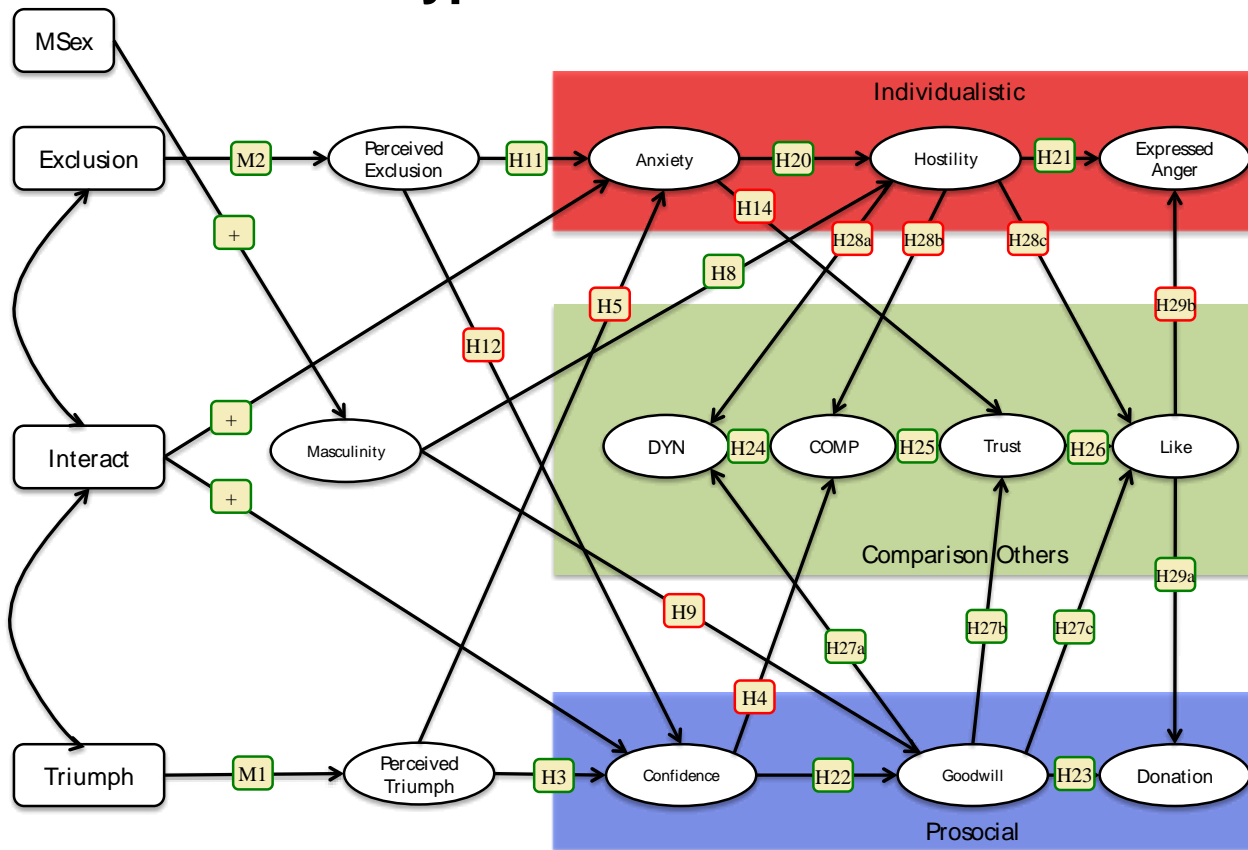
## **Behavioral Action**

The traditional communicative outcomes of BST are aggressive message choice and collaborative message choice. Hostility and goodwill have been found to predict aggression and collaboration. According to Berger (2003), evolutionarily motivated goals are achieved through social interaction. Given that humans are cognitively advanced, language is generally the vehicle through which social goals are achieved. Therefore, language (message choice) should be understood as goal driven, with the intent to either draw the self close to others or distance the self from others. The selfish individualistic affect system results in behavioral aggression, while the prosocial affect system results in behavioral support. However, the outcome is also based on the perception of the others. Given that liking is an affective reaction that acts as an attraction mechanism. It is hypothesized that liking will positively predict behavioral support and negatively predict behavioral aggression, operationalized through written interpersonal messages and willingness to offer monetary support for those in need.

H29: Other liking will a) positively predict behavioral support and b) negatively predict behavioral aggression.

Figure 1.

# Hypothesized Model



## Chapter 3: Methodology

### Participants

A power analysis was conducted using G-POWER to estimate the sample size needed to detect significant relationships between the variables of interest. Assuming an alpha of 0.05, power of 0.80, and a moderate effect size ( $f = .15$ ), the analysis revealed that the sample must consist of at least 127 participants. This closely aligns with conventional recommendations for the ratio of cases to parameters estimated, suggesting that at an absolute minimum, five cases per parameter are required (Bentler & Chou, 1987). In order to increase power, a sample that exceeded the minimum was collected.

Participants ( $N = 426$ ) were required to reside within the United States. Participants ranged in age from 18-78 ( $M = 35.97$ ,  $SD = 12.65$ ), were predominantly female (64.6%;  $n = 275$ ), Caucasian (79.2%), and had earned at least a bachelor's degree (38.9%).

Participants were solicited through an online HIT (human intelligence task) posted on Amazon's Mechanical Turk (MTurk). MTurk is an open online marketplace populated by "workers" interested in performing tasks for compensation. Given the miniscule pay offered for completing tasks, workers are generally considered to be intrinsically motivated, seeking stimulation, enjoyment, and/or distraction (Buhrmester, Kwang, & Gosling, 2011). Furthermore, level of monetary compensation has been found to have very little effect on scale alpha reliabilities (Buhrmester, 2011). The current sample was awarded monetary compensation (\$1.00; 0.75¢ plus a 0.25¢ completion bonus).

MTurk offers many benefits over traditional laboratory data collection methods. For instance, given the anonymity of participants and diverse geographical/cultural backgrounds represented, there is a low prevalence of dishonest responses and subject pool contamination, as well as the elimination of experimenter effects (Paolacci, Chandler, & Ipeirotis, 2010). Despite relinquishing some experimental control, MTurk sample responses are likely more generalizable.

## **Procedure**

Following approval from the institutional review board (IRB), a work request was placed on MTurk containing a brief description of the current study and details concerning how to participate. Once recruited, participants were forwarded to an online experiment hosted via Qualtrics (an online survey-hosting service) that asked for vital demographic information and some preliminary measures. Next, participants engaged in a power manipulation, followed by an intimacy manipulation. Both manipulations appeared to have been completed in conjunction with

three other participants. However, these “other” participants did not actually exist (computer generated). The manipulations are described in the following section with more detail.

Following the engagement with both manipulations, participants filled out post measures assessing their perceptions of self, other(s), and their affective state. After completing the measures, participants were given the opportunity to communicate with the three others. A text box appeared and the participant was prompted to address the others however they saw fit. Once their message was completed, participants were instructed to wait for a reply. The reply message contained a plea for the participant to donate some or all of their completion bonus payment (0.25¢) to one of the others. Again, the participant was then given an opportunity to respond how they saw fit.

Following the faux message exchange, each participant received a debriefing statement (See Appendix H) to explain the false feedback that was received and the deceptive practice of the Cyberball social exclusion paradigm. Furthermore they were informed that no others actually existed and that the relative comparisons were completely fictitious.

**Manipulations.** Given that the current study involves reacting to two sequential interpersonal contingencies, the ordering of these manipulations is fundamental to perceptual and behavioral outcomes. Previous research has suggested that stand-alone Cyberball manipulations may not be salient enough to elicit robust perceptual and behavioral outcomes (Welker et al., 2013) due to the lack of prior social context. If individuals feel as though their inclusion/exclusion is a random occurrence, the likelihood that the manipulation will affect participant experience and behavior is significantly diminished. Therefore, the triumph/defeat manipulation sets the stage for inclusion/exclusion to hold social significance. This ordering allows the secondary manipulation to be attributed to the pre-existing social reality, enabling

attribution to occur while also limiting misattribution. If previous performance is the only information that individuals have about their connection to others, it must be the information that is used to rationalize subsequent events.

Following from this and in conjunction with the goals of the current study, participants first engaged in a perceptual task followed by a manipulated feedback message. In order for the feedback message to be believable and evoke the perception of success/failure, the task must be sufficiently ambiguous, such that, the participant must be unable to accurately assess their performance and must rely on the feedback given to reach a self-evaluative conclusion. For this reason, a facial affect receiving ability task was utilized.

***Performance task manipulation.*** Before beginning, participants read a short description of the task they were about to engage in. The task was described to assess vital social skills. Participants were informed that success at this task is highly predictive of life success, such that those who score highly are more likely to enjoy a large income, experience fulfilling interpersonal and romantic relationships, etc. Given the evolutionary importance of power and intimacy, the prior description emphasizes that success at the task represents social supremacy (See Appendix A). These types of priming messages are common in experimental research to increase task salience (e.g. Heatherton & Vohs, 2000).

After reading the short message, participants engaged in the communication of affect receiving ability test (CARAT; Buck, 1976; 2005). The CARAT uses emotional stimuli derived from the slide-viewing technique (SVT). Originally designed to measure affective communication between rhesus monkeys (Buck, Savin, Miller, & Caul, 1972), the SVT involves showing humans emotionally loaded slides (e.g. pleasant people, unusual, etc.) while inconspicuously filming their facial affective response. As a result, short vignettes of emotional

expressiveness are recorded that can be used to assess the emotional receiving ability of others. Essentially, participants observe short video clips of individuals responding to emotionally loaded slides (See Appendix B) and guess what types of stimuli the individual in the clip is observing, what affect they are displaying, and whether their display is spontaneous (genuine) or fabricated (fake) (See Appendix C).

Following the task, the participant's true accuracy was not revealed. Participants received a manipulated feedback message indicating their performance relative to three fictitious players (See Appendix D). In the triumph condition, the participant scored much higher than the other three individuals. In the defeat condition, the participant scored much lower than the other three individuals. A large body of research has found manipulated feedback to affect perceptions of success/failure (e.g. Lammers et al., 2012; McGloin et al., 2015; Mehta & Josephs, 2006). Furthermore, meta-analysis has revealed that contrived winners and losers differ more post-manipulation with regard to T fluctuation than those that actually engage in sports competitions (Archer, 2006). The participant was informed that all individuals received the same feedback message. Therefore, the participant should believe that their affect reception ability is known to the other three individuals and vice versa.

While this manipulation differs from the traditional use of sporting competitions to operationalize success/failure, a meta-analysis conducted by van Anders and Watson (2006) found mixed results when comparing sports to hormonal outcomes. Specifically, they suggest the issues are likely due to the variety of sports used as quasi-experimental manipulations given the variance in context from sport to sport (e.g. team/individual, violent/nonviolent, duration). Furthermore, they also revealed that non-athletic paradigms have born more consistent results and suggest that the only necessity is for a participant to perceive they are engaged in an actual

competition, further justifying the current choice of manipulation. Following this, participants engaged in an intimacy manipulation.

***Intimacy interaction manipulation.*** As described in the literature review, participants engaged in Cyberball (a virtual ball-tossing game) with the three fictitious individuals that their performance task score was compared against. Abiding by the traditional administration procedures, the task was deceptively described as a session to practice mindfulness. The participant is instructed to acutely focus on the screen, imagining that they are actually playing and to consider everything from visualizing the others to considering weather (See Appendix E for full instructions). In both the inclusion and exclusion conditions, the participant began by holding the virtual ball. Once the player relinquishes the ball to another individual (clicks on another player's avatar), the manipulation begins. In the inclusion condition, the simulated players share the ball equally among themselves and the participant for approximately 165 seconds. In the exclusion condition, the participant receives three throws within the first 45 seconds, but receives no throws for the remaining 120 seconds. Once Cyberball concluded, the participant was directed to post-measures (See Appendix F for sample screenshot).

**Dependent outcomes.** Behavioral outcomes were assessed in two ways, by analyzing the messages that participants choose to send the fictitious others as well as their response to the support request. Linguistic Inquiry and Word Count (LIWC) software (Pennebaker, Booth, & Francis, 2007) was used to assess the prosocial/aggressive nature of the message content. LIWC has been acclaimed for its adaptability to assess various word categories. Essentially, this software processes text files by analyzing each word in relation to word categories (e.g. affect, cognition, etc.) and reports the percentage of content matching each word category as a percentage of the total message size. An extensive dictionary is used to categorize message

words and the coding has been shown to be reliable and valid. Second, participant responses to the support request (See Appendix G) were coded for monetary donation. Participants were given an open response field and any indications of intention to donate were coded accordingly.

## **Measures**

Given the situational nature of the current study, all of the following variables were measured at the state-level. Scales were evaluated for acceptable reliability, factor structure, and item quality using confirmatory factor analysis (CFA) (See Appendix I and J for full survey measures, items-retained, and scale descriptives).

**Triumph/defeat manipulation check.** The effectiveness of the triumph/defeat manipulation was assessed with five items taken from McGloin et al. (2015). Participants indicated their agreement with each statement on a 7-point scale (1 = *Strongly disagree*; 7 = *Strongly agree*). All items were retained and the scale was found to be reliable ( $\alpha = .98$ ). Items included statements such as: “I performed well,” “Others would be impressed with my performance,” and “Overall, my performance was poor” (reverse scored).

**Inclusion/exclusion manipulation check.** The effectiveness of the inclusion/exclusion manipulation was assessed with three items taken from Zardo et al. (2004). Participants indicated their agreement with each statement on a 7-point scale (1 = *Strongly disagree*; 7 = *Strongly agree*). All items were retained and the scale was found to be reliable ( $\alpha = .97$ ). Items included statements such as: “I was...(accepted/rejected),” and “To what extent were you included by the other participants during the game?...(not at all/a great deal).

**Self-esteem.** Self-esteem was assessed with the esteem dimension of the state-self esteem scale (Heatherton & Polivy, 1991). Participants indicated their agreement with each statement on a 7-point scale (1 = *Strongly disagree*; 7 = *Strongly agree*). All items were retained and the scale



was found to be reliable ( $\alpha = .95$ ). Items included statements such as: “I feel displeased with myself,” “I feel inferior to others at this moment,” “I feel good about myself.”

**Confidence.** Confidence was assessed with the performance dimension of the state-self esteem scale (Heatherton & Polivy, 1991). Participants indicated their agreement with each statement on a 7-point scale (1 = *Strongly disagree*; 7 = *Strongly agree*). All items were retained and the scale was found to be reliable ( $\alpha = .93$ ). Items included statements such as: “I feel confident about my abilities,” “I feel as smart as others,” and “I feel like I am not doing well.”

**Anxiety.** Anxiety was assessed with a version of the state-trait anxiety inventory (STAI; Spielberger, 1979, 1983), entitled the STAI-6 (Marteau & Bekker, 1992). Item content was modified for the purposes of this study (increased number of items to improve reliability). The measurement scale was also altered from the original four-point metric to an expanded seven-point metric. Participants indicated their agreement with each statement on a 7-point scale (1 = *Strongly disagree*; 7 = *Strongly agree*). All items were retained and the scale was found to be reliable ( $\alpha = .95$ ). Items included statements such as: “I feel...secure/relaxed/nervous/anxious.”

**Goodwill.** Goodwill was measured with a seven-point semantic differential developed by McCroskey and Teven (1999). Item wordings were altered to represent the participant’s goodwill toward the other fictitious individuals. Participants responded by selecting the option that best reflected their attitude between two bipolar opposites. One item was dropped due to poor factor loading. The scale was found to be reliable ( $\alpha = .94$ ). Items included statements such as: “I (don’t) care about the others,” “I am (not) self-centered,” and “I am (in)sensitive toward the others.”

**Hostility.** Hostility was assessed with a subscale from the Profile of Mood States Inventory (POMS; McNair, Lorr, & Droppleman, 1981). It contained 11 items measured on a 7-

point semantic differential (1 = *Not at all*; 7 = *Extremely*). Four items were dropped due to poor factor loadings. The scale was found to be reliable ( $\alpha = .94$ ). Items included statements such as: “I feel...angry/furious/annoyed/ready to fight.”

**Other Dynamism.** Other dynamism was assessed with seven items using a seven-point semantic differential scale. Participants responded by selecting the option that best reflected their attitude between two bipolar opposites. One item was dropped due to poor factor loading. The scale was found to be reliable ( $\alpha = .90$ ). Items included statements such as: “dull/charismatic,” “controlled/expressive,” and “dynamic/inactive.”

**Other Competence.** Other competence was assessed with the McCroskey and Teven (1999) seven-item competence scale on a seven point semantic differential scale. Participants responded by selecting the option that best reflected their attitude between two bipolar opposites. All items were retained and the scale was found to be reliable ( $\alpha = .95$ ). Items included statements such as: “(un)intelligent,” “(un)trained,” and “(in)expert.”

**Other Trustworthiness.** Other trustworthiness was also assessed with a six-item measure developed by McCroskey and Teven (1999). It contains six items measured on a seven point semantic differential. Participants responded by selecting the option that best reflected their attitude between two bipolar opposites. All items were retained and the scale was found to be reliable ( $\alpha = .96$ ). Items included statements such as: “(dis)honest,” “(un)trustworthy,” and “(im)moral.”

**Other Liking.** Other liking was assessed with a seven-point semantic differential using six items. Participants responded by selecting the option that best reflected their attitude between two bipolar opposites. All items were retained and the scale was found to be reliable ( $\alpha = .96$ ). Items included statements such as: “(un)pleasant,” “(un)friendly,” and “(un)likeable.”

**Emotions experienced.** Experienced emotion will be assessed with a modified version of the interpersonal emotion communication scale (IECS, Buck & Powers, 2009). Each emotion found in the results was measured with a single item, except for general mood state “GenEmo.” “Genemo” was constructed with 10 items (5 positive and 5 reverse coded negative). The scale represents an overarching positive/negative dimension. It was found to be reliable ( $\alpha = .91$ ).

## **Chapter 4: Results**

### **Manipulation Checks**

An independent samples t-test was used to assess the effectiveness of the faux performance feedback manipulation. Participants who received triumph feedback ( $M = 6.02$ ,  $SD = .73$ ) reported that they performed significantly better  $t(422) = 41.11$ ,  $p < .001$ ;  $\beta = .90$ ) than those participants who were in the defeat feedback message condition ( $M = 2.04$ ,  $SD = 1.22$ ). It was also expected that those individuals who were randomly assigned to the exclusion condition would feel more rejected than those in the inclusion condition. The results of an independent samples t-test confirmed that the intimacy manipulation was successful  $t(422) = 29.19$ ,  $p < .001$ ;  $\beta = .82$ ) as participants in the exclusion condition experienced significantly lower levels of acceptance ( $M = 2.03$ ,  $SD = 1.17$ ) compared to those in the inclusion condition ( $M = 5.68$ ,  $SD = 1.38$ ). Therefore, both of the experimental manipulations were successful. Beyond the significance levels, the mean differences were stark and the beta weights were jumbo, further substantiating the effectiveness of the manipulations.

### **Homogeneity of Experimental Conditions**

A one-way analysis of variance was conducted to assess homogeneity among conditions. Conditions did not significantly differ on any of the identifying demographic variables, such as: biological sex ( $F(3, 420) = .68$ ,  $p = .57$ ), age ( $F(3, 418) = .31$ ,  $p = .82$ ), ethnicity ( $F(3, 419) = .12$ ,

$p = .95$ ), gross income ( $F(3, 419) = .98, p = .40$ ), religious affiliation ( $F(3, 420) = .69, p = .56$ ), or attained education ( $F(3, 420) = .11, p = .96$ ). Therefore, homogeneity of conditions is assumed.

## Analyses

Hypotheses are dealt with in order, beginning with those not included in the causal model. Causal model hypotheses will be described together given their interrelated nature.

Hypothesis 1a-i predicted that the experience of triumph/defeat would significantly predict the emotional experience of the participant. For the purposes of these results, the belief of the degree to which one was successful is used as the antecedent, not the effect coded manipulation. Previous research indicates that the belief of one's success is the primary driver of perceptual effects (Archer, 2006; Heatherton & Vohs, 2000; Lammers et al., 2012; Meta & Josephs, 2006). Using the triumph/defeat manipulation check variable as the predictor, nine linear regressions were run to assess these hypotheses. The perceptual variable was standardized prior to analysis resulting in the mean becoming zero, the degree of triumph experienced being represented by positive values and the degree of perceived defeat being represented with negative values. Results are summarized in the Table 1 below.

Table 1.

### *Triumph/Defeat Linear Regression Emotional Outcomes*

Consequent	B	F	$\beta$	$R^2$	p
H1a: GenEmo	.16	31.99	.27	.07	.000*
H1b: Pride	.22	27.72	.25	.06	.000*
H1c: Pity	-.01	.04	-.01	.00	.844
H1d: Guilt	-.10	13.35	-.18	.03	.000*
H1e: Envy	-.08	6.63	-.12	.02	.010*
H1f: Triumph	.25	38.36	.29	.08	.000*
H1g: Contempt	-.05	2.45	-.08	.01	.119
H1h: Humiliate	-.14	17.99	-.20	.04	.000*
H1i: Admiring	.14	10.25	.15	.02	.001*

Note: \* denotes effect is significant at  $p < .05$

Hypotheses associated with emotions directed toward the self were all supported. The experience of triumph lead participants to feel generally positively toward the self, while defeat resulted in an opposing effect. However, the hypotheses associated with emotions directed toward others were not as successful. Specifically, the coefficients for pity and contempt were non-significant and the outcome for admiration was found to be contradictory. Triumphant over others resulted in the hypothesized negative effect on envy, yet resulted in the opposite (positive) significant outcome for admiration. Taken together, H1a-i should be considered supported for self-directed emotional experience, yet only marginally supported for other-directed emotional experience.

Hypothesis 2 predicted that triumph/defeat would significantly positively predict state self-esteem. In order to properly assess the causal influence of triumph perception on self-esteem, state self-esteem was measured both before (time one) and after (time two) the experimental manipulations. Time one and time two were then subtracted from one another to create a change score representing the self-perceptual alteration that occurred during the manipulations. A linear regression supported this hypotheses, finding that the perception of triumph was a significant predictor ( $F(1, 422) = 6.40, p < .05, \beta = .12$ ) of change in state self-esteem from time one to time two.

Based in the physiological threat literature, Hypothesis 6 predicted that triumph would negatively predict the perceived trustworthiness of the others due to the need for increased vigilance following power ascension. This effect was not supported ( $F(1, 422) = 0.53, p > .05, \beta = .01$ ), finding that triumph perception was not directly related to outward trustworthiness perception.

Hypotheses 7a-i resemble the predictions of H1a-i by suggesting that the degree to which one feels socially excluded should affect self and other directed emotional experience. Similar to before, the experience of being included/excluded is not perfectly representative of the belief that one was included/excluded. Therefore, the manipulation perception will be used as the causal antecedent, not the effect coded condition. Nine linear regressions were conducted to assess these hypotheses. The perceptual variable was again standardized prior to analysis, resulting in the mean becoming zero, the degree of exclusion experienced being represented by positive values and the degree of perceived inclusion being represented with negative values. Results are summarized in the Table 2 below.

Table 2.

<i>Exclusion/Inclusion Linear Regression Emotional Outcomes</i>					
Consequent	B	F	$\beta$	$R^2$	p
H7a: GenEmo	-.16	33.66	-.27	.07	.000*
H7b: Ashamed	.09	8.16	.14	.02	.004*
H7c: Jealousy	.05	2.48	.08	.01	.116
H7d: Arrogant	.03	1.48	.06	.00	.225
H7e: Scorn	.07	9.16	.15	.02	.003*
H7f: Indignant	.07	5.26	.11	.01	.022*
H7g: Resent	.11	12.27	.17	.03	.001*
H7h: Modesty	-.08	4.03	-.10	.01	.045*
H7i: Sympathy	-.12	8.15	-.14	.02	.005*

Note: \* denotes effect is significant at  $p < .05$

Emotional predictions associated with the degree to which each participant experienced exclusion were predominantly supported. Both emotions felt toward the self and directed toward the other were generally supported. However, H7c predicting a positive exclusion/jealousy relationship and H7d predicting a negative exclusion/arrogance relationship failed to reach traditional statistical significance standards. The effect of exclusion on jealousy was in the hypothesized direction and suggestive of a positive trend, however, the effect of exclusion on

arrogance was not significant and in opposition to the hypothesized direction. These findings are further addressed in the discussion.

Hypothesis 10 predicted that exclusion/inclusion would significantly negatively predict state self-esteem. The analyses for this hypothesis mimicked that of hypothesis 2. A linear regression supported this hypothesis, revealing that the perception of social exclusion was a significant predictor ( $F(1, 422) = 8.98, p < .05, \beta = -.14$ ) of change in state self-esteem from time one to time two.

Hypothesis 13 predicted that exclusion/inclusion would significantly negatively predict the perception of other competence. A linear regression supported this hypotheses, revealing that the perception of social exclusion was a significant predictor ( $F(1, 422) = 79.01, p < .05, \beta = -.40$ ) of the belief that the others were competent.

In accordance with the DHH, which suggests that outcomes are driven by the interaction between social experiences that affect power and intimacy, hypothesis 15 examined the interactive relationship between the experimental conditions on general emotional mood state. The results of a factorial univariate ANOVA failed to support this prediction. In agreement with results presented earlier, both triumph/defeat ( $F(1, 424) = 18.47, p < .001, \eta_p^2 = .04$ ) and exclusion/inclusion ( $F(1, 424) = 16.30, p < .001, \eta_p^2 = .04$ ) returned significant main effects. However, the interactive term was not a significant predictor ( $F(1, 424) = .118, p > .05, \eta_p^2 = .00$ ) of general emotional mood state.

Hypothesis 15 also hypothesized an ordering effect for mood state, such that, the most positive emotional state will arise in the triumph/inclusion condition, followed by the defeat/inclusion, the defeat/exclusion, and the triumph/exclusion condition, in that order. This effect was assessed with a Tukey post-hoc paired comparison. Due to the presence of a non-

significant interaction term, a post-hoc analysis revealed only marginal support for this portion of the hypothesis (See table 3 for summary). As suggested, the most positive mood was found in the triumph-inclusion condition. It was also expected that the experience of being unexpectedly excluded (triumph – exclusion) would result in the lowest emotional mood state, with defeat - inclusion resulting in a more positive emotional mood state than defeat-exclusion between the high and low ends. However, the remaining three conditions did not align as hypothesized.

Table 3.

<i>General Emotional Mood State by Condition</i>			
Condition	<i>n</i>	<i>M</i>	<i>SD</i>
Triumph - Inclusion	107	5.53 <sub>a</sub>	1.05
Defeat - Inclusion	109	4.95 <sub>b</sub>	1.37
Triumph - Exclusion	110	4.98 <sub>b</sub>	1.30
Defeat - Exclusion	98	4.49 <sub>c</sub>	1.40

*Note:* Subscripts denote significant mean differences at  $p < .05$

Hypothesis 16 suggests that an interaction will occur between experimental conditions, explaining significant variance above and beyond the main effects for each of the previously listed emotional outcomes. To test this hypothesis, an interaction term was computed by multiplying the perceptual conditions. A hierarchical regression was performed for each of the previous emotional outcomes. In the first block, the primary conditional perception antecedent was entered. Next, the influence of the secondary perceptual outcome was entered. The third block contained the computed interaction term, achieved by multiplying the two standardized perceptual outcomes. Also, a fourth block was included to account for the effect of biological sex on emotional outcomes. As previously stated, some literature argues for a no differences model, while others suggest differences exist. The application of the fourth block will address this concern. The previously described coding schemes for perceptual exogenous variables also hold true for these outcomes. Further, sex is coded male = 1, female = -1. Table 4a and 4b contain a summary of all final model results.



Table 4a.

*Hierarchical Regression Test of Conditional Interaction on Emotional Outcomes*

Consequent	Antecedent	B	$\beta$	$\Delta R^2$
Pride	Triumph/Defeat	.51	.26*	.062*
	Exclusion/Inclusion	-.36	-.18*	.095*
	Interact	.01	.00	.095
	Sex	.19	.09*	.104*
Pity	Triumph/Defeat	-.02	-.02	.000
	Exclusion/Inclusion	.06	.05	.003
	Interact	-.02	-.02	.003
	Sex	.09	.08	.010
Guilt	Triumph/Defeat	-.23	-.18*	.031*
	Exclusion/Inclusion	.10	.08	.037
	Interact	.04	.03	.037
	Sex	.12	.09	.046
Envy	Triumph/Defeat	-.20	-.13*	.015*
	Exclusion/Inclusion	.06	.04	.017
	Interact	-.04	-.03	.018
	Sex	.21	.13*	.036*
Triumph	Triumph/Defeat	.58	.30*	.083*
	Exclusion/Inclusion	-.40	-.20*	.123*
	Interact	.07	.04	.124
	Sex	.16	.08	.130
Contempt	Triumph/Defeat	-.12	-.09	.006
	Exclusion/Inclusion	.09	.07*	.011*
	Interact	-.03	-.02	.011
	Sex	.18	.13*	.028*
Humiliation	Triumph/Defeat	-.32	-.22*	.041*
	Exclusion/Inclusion	.32	.21*	.087*
	Interact	.03	.02	.088
	Sex	.08	.05	.091
Admiration	Triumph/Defeat	.33	.17*	.024*
	Exclusion/Inclusion	-.56	-.28*	.102*
	Interact	.02	.01	.102
	Sex	.17	.09	.109

Note: \* denotes effect or change is significant at  $p < .05$

Table 4b.

*Hierarchical Regression Test of Conditional Interaction on Emotional Outcomes*

Consequent	Antecedent	B	$\beta$	$\Delta R^2$
Shame	Exclusion/Inclusion	.21	.15*	.019*
	Triumph/Defeat	-.32	-.23*	.067*
	Interact	.09	.07	.071
	Sex	.12	.08	.077
Jealousy	Exclusion/Inclusion	.12	.08	.006
	Triumph/Defeat	-.20	-.13*	.022*
	Interact	-.02	-.01	.023
	Sex	.17	.11*	.034*
Arrogance	Exclusion/Inclusion	-.07	-.06	.004
	Triumph/Defeat	.57	.05	.007
	Interact	-.08	-.07	.013
	Sex	.28	.22*	.061*
Scorn	Exclusion/Inclusion	.17	.15*	.021*
	Triumph/Defeat	-.14	-.13*	.037*
	Interact	-.01	-.01	.037
	Sex	.06	.06	.041
Indignation	Exclusion/Inclusion	.15	.11*	.012*
	Triumph/Defeat	-.14	-.11*	.021*
	Interact	.09	.07	.025
	Sex	.28	.20*	.064*
Resentfulness	Exclusion/Inclusion	.27	.18*	.028*
	Triumph/Defeat	-.22	-.15*	.049*
	Interact	-.10	-.07	.055
	Sex	.04	.04	.056
Modesty	Exclusion/Inclusion	-.19	-.10*	.009*
	Triumph/Defeat	.13	.07	.015
	Interact	.03	.02	.015
	Sex	.13	.07	.020
Sympathy	Exclusion/Inclusion	-.28	-.15*	.019*
	Triumph/Defeat	.18	.09*	.028*
	Interact	.05	.03	.029
	Sex	.12	.06	.032

Note: \* denotes effect or change is significant at  $p < .05$

This hypothesis was rejected. As can be seen above, none of the emotional outcomes were significantly predicted by the interaction term. Across the results, triumph/defeat (Mean  $\beta = .15$ ) and exclusion/inclusion (Mean  $\beta = .13$ ) often have similar standardized effect sizes. Also, sex was found to have a significant predictive effect in one-third of the regression models. An interesting pattern can be found within these sex effects. Across all significant effects, males were found to be more emotionally reactive. Males appear to experience more pride/arrogance when triumphing over comparison others and more envy/jealousy when being defeated by comparison others, all of which are social emotional outcomes. Men also experienced significantly more contempt for those who failed to exceed expectations and more indignation for the self when failing to be loved, both of which are moral emotional outcomes. The implications of these results will be elaborated upon in the discussion.

Hypothesis 17 predicted that the previously suggested interaction would significantly predict perceptions of other competence. Specifically, that the highest ratings of other competence will be found in the defeat/exclusion condition, followed by the defeat/inclusion condition, followed by the triumph/inclusion condition, and ending at the lowest point in the triumph/exclusion condition. As such, this hypothesis was examined in a similar format to hypothesis 15. The results of a factorial univariate ANOVA failed to support this prediction. Both triumph/defeat ( $F(1, 424) = 9.88, p < .01, \eta_p^2 = .02$ ) and exclusion/inclusion ( $F(1, 424) = 54.34, p < .001, \eta_p^2 = .12$ ) returned significant main effects, such that other competence was higher in defeat condition than the triumph condition and higher in the inclusion condition than the exclusion condition. However, the interactive term was not a significant predictor ( $F(1, 424) = .016, p > .05, \eta_p^2 = .00$ ) of other competence.

To assess the ordering effect, a Tukey post-hoc paired comparison analysis was performed. Due to the presence of a non-significant interaction term, a post-hoc analysis revealed only marginal support for this portion of the hypothesis (See table 5 for summary). The suggested order held true for three of the conditions. Defeat-inclusion resulted in higher other competence perceptions than triumph-inclusion; and triumph-inclusion resulted in higher other competence perceptions than triumph-exclusion. However, defeat-exclusion was incorrectly predicted. Defeat-exclusion other competence perception fell between triumph-inclusion and triumph-exclusion. This result is likely due to the overwhelmingly powerful influence of the inclusion/exclusion manipulation on the perception of other competence.

Table 5.

<i>Perception of Other Competence by Condition</i>			
Condition	<i>n</i>	<i>M</i>	<i>SD</i>
Defeat - Exclusion	98	4.34 <sub>a</sub>	1.22
Defeat - Inclusion	109	5.23 <sub>b</sub>	1.20
Triumph - Inclusion	107	4.84 <sub>b</sub>	1.11
Triumph - Exclusion	110	3.98 <sub>a</sub>	1.33

*Note:* Subscripts denote significant mean differences at  $p < .05$

Hypothesis 18 mimicked hypothesis 17 with the consequent being the perception of other trustworthiness. It was hypothesized that the highest ratings of other trustworthiness will be found in the defeat/inclusion condition, followed by the triumph/inclusion condition, followed by the defeat/exclusion condition, and ending at the lowest point in the triumph/exclusion condition. The results of a factorial univariate ANOVA failed to support this prediction. Triumph/defeat ( $F(1, 424) = .001, p > .05, \eta_p^2 = .00$ ) was not found to be a significant predictor, but exclusion/inclusion ( $F(1, 424) = 66.83, p < .001, \eta_p^2 = .14$ ) did return a significant main effect, such that the others were trusted more in the inclusion condition than in the exclusion condition. However, again, the interactive term was not a significant predictor ( $F(1, 424) = .446, p > .05, \eta_p^2 = .00$ ) of other trustworthiness.

To assess the ordering effect, a Tukey post-hoc paired comparison analysis was performed. Due to the presence of a non-significant interaction term, a post-hoc analysis revealed only marginal support for this portion of the hypothesis (See table 6 for summary). As predicted, defeat-inclusion resulted in the highest perceived level of other trustworthiness followed next by the triumph inclusion condition. Although the order of these two outcomes is confirmed, the small mean difference ( $M_{\text{diff}} = .08$ ) leaves this difference to be considered trivial. The ordering to the third and fourth conditions is in opposition to the pattern suggested, yet, again, the small mean difference ( $M_{\text{diff}} = .09$ ) is not statistically meaningful. Taken together the order component of hypothesis 18 should be considered moderately supported, given that inclusion-exclusion was the major driving force as hypothesized.

Table 6.

*Perception of Other Trustworthiness by Condition*

Condition	<i>n</i>	<i>M</i>	<i>SD</i>
Defeat - Inclusion	109	4.98 <sub>a</sub>	1.41
Triumph - Inclusion	107	4.90 <sub>a</sub>	1.17
Defeat - Exclusion	98	3.85 <sub>b</sub>	1.26
Triumph - Exclusion	110	3.94 <sub>b</sub>	1.39

*Note:* Subscripts denote significant mean differences at  $p < .05$

Hypothesis 19 was concerned with the degree to which the suggested interaction was predictive of both behavioral outcomes: a) monetary support and b) expressed anger. Hierarchical regressions were performed in an identical manner to hypothesis 16. As can be seen below in Table 7, both hypothesis 19a and 19b are rejected. The interactive term did not significantly predict either the prosocial or individualistic behavioral outcome. The intimacy manipulation was the primary driver of willingness to donate. Also, females were found to be willing to donate more than their male counterparts, yet this effect was non-significant. None of the specified predictors held significant direct effects on anger expressed toward the others. As suspected, males were more likely to express anger, yet this effect is also non-significant.

Table 7.

<i>Hierarchical Regression Test of Conditional Interaction on Behavioral Outcomes</i>				
Consequent	Antecedent	B	$\beta$	$\Delta R^2$
Donation	Exclusion/Inclusion	-1.52	-.15*	.022*
	Triumph/Defeat	.62	.06	.025
	Interact	-.11	-.01	.025
	Sex	-.99	-.09	.034
Anger	Exclusion/Inclusion	.13	-.04	.002
	Triumph/Defeat	.20	.07	.007
	Interact	-.01	-.00	.007
	Sex	.17	.06	.010

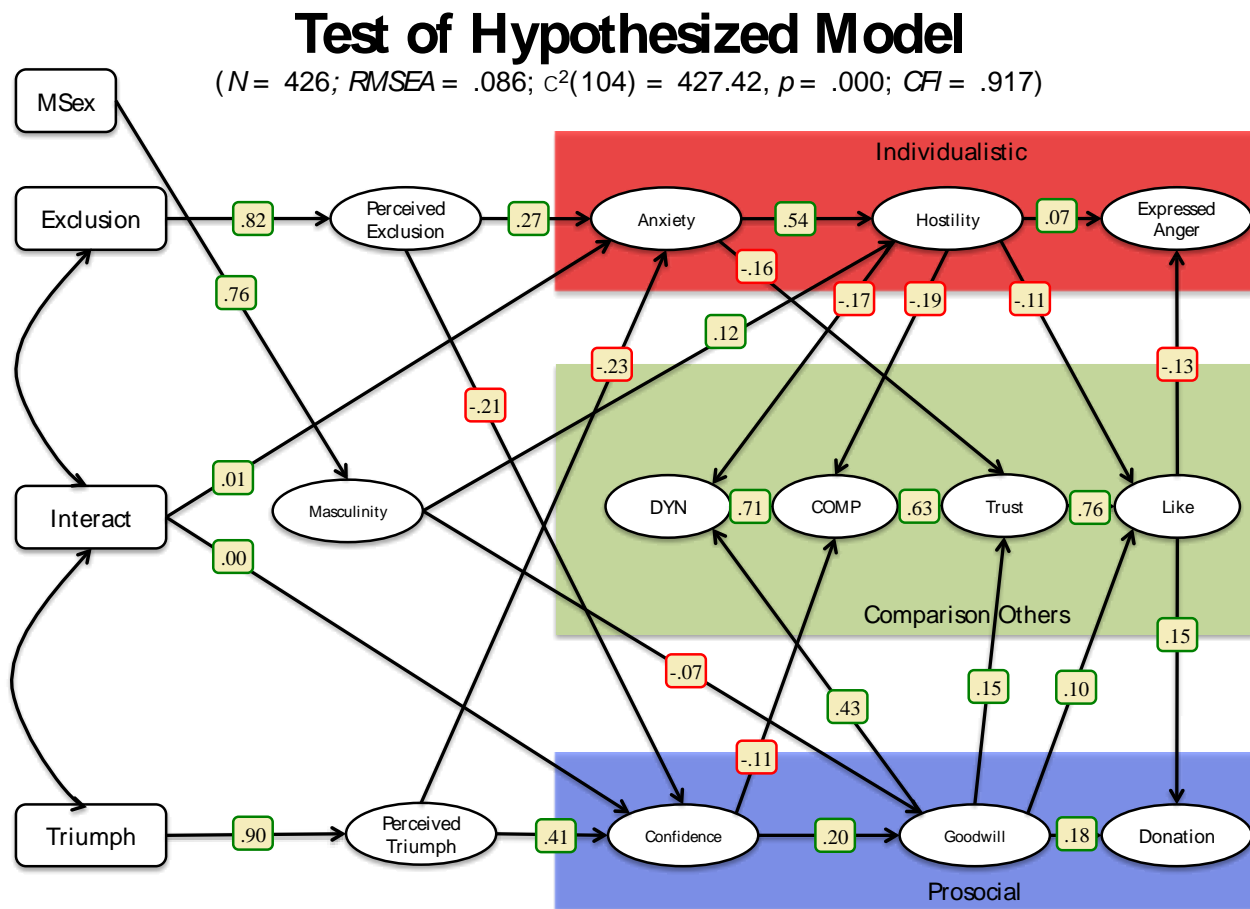
Note: \* denotes effect or change is significant at  $p < .05$

The remaining hypotheses (3-5, 8, 9, 11, 12, 14, & 20-29) were addressed with a causal model constructed using IBM SPSS AMOS v. 22. Seventeen variables were included in the initial analysis, including four exogenous variables, seven participant experience variables, four other-perception variables, and two behavioral outcome variables. Correlations among these variables can be found in appendix K. Modeling was performed systematically in the following stages: First, assessing the full hypothesized model fit; Second, adjusting by removing non-significant paths and assessing model fit; Third, adding theoretically valid paths and assessing model fit a third time; Fourth, removing non-significant paths again and assessing final model fit.

The test of the full-hypothesized model returned a model fit that did not meet traditional standards ( $N = 426$ ;  $RMSEA = .086$ ;  $\chi^2(104) = 427.42$ ,  $p = .000$ ;  $CFI = .917$ ). In order to improve model fit, path coefficients were assessed and non-significant paths were removed. Specifically, four paths were found to be non-significant, the effect of the interaction term on both of the affect system sequences (individualistic:  $\beta = .01$ ; prosocial:  $\beta = .00$ ), the effect of participant gender on goodwill (H9:  $\beta = -.07$ ), and the influence of participant hostility on expressed anger (H21:  $\beta = .07$ ). In alignment with earlier results, the interactive effect remained

null in the modeling process. Although the effects of self-reported participant gender on goodwill did not reach significance, it was in the correct direction, suggesting that feminine participants held more goodwill toward the others than masculine participants. A similar effect occurred with regard to the hostility-anger relationship. Hostility was positively predictive of expressed anger as hypothesized, yet the effect did not reach traditional standards of statistical significance. Therefore, these four paths were removed in an effort to increase model fit.

Figure 2.



The test of the reduced model returned a slightly poorer fit than the full model ( $N = 426$ ;  $RMSEA = .09$ ;  $\chi^2(94) = 415.56$ ,  $p = .000$ ;  $CFI = .917$ ), likely due to the degrees of freedom lost by eliminating an exogenous variable. In an effort to improve fit, theoretically viable

unhypothesized relationships were considered. Given the high correlations between the other-perception variables, paths were added from other-dynamism to other-trustworthiness, other-dynamism to other-liking, and other-competence to other-liking. Despite these relationships not being originally hypothesized with an eye toward parsimony, they are often present in past literature and therefore justified. With these three paths added, model fit was once again assessed, finding an adequate fit ( $N = 426$ ;  $RMSEA = .075$ ;  $\chi^2(91) = 307.54$ ,  $p = .000$ ;  $CFI = .94$ ). The effect for each of the added paths were in the correct direction and significant (other-dynamism on other-trustworthiness  $\beta = .33$ , other-dynamism on other-liking  $\beta = .22$ , and other-competence on other-liking  $\beta = .09$ ).

After achieving adequate fit, all effects were reassessed for statistical significance. After accounting for the new paths, the effects of goodwill on other-trustworthiness and other-liking were suppressed. The effect of goodwill on other-liking became non-significant (H27c:  $\beta = .04$ ) and was subsequently removed from the model. Fit was assessed for a final time, again revealing adequate fit ( $N = 426$ ;  $RMSEA = .075$ ;  $\chi^2(92) = 309.48$ ,  $p = .000$ ;  $CFI = .94$ ).

All of the remaining hypotheses were supported. The manipulation of triumph predicted the perception of triumph with a jumbo coefficient ( $\beta = .90$ ) and perceived triumph positively predicted self-confidence (H3:  $\beta = .41$ ). As hypothesized, confidence spurred prosocial affect by positively predicting goodwill toward the others (H22:  $\beta = .19$ ), which then positively predicted prosocial behavior operationalized through monetary donation to others in need (H23:  $\beta = .18$ ). With regard to the individualistic affect system, the manipulation of exclusion predicted the perception of exclusion with another jumbo coefficient ( $\beta = .82$ ). The perception of exclusion then positively predicted the experience of anxiety (H11:  $\beta = .27$ ), which then predicted the experience of hostility (H20:  $\beta = .54$ ). As mentioned earlier, the positive effect of hostility on



expressed anger was not found to be significant and was dropped from the model. Also, the perception of the manipulated conditions also negatively cross-predicted the activation of the opposing affect system sequences. Perceived triumph negatively predicted the experience of anxiety (H5:  $\beta = -.23$ ) and perceived exclusion negatively predicted the experience of self-confidence (H12:  $\beta = -.21$ ). These results substantiate the presence of individualistic and prosocial affect systems and the ability for experiential perceptions to positively/negatively engage them.

With regard to participant characteristics, male sex strongly predicted the feeling of one's masculinity ( $\beta = .76$ ). Masculinity was then predicted to positively influence hostility and negatively influence goodwill. Only hypothesis 8 was supported, finding that masculinity did significantly predict the experience of hostility toward the others ( $\beta = .10$ ).

The basic person perception process (charisma sequence, Hamilton & Stewart, 1993) was again confirmed by the current results. The perception of other dynamism positively predicted the perception of other competence (H24:  $\beta = .71$ ), other perceived competence positively predicted other trustworthiness (H25:  $\beta = .40$ ), and other perceived trustworthiness positively predicted liking the others (H26:  $\beta = .57$ ). As noted earlier, three paths were added to this sequence to account for the partial mediation that occurred.

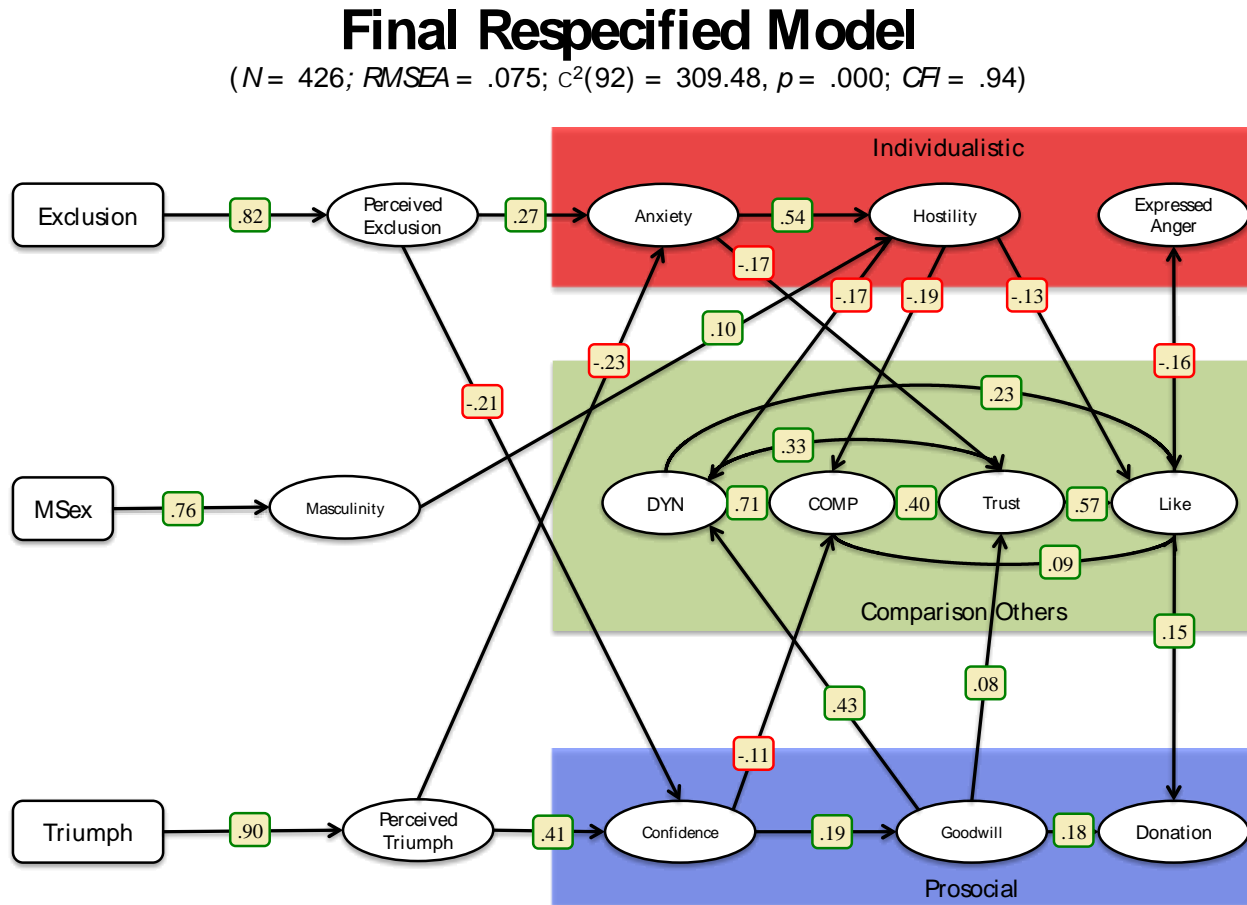
As hypothesized, the affective systems directly affected the perception of the others. The degree to which the individual felt confident was negatively predictive of beliefs about other competence (H4:  $\beta = -.11$ ). With regard to individualistic affect, anxiety negatively predicted the degree to which the participant felt s/he could trust the others (H14:  $\beta = -.17$ ). The hypothesized systemic influence of goodwill and hostility for other-perception was partially supported. With regard to hostility, all three hypotheses were confirmed, finding that it negatively influenced

perceptions of other-dynamism (H28a:  $\beta = -.17$ ), other-competence (H28b:  $\beta = -.19$ ), and other-liking (H28c:  $\beta = -.13$ ). The influence of negative affect on person perception appears to be systemically balanced, having an overarching influence not focused on any one perceptual characteristic. However, the positive effect of goodwill was more concentrated. It was hypothesized that goodwill toward the others would also have a systemic influence. Goodwill was positively predictive of other-dynamism (H27a:  $\beta = .43$ ) and other-trustworthiness (H27b:  $\beta = .08$ ). In the test of the initial model, the effect of goodwill on other-liking was positive and significant, however, the incorporation of partially mediated paths in the charisma sequence suppressed the effect of goodwill on liking to the point of non-significance. Therefore, it can be assumed that goodwill is positively related to liking others, yet was not a strong enough effect to remain in the model for the current study. In opposition to the effect of hostility, goodwill positively influenced other perception, but in a very concentrated manner. Almost the entirety of the effect can be attributed to perceiving the others as dynamic. The reasoning and implications of this finding will be addressed in the discussion.

Finally, it was hypothesized that liking the other would positively predict behavioral support by way of monetary donation and would negatively predict behavioral aggression, operationalized by expressed anger. Both hypotheses were confirmed, finding liking to positively predict support (H29a:  $\beta = .15$ ) and negatively predict expressed anger (H29b:  $\beta = -.16$ ).

Taken together, the suggested model structure predominantly held true. Manipulated experience translated directly to perceptions of actual experience, which activated competing individualistic and prosocial affect systems. This dual-process significantly affected how one perceives a comparison other, which directly translated into behavioral action. See Figure 3 below for the final respecified model.

Figure 3.



## Chapter 5: Discussion

Power and intimacy are ubiquitous and pervasive social factors, affecting individual reactivity and relational development at four levels of abstraction: hormonal, emotional, cognitive, and behavioral. The current study sought to investigate the emotional, cognitive, and behavioral outcomes associated with the manipulation of these two core dimensions. The results of the current study reveal that the main effects of each manipulation are strong and predictive of personal experience and social outcomes, yet the suggested interaction failed to reach significance. This study also confirmed the competing influence of polarized affective systems

that influence perceptual and behavioral outcomes. The following discussion will address the results of interest previously presented.

The experimental manipulations and priming/feedback messages constructed for the current study appear to have successfully altered participant perception. The predictive coefficients from exogenous experience to endogenous self-report were strong and in the hypothesized direction. On the surface, this appears to indicate that participants were willing to accept the conclusions of the performance manipulation and that they believed “others” had included/excluded them. These findings further confirm the ability for the long-standing Cyberball paradigm to successfully manipulate inclusion/exclusion. Furthermore, this study confirms the potential for using the CARAT followed by manipulated feedback messages to indicate relative success/failure.

In order to further investigate the quality of these manipulations, two post-experiment suspicion questions were included to assess the degree to which participants actually believed what had occurred. The first question addressed how real/fake the participant felt their relative ability feedback was, finding that participants who received failure feedback were more suspicious of the experience than their faux successful counterparts, yet this effect did not reach statistical significance ( $r = -.09, p > .05$ ). A similar question geared toward social interaction was also presented; asking participants to report the degree to which they believed the “others” actually existed. Again, those in the negative condition (exclusion) reported more suspicion ( $r = -.11, p < .05$ ), this time to a significant degree, than their included colleagues. Finally, one additional question assessed the participant’s prior familiarity with Cyberball, yet this question resulted in no significant effects. Together, these indicate the current manipulations were overall

successful, but that participant reports of experience may still be tainted with suspicion, which should be taken seriously by researchers, especially those using newly established manipulations.

The first grouping of hypotheses was concerned with the ability of the power manipulation to affect emotional experience. All but two of the hypotheses were supported. Among these results, an interesting pattern emerged. Participant self-directed emotional experience was accurately predicted; finding that being supplied with information showing one had triumphed over others led to a more positive general emotional experience, the elevation of pride/triumph and the reduction of experienced guilt/humiliation. However, the competitive outcome was less predictive of emotional experience directed at the other(s). Triumphant over others did accurately negatively predict envy, but positively predicted admiration.

These results are indicative of the newly established relational reality that had formed post-manipulation. When one is defeated by a comparison other, especially concerning some type of evolutionary advantage, envy is a functional response to spur goal identification and subsequent acts toward attainment. Alternatively, when one triumphs over others, envy does not serve a functional purpose for goal identification or attainment. One may want to experience the triumph again and again, but each future success achieves less and less utility. As suggested by social comparison theory (Festinger, 1954), comparing the self against optimally successful others is the most effective form of comparison. Downward social comparison only results in a false sense of security and inflated ego, which can be damning when facing future challenges.

However, in hindsight, the contradictory finding of triumph positively predicting admiration is an intuitive response. Admiring the efforts of a defeated other may act as a prosocial response to indicate respect. While competitive outcomes may be definitive, the implications that these results have for the relational reality of a dyad or grouping are not

predetermined. One who has reached social supremacy may admire the acts of lesser successful others in an attempt to preserve the relational bond (intimacy). As mentioned in the introduction, power is a distancing mechanism that can be harmful for self-preservation if exaggerated. If comparison others who are defeated coalesce, the triumphant individual could easily be overthrown by consensus. Together envy may prompt future self-competitiveness, while admiration may function to suppress future other-competitiveness via the expression and reception of respect. This differentiation is also reflective of the dual activation of individualistic and prosocial affect systems by the perception of triumph/defeat.

The power manipulation also failed to predict the experience of pity/contempt for less successful others. It may be that the manipulations were not strong enough to activate these feelings. Specifically, given the computer-mediated nature of this experiment, the participants may not have felt connected enough to attribute loss to the others. Despite priming participants with the importance of emotional detection/interpretation, this is only one indicator of personal competence. This non-significant effect aligns with the admiration finding previously discussed, in that those who are admired tend not to be pitied or held in contempt (Buck, 2014).

In a similar fashion, hypothesis 7a-i assessed the ability of the intimacy manipulation to affect emotional experience most closely associated with being loved (Buck, 2014). Again, the majority of these hypotheses were supported, finding that being excluded led individuals to experience more negative affect both toward the self and the others. Interestingly, inclusion/exclusion was not significantly predictive of arrogance felt toward the self or jealousy experienced toward the other. The lack of an effect for arrogance may simply be due to the undesirable consequences of being labeled as arrogant. However, the lack of effect for jealousy is more perplexing. It could be that the lack of knowledge about the “others” could have limited

this capacity. Specifically, the participant may not have believed any of the others were viable relational partners. Having limited interest and investment in becoming an in-group member likely limits one's capacity for jealousy when excluded.

To explore the interactive potential of the manipulations on the emotional outcomes previously discussed, each outcome was examined with an individual hierarchical regression. As witnessed within the results, the interaction term failed to predict not only emotional outcomes, but also perceptual and behavioral consequents. This study reveals that the DHH is representative of two main effects, as opposed to a multiplicative interaction. As such, the following description will concern the main effects, which are by default the appropriate level of meaningful interpretation.

Inclusion/exclusion was found to be a significant cross-predictor of many of the social/moral emotions primarily associated with exceeding competitive expectations. Specifically, positive feelings toward the self when exceeding expectations (pride/triumph) as well as self-directed humiliation when being defeated by a comparison other, and other directed admiration. Further, even when incorporating both conditions, the interaction of those conditions, and biological sex as predictors, pity could not be significantly predicted. These results also revealed that intimacy significantly predicted contempt toward the others, while triumph/defeat remained non-significant.

Similarly, triumph/defeat was also found to be a significant cross-predictor of many emotional outcomes associated with the degree to which one is loved. Namely, both manipulations were predictive of emotional outcomes related to the lack of being loved toward self (shame and indignation) and other (scorn and sympathy). However, results become less consistent when examining the success of self and other in achieving love. Specifically, modesty

was only predicted by its primary determinant (inclusion/exclusion), jealousy was only predicted by its secondary determinant (triumph/defeat), resentment toward the others was the product of both antecedents, and arrogance was not predicted by either manipulation.

Of particular interest within these results are the instances where participant sex was a significant predictor. Of the sixteen primary emotional outcomes, males experienced significantly more pride/arrogance, envy/jealousy, contempt, and indignation. These results align directly with both broaden and build (Fredrickson, 2001) and tend and befriend (Taylor, 2002) theories of emotion. TAB suggests that when males experience stress, they are more likely to become hostile focusing on goal attainment as opposed to women who emphasize prosociality directed at others. These emotional findings suggest that the twin emotions of pride/arrogance directed toward the self and envy/jealousy directed at a comparison other are more likely to be elicited in males. These emotions are oriented toward the success of self/other, such that feeling positively toward self is likely to reinforce behavior (broaden and build) while experiencing the twin emotions of envy/jealousy are likely to promote future goal attainment. Both of these outcomes are achievement oriented. Furthermore, indignation refers to feeling disrespected, which again emphasizes the male dominated response to being defeated. Finally, experiencing contempt toward the others is a response to others failing a competitive scenario perceived to be fair. Male sex predicted the experience of contempt, but not the more empathetic response of sympathy. Males are prone to experiencing selfish emotions (MacLean, 1993), which is evident in these findings.

As for the hypothesized path model, the general structure was confirmed, lending further support for belief systems theory, the charisma sequence, and the ability for the manipulated exogenous social experiences to drive this process. The detailed description found in the results



section will not be rehashed here. However, an unusually noteworthy effect is evident that requires further explanation. The effect of the primary individualistic (hostility) and prosocial (goodwill) affective components affected other perception in differing ways. Hostility held a much more global and balanced influence on other perception, directly negatively affecting dynamism, competence, and liking fairly evenly. In opposition, goodwill positively supported trustworthiness and dynamism. The opposing nature of these effects is not surprising, yet the size of the coefficients is. The effect of hostility was nearly equally distributed among the person perception outcomes, yet goodwill was nearly exclusively predictive of other dynamism.

The distribution of effect sizes may be an artifact of the study design. Given the computer-mediated nature of the faux interaction, positive affect directed toward the others may directly contribute to the willingness to believe and envision the others as “real” individuals. Humans are prone to view computers, avatars, and digital representations as social actors (Nass & Moon, 2000; Reeves & Nass, 1996). During information processing, attributions are formed of others, whether digital or corporeal. Attributions formed are contingent upon the belief that others *are* real. Therefore, believing that the others were real is the primary antecedent that allows for further attributions to be formed. This effect then fed through the person perception process resulting in behavioral action. However, it is unclear the degree to which this effect might exist outside of a mediated context. Future work should attend to the goodwill – other dynamism relationship, as it may be a valuable antecedent to consider.

Finally, as can be witnessed as a pervasive trend throughout the results, the interaction between the manipulations was not a significant predictor of outcomes. With regard to emotional and cognitive outcomes, a clear trend can be witnessed in the conditional comparisons. Generally speaking, the intimacy manipulation dominated these effects, finding that more positive affect, as

well as elevated perceptions of other competence and trustworthiness were found in the inclusion conditions as compared to the exclusion conditions. This trend was slightly modified by the manipulated power outcome for mood state, finding that triumph/inclusion resulted in the most positive mood and was significantly different from the other three conditions. However, the general trend of self and other elevation in the inclusion conditions was still present.

Furthermore, due to the lack of the specified interaction, the hypothesized rank ordering of these outcomes was also only partially supported. As for the behavioral outcomes, it was not surprising that the interaction did not directly predict these outcomes due to their presence as the outcome of a *process*. As Bos et al. (2012) found, when T is not found to increase aggressiveness, it is often found to increase the intention or motivation to aggress (hostility), which then is a positive predictor of behavioral action.

Taken together, there are some reasons why this effect may not have occurred. First, the current study is the first to examine the fluctuation of both power and intimacy at the perceptual level. The closest study to the current work is Welker et al. (2013) who asked participants to hold power poses while engaging in Cyberball. As such, exclusion was a perceptual outcome that resulted in C responsiveness, but the T manipulation was fixed, resulting in either increases or decreases in T responsiveness, which bypassed the cognitive processing of the event. The current study is more externally valid, but failed to reach the same conclusion as other recent research.

Also, many of the studies described in the literature review featured hormonal administration, which is a more direct and powerful manipulation that also does not need to be cognitively mediated. For instance, it was hypothesized that triumph would decrease the trustworthiness of others based on the relationship between administered T and facial threat recognition. This hypothesis was not supported in the current study likely due to the variation in

reactivity to the manipulations. Administration studies bypass this issue, improving internal validity, but sacrificing external validity. Meta-analysis should compare these approaches to reveal the difference in effect size for both methodologies.

## **Implications**

This study modeled a common relational occurrence that is represented across the human lifespan, being included/excluded as a result of personal performance. Although the sample of this study had a mean age of approximately 36 years, these types of experiences are also prevalent during early development. Specifically, children frequently experience adverse social consequences as a result of comparative performance (both positive and negative), depending on the surrounding social group (i.e. being included/excluded for poor/excellent comparative educational success). This study reveals that both prosocial and individualistic affect systems are activated by these experiences. The mixed behavioral results of both power attainment and intimacy fluctuation, as evidenced in the literature review, should be understood to mutually activate as a result of social experience. Conceptualizing reactions not as an either/or, but as a dual process system where one process exerts more influence to override behavioral outcomes will allow future theoretical developments to be modeled in their entirety. Understanding interpersonal relationships through this lens will be valuable for future research.

## **Limitations**

The results of the current study are intriguing and offer an informative assessment for the development of future research. However, important limitations must be noted. First, the computer-mediated nature of this study was not ideal. While conducting online research eliminates the potential for experimenter interference, a great deal of experimental control is also sacrificed. There is no way to control the environment one is embedded within while engaged in

the specified tasks. The trade-off of sacrificing internal-validity for external-validity, for better and for worse, must be acknowledged. Second, the detached nature of the “interaction” between the participant and the others likely limited the degree to which the participant experienced intense feelings. Despite mediated competition occurring regularly in the Internet age, interpersonal encounters are often more salient when occurring face-to-face. The lack of true interdependence likely suppressed the outcomes of interest. Third, the MTurk participant pool may react differently to these types of scenarios than other groups. Given that Turkers complete surveys as a primary source of income, the social isolation of doing so may lead them to seek connection with others despite experiencing exclusion. This may have dampened the anger exhibited and increased the prosocial responsiveness of participants. Future research should assess the potential for this design artifact. Fourth, given the current design, participants were asked how they felt toward the “others,” grouping them together into an out-group conglomerate. No reactions of any kind were identified for each individual “other.” Therefore, the results are assumed felt toward all others equally, despite the fact that the participant may have favored some over others. Given the complexity of the design and enormity of measures, reactions to individual members were not feasible.

Also, as noted in the discussion, the roots of this study were generated in an interdisciplinary manner. Great effort was devoted to draw linkages between physiological reactivity and behavioral action, while accounting for the intermediary layers of emotional and cognitive experience. Despite a large basis of the current study being grounded in human hormonal reactivity, this layer was not measured in the current study. The inclusion of such measures is cost, expertise, and time prohibitive. Not until collection methods become more easily accessible will large-scale studies such as this be able to incorporate such data.

Finally, previous research suggests that social rejection can dampen motivation and self-regulation (Baumeister, DeWall, Ciarocco, & Twenge, 2005). This effect is evidenced in the current study by the rate of attrition in the defeat-exclusion condition. A larger proportion of participants in this condition either quit or did not full complete measures to a level necessary for inclusion in analyses. This is a widespread challenge throughout the exclusion literature with no clear solution except for oversampling. These participants are likely experiencing more extreme levels of reactivity, but were self-selecting out. This is valuable data that is lost due to the nature of the study that cannot be accounted for.

### **Future Directions**

The first issue that must be dealt with by future research is the development of a ubiquitous, global, and salient competence manipulation. As noted earlier, physiological studies often rely on games both physical and mental. These games offer clear and definitive outcome feedback that cannot be disputed. However, unless salient to the participant, the outcome of any game or match can be attributed to uncharacteristically poor performance, uncontrollable external circumstances, and/or a simple lack of interest/skills. The affect receiving task was selected for the current study in an attempt to increase salience and participant buy-in. Affect reception is a skill that has an enormous influence on life trajectory. Despite its primacy for all individuals, participant discounting of the experience was still evident, exemplified by their comments to the “others” noting that one cannot be judged by one task alone, and that this outcome alone is meaningless. The question remains, what type of competence manipulation is effective for all people at all times? Finding this may not be a reality, but effort should be devoted to testing manipulations to approach this goal. Doing so will improve the ability to compare research findings across studies.

Furthermore, a comprehensive examination of currently used manipulations must be undertaken. Some meta-analyses exist that compare competence tasks, yet the findings are limited for interdisciplinary study due to the specific dependent variables considered. Future work should begin with a causal meta-analytic review of manipulations to understand their impact at all four levels of abstraction noted in the current work: physiological, emotional, cognitive, and behavioral. Doing so will not only increase the understanding of how these manipulations function, but will also enable these four levels of outcomes to be modeled together for the purpose of selecting effective experimental stimuli.

Second, more comprehensive interdisciplinary work must be done to account for the numerous layers of outcomes. Of particular note are the inclusion of physiological measurement, the measurement of emotional outcomes in a manner more specific than simply positive/negative, person perception measured as a process, and the consideration of actual behavioral outcomes, not simply behavioral intentions. This is a tall order, but specificity is key for moving forward.

Finally, sequential simulations such as the current study, need to be tested extensively to reveal patterns of reactivity. As mentioned earlier, this is the first study to treat both power and intimacy as variable. The current work does not support the dual-hormone hypothesis at the perceptual level, but more work needs to be done to confirm these findings.

## **Conclusion**

The current study attempted to address some of the calls for future research (i.e. Loving, Heffner, & Kiecolt-Glaser, 2006) by modeling the influence of primary social contingencies on individualistic and prosocial affect systems in the realm of interpersonal relations. Despite the core nature of the implicit social hierarchy, few examine its influence, and even fewer consider

potential moderators (Tiedens et al., 2000). Needless to say, this study does not fully resolve the “big challenge” (Bos et al., 2012) or “the great challenge” (van Honk et al., 2011) of understanding the linkages between neuropeptide systems, social experience, and interpersonal behavior, but it does move the interdisciplinary study of human nature a bit further than before. This is only the second study to assess the dual-hormone hypothesis using manipulated social scenarios, and the first to attempt it with both dimensions (power and intimacy) as fluctuating perceptual variables. Further, this study examined emotional and perceptual experience at a granular level not found in other work. This study is a small step toward greater understanding of the interpersonal communication process. It is hoped that the outcomes of this study aid the future directions of interdisciplinary social science research and help to bridge the gap between research domains.

## Appendix A

### CARAT Instructions

The clips you are about to see are a test of your ability to perceive the emotions of others. You will see previously recorded facial expressions of reactions to emotionally loaded images. Please carefully watch each person's facial expression. After observing each facial reaction, you will be asked to guess what type of image the individual was looking at, how the person felt while looking at the slide, and whether the expression you witnessed was spontaneous (natural) or imitated (fake).

The ability to understand the emotional experience of others is an important evolutionary skill. Past research indicates that individuals who have high emotional intelligence:

- Have more fulfilling social and romantic relationships
- Have the ability to attract more socially desirable partners
- Are more likely to be employed and earn significantly more money
- Are more persuasive and are likely to hold positions of social power

The importance of this perceptual ability cannot be denied. Understanding the emotional experience of others is vital to your life success.

The following task will offer a formal assessment of your aptitude. Be sure to focus on the task as closely as possible in order to receive an accurate index of your ability level. Once finished, you will be presented with a percentage correct score that indicates your skill level. Your score will also be compared to the other individuals you have been matched with during this session.



## Appendix B

### Sample CARAT Task Example Image



## Appendix C

### CARAT Perception Measures

The short clips you are about to see are a test of your ability to tell what other people are feeling. You will be shown the facial expressions of college students as they are exposed to a series of emotionally loaded color slides. Carefully watch the person's facial expressions. After the clip has concluded, please answer the following questions using your best judgment.

1. To what degree did the individual in the clip experience the following emotions?

				Happiness				
Not at All	1	2	3	4	5	6	7	Very Much
				Sadness				
Not at All	1	2	3	4	5	6	7	Very Much
				Fear				
Not at All	1	2	3	4	5	6	7	Very Much
				Anger				
Not at All	1	2	3	4	5	6	7	Very Much
				Surprise				
Not at All	1	2	3	4	5	6	7	Very Much
				Disgust				
Not at All	1	2	3	4	5	6	7	Very Much
				Pleasantness				
Not at All	1	2	3	4	5	6	7	Very Much

2. What type of photograph did the person in the clip respond to?

- a. Pleasant people
- b. Disturbing Image
- c. Unusual Picture
- d. Neutral Image

3. Was the emotional expression...

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree

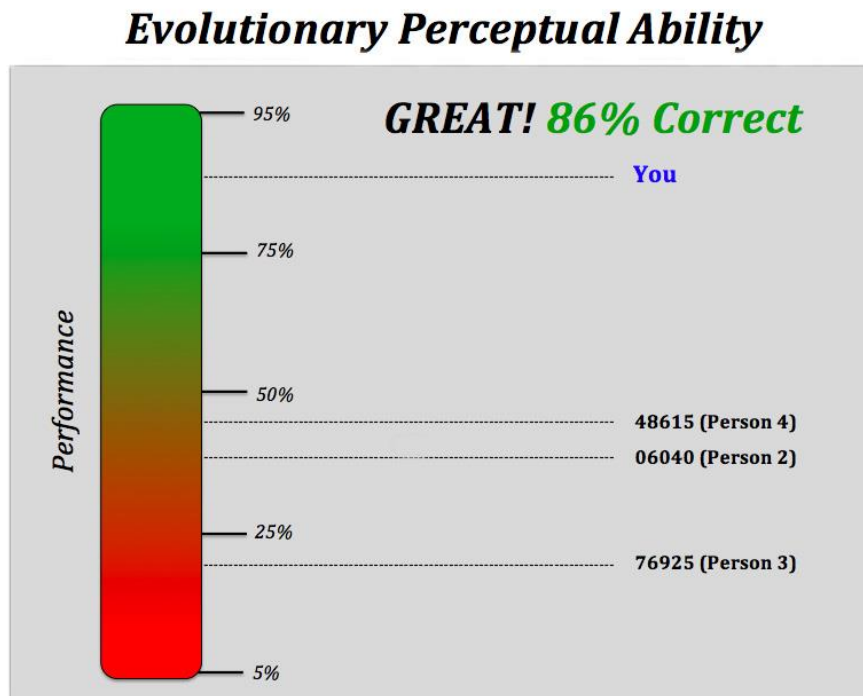
- a. Spontaneous (Real)
- b. Posed (Fake)

4. I am confident that my answers for this expression are correct.

Not at All	1	2	3	4	5	6	7	Very Much
------------	---	---	---	---	---	---	---	-----------

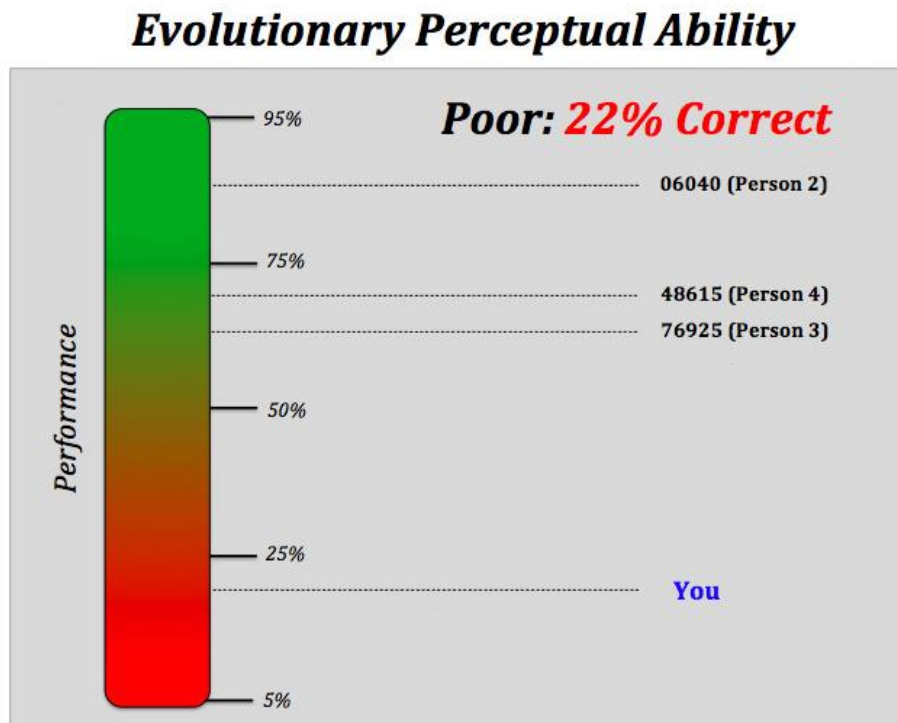
Appendix D  
CARAT Performance Feedback Messages

Triumph



You averaged: **52% Better** than the others

Defeat



You averaged: **52% Worse** than the others

## Appendix E

### Cyberball Instructions



#### **Welcome to Cyberball, the Interactive Ball-Tossing Game Used for Mental Visualization!**

We need you to practice your mental visualization skills. We have found that the best way to do this is to have you play an on-line ball tossing game with other participants who are logged on at the same time.

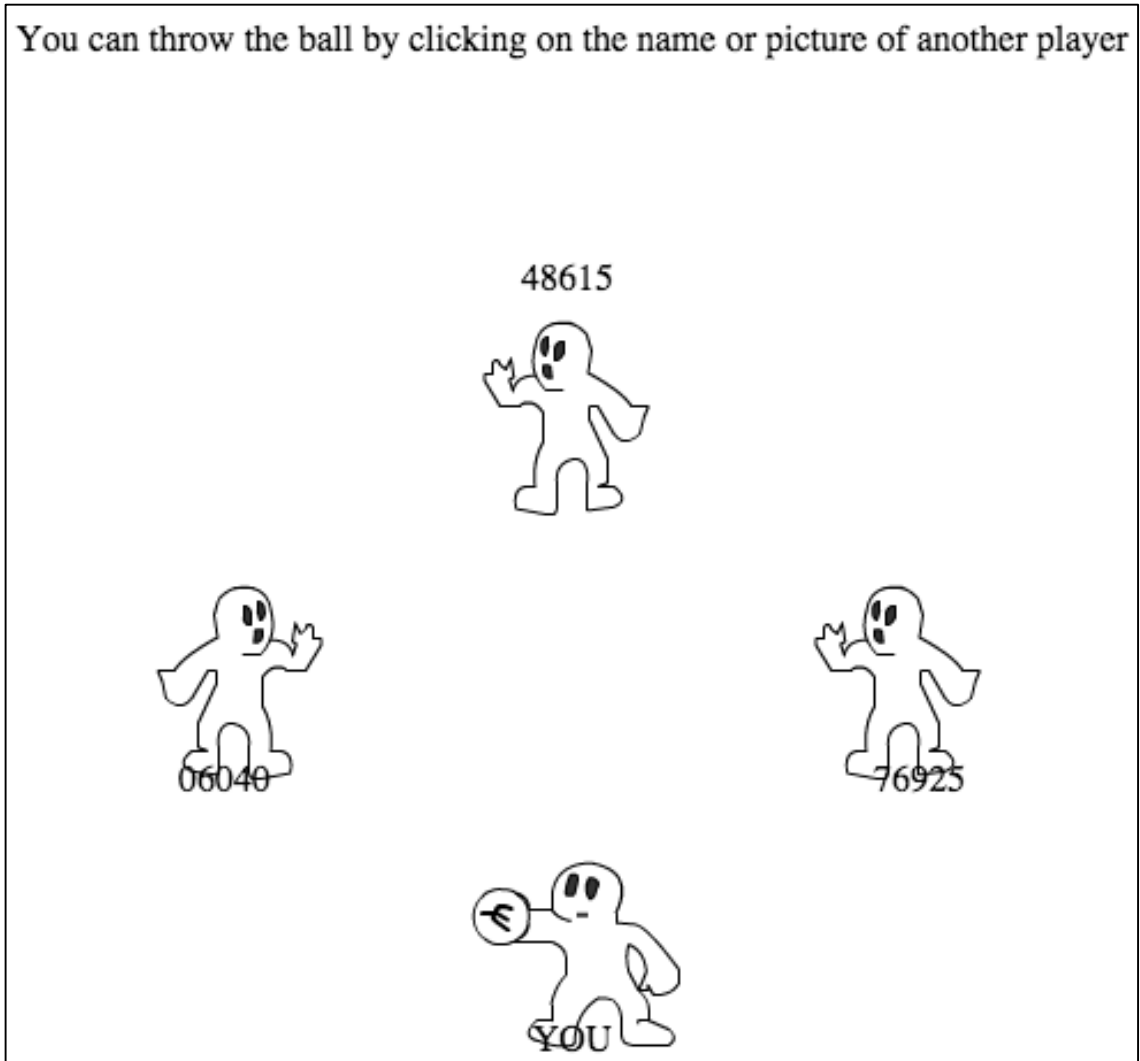
In a few moments, you will be playing a ball tossing game with the individuals you were compared to on the previous task. The game is very simple. When the ball is tossed to you, simply click on the name of the player you want to throw it to. When the game is over, just go on to the next page of the survey.

What is important is not your ball tossing performance, but that you ***MENTALLY VISUALIZE*** the entire experience. Imagine what the others look like. What sort of people are they? Where are you playing? Is it warm and sunny or cold and rainy? Create in your mind a complete mental picture of what might be going on if you were playing this game in real life.

Okay, ready to begin? Please click on the "Next" button below to begin:

## Appendix F

### Cyberball Interaction Example Image



## Appendix G

### Request for Support

Hey fellow Turker,

I think we are just about finished but I was hoping you would be willing to help me out. I am really struggling right now and could use some extra money. I know that we are bonused 25 cents for completing this entire thing, so I was wondering if you would let me have your bonus. I think the requestor is going to read these, so if we get to interact more, can you please find a way to let them know about your donation. I know this might be weird, but please, any amount will help, even a penny. I'm pretty sure my id number is 06040.

Thanks in advance!

## Appendix H

### Debriefing Statement

The study you just participated in examined the relationship between triumph/defeat and subsequent group inclusion/exclusion. Your emotional reactions, self/other-perceptions and potential behavioral reactions were of interest. Please be aware that both the perceptual task and the ball-tossing interaction were manipulated. The performance feedback that you received did not accurately reflect your performance. There was no connection between your actual performance and the reported performance. Also, your fictitious performance was compared with scores from three other individuals that do not actually exist. The ball-tossing interaction was preprogrammed to either include you or exclude you. The other three individuals were computer generated. All feedback you received and interactions you engaged in were completely fabricated. Please disregard any alteration of your perceived competence level that this experiment may have caused. Also, ignore any negative affect you may have experienced during the ball-tossing interaction. None of what just happened accurately reflects your ability to perceive the emotion of others or how others feel about you.

This study required deception in order to examine the variable relationships of interest. I sincerely apologize for any discomfort you may have experienced. If you feel at all uncomfortable after having participated in this study, please do not hesitate to ask any questions that you may have using the contact information below.

Thank you for your participation in this study. As this is an ongoing study, please do not discuss the details of this study with anyone as others you know may also choose to participate.

University of Connecticut  
Institutional Review Board  
(860) 486-8802

Kyle Hull  
[Kyle.Hull@UConn.edu](mailto:Kyle.Hull@UConn.edu)

## Appendix I

### Scales & Measures

**Directions: Please answer the following questions to the best of your ability.**

#### DEMOGRAPHICS

What is your biological sex?

- Male
- Female

I consider myself to be:

- Not masculine \_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_ Very masculine
- Not feminine \_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_ Very feminine

What is your age in years?

- 18-99 [Dropdown]

What is your ethnicity?

- Hispanic or Latino/a
- Asian
- White or Caucasian
- African American or Black
- American Indian or Alaskan Native
- Native Hawaiian or Pacific Islander
- Other: \_\_\_\_\_

What is your gross annual income?

(Total dollar amount earned before taxes)

- Less than \$9,999 - \$100,000+ [Dropdown]

What state do you most identify with? [Dropdown]

How many years did you live in this state? [Dropdown]

What religion do you most adhere to? [Dropdown of major religions]

How strongly do you consider yourself to be devout (committed) to this religion?

Not at all      1      2      3      4      5      6      7      Extremely

What is the highest level of schooling you completed or the highest degree you received?

- Never attended school
- Grades K through 8 (Elementary or grade school)
- Grades 9-12 (Some high school)



- Grade 12 (High school graduate) or GED
- Some college
- Associates degree
- Bachelor's degree
- Postgraduate/Masters/Doctorate/Law/ MD

**Directions: Please answer the following questions about how you perceive yourself.**

### **BEFORE THE COGNITIVE TASK**

(Wesselmann et al., 2010)

1. I am skilled at reading the feelings and emotional reactions of others.

Strongly Disagree \_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_:\_\_\_\_ Strongly Agree

### **MESSAGE EFFECTIVENESS**

Being skilled at perceiving emotions in others is...

Desirable	____:____:____:____:____:____:____	undesirable
Helpful	____:____:____:____:____:____:____	harmful
Damaging	____:____:____:____:____:____:____	Advantageous
Beneficial	____:____:____:____:____:____:____	Detrimental
Impractical	____:____:____:____:____:____:____	Practical

### **TASK INTEREST**

How do you feel about engaging in the upcoming perceptual ability test?

Disinterested	____:____:____:____:____:____:____	Interested
Excited	____:____:____:____:____:____:____	Bored
Involved	____:____:____:____:____:____:____	Uninvolved
Depressed	____:____:____:____:____:____:____	Stimulated
Unmotivated	____:____:____:____:____:____:____	Withdrawn

### **EFFORT SUBSCALE OF THE INTRINSIC MOTIVATION INDEX**

(McAuley et al., 1987) See Salvador (2005)

1	2	3	4	5	6	7
Strongly	Disagree	Somewhat	Neutral	Somewhat	Agree	Strongly
Disagree		Disagree		Agree		Agree

1. I put a lot of effort into this
2. I didn't try very hard to do well at this activity
3. I didn't put much energy into this

- I tried very hard on this activity

### TASK ENJOYMENT

I enjoyed assessing my emotional perceptual abilities.

Not At All    1       2       3       4       5       6       7       Very Much

### COMPETITIVE TASK PERFORMANCE MANIPULATION CHECK

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree

- I performed well
- Overall, my performance was poor
- Others would be impressed with my performance
- My emotional perceptual abilities are much better than others
- I am relatively unskilled at assessing the emotions of others

### CYBERBALL MANIPULATION CHECK (Welker et al., 2013; Zardo et al., 2004)

- What percentage of the throws did you receive? (Please offer your best estimate)
- I was...

Rejected	1	2	3	4	5	6	7	Accepted
Included	1	2	3	4	5	6	7	Excluded
Ignored	1	2	3	4	5	6	7	Recognized

- I enjoyed playing the Cyberball game

Not At All    1       2       3       4       5       6       7       A Great Deal

Please use the following scale in response to the following questions.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree

### Belongingness

1. I felt poorly accepted by the other participants
2. I felt as though I had made a “connection” or bonded with one or more of the participants during the Cyberball game
3. I felt like an outsider during the Cyberball game

### Control

1. I felt that I was able to throw the ball as often as I wanted during the game
2. I felt somewhat frustrated during the Cyberball game
3. I felt in control during the Cyberball game

### Self-Esteem

1. During the Cyberball game, I felt good about myself
2. I felt that the other participants failed to perceive me as a worthy and likeable person
3. I felt somewhat inadequate during the Cyberball game

### Meaningful Existence

1. I felt that my performance (e.g. catching the ball, deciding who to throw the ball to) had some effect on the direction of the game.
2. I felt non-existent during the Cyberball game
3. I felt as though my existence was meaningless during the Cyberball game.

### **EMOTIONS EXPERIENCED (IECS, Buck & Powers, 2009)**

When interacting with the others, I felt \_\_\_\_\_?

Not at all	1	2	3	4	5	6	7	Extremely
Happy								Ashamed
Confident								Guilty
Secure								Embarrassed
Sad								Scornful
Depressed								Contemptuous
Down								Disdainful
Afraid								Humiliated
Nervous								Dishonored
Anxious								Resentful
Distressed								Grateful
Angry								Respectful
Insulted								Admiring
Hostile								Trusting
Surprised								Erotic
Dazed								Sexy
Confused								Aroused

Annoyed	Sympathetic	Strong
Irritated	Disliked	Dominant
Frustrated	Disrespected	Submissive
Hateful	Stigmatized	Aggressive
Pleased	Betrayed	Welcoming
Cheerful	Hurt	Caring
Satisfied	Deceived	
Envious	Loving	
Jealous	Caring	
Pitying	Intimate	

### **SELF-ESTEEM** (State Self-Esteem, Heatherton & Polivy, 1991)

This is a questionnaire designed to measure what you are thinking at this moment. There is, of course, no right answer for any statement. The best answer is what you feel is true of yourself at this moment. Be sure to answer all of the items, even if you are not certain of the best answer. Again, answer these questions, as they are true for you RIGHT NOW.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree

1. I am worried about whether I am regarded as a success or failure.
2. I feel self-conscious.
3. I feel displeased with myself.
4. I am worried about what other people think of me.
5. I feel inferior to others at this moment.
6. I feel concerned about the impression I am making.
7. I am worried about looking foolish.
8. I feel good about myself.
9. I feel that others respect and admire me.

### **CONFIDENCE** (State-self esteem; Heatherton & Polivy, 1991)

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree

1. I feel confident about my abilities.
2. I feel frustrated or rattled about my performance.\*
3. I feel that I am having trouble understanding things that I am presented with.\*
4. I feel as smart as others.
5. I feel confident that I understand things.
6. I feel that I have less ability right now than others.\*

7. I feel like I am not doing well.\*

**ANXIETY** (State-Trait anxiety inventory; Marteau & Bekker, 1992)

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the most appropriate number to the right of the statement to indicate how you feel right now, at this moment. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

1	2	3	4	5	6	7
Strongly	Disagree	Somewhat	Neutral	Somewhat	Agree	Strongly
Disagree		Disagree		Agree		Agree

I feel...

1. Secure
2. Strained
3. Calm
4. Tense
5. At ease
6. Upset
7. Relaxed
8. Content
9. Worried
10. Jittery
11. Nervous
12. Anxious

**GOODWILL** (McCroskey & Teven, 1999)

I care about the others	1	2	3	4	5	6	7	I don't care about the others
I have their interests at heart	1	2	3	4	5	6	7	I don't have their interests at heart
I am self-centered	1	2	3	4	5	6	7	I am not self-centered
I am concerned about the others	1	2	3	4	5	6	7	I am not concerned about the others
I am insensitive toward the others	1	2	3	4	5	6	7	I am sensitive toward the others
I am not understanding toward the others	1	2	3	4	5	6	7	I am understanding toward “

**HOSTILITY** (POMS; McNair, Lorr, & Droppleman, 1981)

Not at all	1	2	3	4	5	6	7	Extremely
------------	---	---	---	---	---	---	---	-----------

Below is a list of words that describe feelings people have. Please read each one carefully. Then report the degree to which you are currently feeling the each of the following.

1. Furious
2. Peeved

3. Annoyed
4. Ready to Fight
5. Angry
6. Bad-tempered
7. Resentful
8. Grouchy
9. Bitter
10. Spiteful
11. Deceived

### **DYNAMISM**

Dynamic	1	2	3	4	5	6	7	Inactive
Dull	1	2	3	4	5	6	7	Charismatic
Controlled	1	2	3	4	5	6	7	Expressive
Exciting	1	2	3	4	5	6	7	Boring
Cheerful	1	2	3	4	5	6	7	Gloomy
Calming	1	2	3	4	5	6	7	Stimulated
Arousing	1	2	3	4	5	6	7	Monotonous

### **COMPETENCE** (McCroskey & Teven, 1999)

Intelligent	1	2	3	4	5	6	7	Unintelligent
Untrained	1	2	3	4	5	6	7	Trained
Inexpert	1	2	3	4	5	6	7	Expert
Informed	1	2	3	4	5	6	7	Uninformed
Incompetent	1	2	3	4	5	6	7	Competent
Bright	1	2	3	4	5	6	7	Stupid
Skilled	1	2	3	4	5	6	7	Unskilled

### **TRUSTWORTHINESS** (McCroskey & Teven, 1999)

Honest	1	2	3	4	5	6	7	Dishonest
Untrustworthy	1	2	3	4	5	6	7	Trustworthy
Honorable	1	2	3	4	5	6	7	Dishonorable
Moral	1	2	3	4	5	6	7	Immoral
Unethical	1	2	3	4	5	6	7	Ethical
Phoney	1	2	3	4	5	6	7	Genuine

### **LIKING**

Pleasant	1	2	3	4	5	6	7	Unpleasant
Unfriendly	1	2	3	4	5	6	7	Friendly
Unsociable	1	2	3	4	5	6	7	Sociable
Awful	1	2	3	4	5	6	7	Nice
Likeable	1	2	3	4	5	6	7	Unlikable

Warm      1      2      3      4      5      6      7      Cold

Appendix J  
Scale Descriptives

Variable	Items retained after tests of internal consistency and reliability
Triumph/Defeat Manipulation Check $\alpha = .98$ $M = 4.07$ ; $SD = 2.23$	I performed well. Overall, my performance was poor. Others would be impressed with my performance. My emotional perceptual abilities are much better than others. I am relatively unskilled at assessing the emotions of others.
Inclusion/Exclusion Manipulation Check $\alpha = .97$ $M = 3.89$ ; $SD = 2.23$	I was... Rejected: Accepted Included: Excluded Ignored Recognized
State Self-Esteem $\alpha = .95$ $M = 4.65$ ; $SD = 1.62$	I am worried about whether I am regarded as a success or failure. I feel self-conscious. I am displeased with myself. I am worried about what other people think of me. I feel inferior to others at this moment. I feel concerned about the impression that I am making. I am worried about looking foolish.
State Confidence $\alpha = .93$ $M = 5.32$ ; $SD = 1.32$	I feel... Confident about my abilities. Frustrated or rattled about my performance. I am having trouble understanding things I am presented with. As smart as others. Confident that I understand things. That I have less ability right now than others. Like I am not doing well.
State Anxiety $\alpha = .95$ $M = 2.70$ ; $SD = 1.42$	I am currently... Strained Calm Tense At Ease Upset Relaxed Worried Jittery
Goodwill $\alpha = .94$ $M = 5.41$ ; $SD = 1.57$	I [don't] care about the others I [don't] have their interests at heart I am [not] concerned about the others I am [in]sensitive toward the others I am [Not] understanding toward the others
Hostility $\alpha = .94$ $M = 1.93$ ; $SD = 1.30$	I felt _____ toward the others. Furious Peeved



	Ready to Fight Bad-Tempered Grouchy Bitter Spiteful
Other Dynamism $\alpha = .90$ $M = 4.36; SD = 1.20$	I think that the others are... Dynamic : Inactive Dull : Charismatic Controlled : Expressive Exciting : Boring Cheerful : Gloomy Arousing : Monotonous
Other Competence $\alpha = .95$ $M = 4.60; SD = 1.30$	I think that the others are... Intelligent : Unintelligent Untrained : Trained Inexpert: Expert Informed : Uninformed Incompetent : Competent Bright : Stupid Skilled : Unskilled
Other Trustworthiness $\alpha = .96$ $M = 4.43; SD = 1.41$	I think that the others are... Honest : Dishonest Untrustworthy : Trustworthy Honorable : Dishonorable Moral : Immoral Unethical : Ethical Phoney : Genuine
Other Liking $\alpha = .96$ $M = 4.52; SD = 1.46$	I think that the others are... Pleasant : Unpleasant Unfriendly : Friendly Unsociable : Sociable Awful : Nice Likeable : Unlikeable Warm : Cold

Appendix K  
Causal Model Variable Correlations

Hypothesized Model Correlation Matrix																
	Msex	CondTD	CondIE	Interact	TDmck	IEmck	Masc	Anxiety	Confid	Hostility	Goodwill	Odyn	Ocomp	Otrust	Olike	Donation
CondTD	0.022															
CondIE	-0.014	-0.033														
Interact	-0.064	0.020	0.024													
TDmck	0.049	.895**	-0.022	0.001												
IEmck	-0.011	-0.089	.818**	-0.048	-0.059											
Masc	.764**	0.005	-0.020	-0.026	-0.010	-0.010										
Anxiety	-.101*	-.135**	-.162**	0.016	-.213**	-.257**	-0.018									
Confid	0.066	.290**	.131**	-0.024	.394**	.191**	0.007	-.707**								
Hostility	.104*	-0.078	-.291**	0.005	-.117*	-.326**	.105*	.548**	-.454**							
Goodwill	-.099*	0.006	.175**	0.043	-0.029	.237**	-0.066	-.227**	.216**	-.347**						
Odyn	-.098*	-0.044	.318**	-0.048	-0.059	.376**	-0.067	-.109*	.109*	-.318**	.492**					
Ocomp	-.109*	-.154**	.339**	0.000	-.165**	.397**	-0.066	-.160**	0.057	-.365**	.439**	.754**				
Otru	-0.067	-0.012	.370**	-0.021	0.011	.439**	-0.043	-.285**	.191**	-.463**	.454**	.689**	.710**			
Olik	-0.063	-0.002	.487**	-0.013	0.003	.545**	-0.024	-.260**	.209**	-.494**	.482**	.731**	.715**	.848**		
Donation	-0.092	0.064	.173**	-0.014	0.046	.148**	-0.092	-0.088	0.078	-.165**	.259**	.183**	.207**	.218**	.245**	
ExpAnger	0.059	0.055	-0.094	-0.078	0.074	-0.048	0.075	0.086	-.106*	.135**	-.167**	-.146**	-.194**	-.122*	-.166**	-0.093

\* $p < .05$ ; \*\* $p < .01$ ;

## References

- Andersen, M. L., Alvarenga, T. F., Mazaro-Costa, R., Hachul, H. C., & Tufik, S. (2011). The association of testosterone, sleep, and sexual function in men and women. *Brain Research, 1416*(C), 80-104. doi: 10.1016/j.brainres.2011.07.060
- Archer, J. (1991). The influence of testosterone on human aggression. *British Journal of Psychology, 82*, 1-28.
- Archer, J. (2006). Testosterone and human aggression: An evaluation of the challenge hypothesis. *Neuroscience and Biobehavioral Reviews, 30*(3), 319-345. doi: 10.1016/j.neubiorev.2004.12.007
- Archer, J., Birring, S. S., & Wu, F. C. W. (1998). The association between testosterone and aggression among young men: Empirical findings and a meta-analysis. *Aggressive Behavior, 24*(6), 411-420.
- Archer, J., Graham-Kevan, N., & Davies, M. (2005). Testosterone and aggression: A reanalysis of Book, Starzyk, and Quinsey's (2001) study. *Aggression and Violent Behavior, 10*(2), 241-261. doi: 10.1016/j.avb.2004.01.001
- Ayduk, O., Gyurak, A., & Luerksen, A. (2008). Individual differences in the rejection-aggression link in the hot sauce paradigm: The case of rejection sensitivity. *Journal of Experimental Social Psychology, 44*(3), 775-782. doi: 10.1016/j.jesp.2007.07.004
- Baldwin, M. W., & Sinclair, L. (1996). Self-esteem and "if...then" contingencies of interpersonal acceptance. *Journal of Personality and Social Psychology, 71*, 1130-1141.
- Bargh, J. A. (1994). The four horsemen of automaticity: Awareness, intention, efficiency, and control in social cognition. In R. S. Wyer, & T. K. Srull (Eds.), *Handbook of social cognition, Vol. 1* (2<sup>nd</sup> ed.; pp. 1-40). Hillsdale, NJ: Erlbaum.

- Bargh, J. A. (1997). The automaticity of everyday life. In R. S. Wyer (Ed.), *Advances in social cognition, Vol. 10* (pp. 1-61). Mahwah, NJ: Erlbaum.
- Bartz, J. A., Zaki, J., Bolger, N., & Ochsner, K. N. (2011). Social effects of oxytocin in humans: context and person matter. *Trends in Cognitive Science, 15*, 301-309. doi: 10.1016/j.tics.2011.05.002
- Bastian, B., & Haslam, N. (2010). Excluded from humanity: The dehumanizing effects of social ostracism. *Journal of Experimental Social Psychology, 46*, 107-113.
- Bateup, H. S., Booth, A., Shirtcliff, E. A., & Granger, D. A. (2002). Testosterone, cortisol, and women's competition. *Evolution and Human Behavior, 23*, 181-192. doi: 10.1016/S1090-5138(01)00100-3
- Batson, C. D., Van Lange, P. A. M., Ahmad, N., & Lishner, D. A. (2003). Altruism and helping behavior. In M. A. Hogg & J. Cooper (Eds.), *Sage Handbook of Social Psychology* (pp. 279-295). London, UK: Sage.
- Baumeister R. F. (1990). Suicide as escape from the self. *Psychological Review, 97*(1), 90-113.
- Baumeister, R. F. (1993). *Self-esteem*. New York, NY: Plenum Press.
- Baumeister, R. F., Bushman, B. J., & Campbell, W. K. (2000). Self-esteem, narcissism, and aggression: Does violence result from low self-esteem or from threatened egotism? *Current Directions in Psychological Science, 9*, 26-29.
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117*(3), 497-529.

- Baumeister, R. F., DeWall, C. N., Ciarocco, N. J., & Twenge, M. (2005). Social exclusion impairs self-regulation. *Journal of Personality and Social Psychology*, 88(4), 589-604.
- Beach, F. A. (1975). Behavioral endocrinology: An emerging discipline. *American Scientist*, 63(2), 178-187.
- Beatty, M. J., & McCroskey, J. C. (1997). It's in our nature: Verbal aggressiveness as temperamental expression. *Communication Education*, 45(4), 446-460.
- Beatty, M. J., & McCroskey, J. C. (2000). Theory, scientific evidence, and the communibiological paradigm: Reflections on misguided criticism. *Communication Education*, 49(1), 36-44. doi: 10.1080/03634520009379191
- Beatty, M. J., & McCroskey, J. C., & Pence, M. E. (2009). Communibiological paradigm. In M. J. Beatty, J. C. McCroskey, & K. Floyd (Eds.), *Biological dimensions of communication: Perspectives, Methods, and Research* (pp. 3-16). Cresskill, NJ: Hampton Press.
- Beatty, M. J., McCroskey, J. C., & Heisel, A. D. (1998). Communication apprehension as temperamental expression: A communibiological paradigm. *Communication Monographs*, 65, 197-219. doi: 10.1080/03637759809376448
- Beatty, M. J., McCroskey, J. C., & Valencic, K. M. (2001). *The biology of communication: A communibiological perspective*. Cresskill, NJ: Hampton Press.
- Benenson, J. F., Mrkovits, H., Thompson, M. E., Wrangham, R. W. (2011). Under threat of social exclusion, females exclude more than males. *Psychological Science*, 22, 538-544.
- Bentler, P. M., & Chou, C. P. (1987). Practical issues in structural equation modeling. *Sociologica Methods & Research*, 16, 78-117. doi: 10.1177/0049124187016001004

- Berger, C. R. (2003). Message production skill in social interaction. In. J. O. Greene & B. R. Burleson (Eds.), *Handbook of communication and social interaction skills* (pp. 257-290). Mahwah, NJ: Lawrence Erlbaum.
- Bernhardt, P. C., Dabbs Jr., J. M., Fielden, J. A., & Lutter, C. D. (1998). Testosterone changes during vicarious experiences of winning and losing among fans of sporting events. *Physiology & Behavior*, 65(1), 59-62. doi: 10.1016/S0031-9384(98)00147-4
- Blackhart, G. C., Eckel, L. A., & Tice, D. M. (2007). Salivary cortisol in response to acute social rejection and acceptance by peers. *Biological Psychology*, 75, 267-276. doi: 10.1016/j.biopsycho.2007.03.005
- Boksem, M. A. S., Mehta, P. H., Van den Bergh, B., van Son, V., Trautmann, S. T., Roelofs, K., Smidts, A., & Sanfey, A. G. (2013). Testosterone inhibits trust but promotes reciprocity. *Psychological Science*, 24(11), 2306-2314. doi: 10.1177/0956797613495063
- Book, A. S., Starzyk, K. B., & Quinsey, V. L. (2001). The relationship between testosterone and aggression: A meta-analysis. *Aggression and Violent Behavior*, 6, 579-599. doi
- Booth, A., Carver, K., & Granger, D. A. (2000). Biosocial perspectives on the family. *Journal of Marriage and the Family*, 62(4), 1018-1034. doi:
- Booth, A., Granger, D. A., Mazur, A., & Kivlighan, K. T. (2006). Testosterone and social behavior. *Social Forces*, 85(1), 167-191. doi: 10.1353/sof.2006.0116
- Booth, A., Shelley, G., Mazur, A., Tharp, G., & Kittok, R. (1989). Testosterone, and winning and losing in human competition. *Hormones and Behavior*, 23, 556-571. doi: 10.1016/0018-506X(89)90042-1

- Boren, J. P., & Veksler, A. E. (2011). A decade of research exploring biology and communication: The brain, nervous, endocrine, cardiovascular, and immune systems. *Communication Research Trends*, 30(4), 4-31. doi:
- Bos, P. A., Hermans, E. J., Ramsey, N. F., & van Honk, J. (2012). The neural mechanisms by which testosterone acts on interpersonal trust. *NeuroImage*, 61(3), 730-737. doi: 10.1016/j.neuroimage.2012.04.002
- Bos, P. A., Panksepp, J., Bluthé, R. M., & van Honk, J. (2012). Acute effects of steroid hormones and neuropeptides on human social-emotional behavior: A review of single administration studies. *Frontiers in Neuroendocrinology*, 33(1), 17-35. doi: 10.1016/j.yfrne.2011.01.002
- Bos, P. A., Terburg, D., van Honk, J., & McEwen, B. S. (2010). Testosterone decreases trust in socially naïve humans. *Proceedings of the National Academy of Sciences*, 107(22), 9991-9995.
- Boyes, M. E., & French, D. J. (2009). Having a cyberball: Using a ball-throwing game as an experimental social stressor to examine the relationship between neuroticism and coping. *Personality and Individual Differences*, 47, 396-401. doi: 10.1016/j.paid.2009.04.005
- Brewer, M. B., & Caporael, L. R. (1990). Selfish genes versus selfish people: Sociobiology as origin myth. *Motivation and Emotion*, 14, 237-243.
- Buck, R. (1976). A test of nonverbal receiving ability: Preliminary studies. *Human Communication Research*, 2, 162-171.
- Buck, R. (1984). *The communication of emotion*. New York, NY: Guilford.
- Buck, R. (1985). Prime theory: An integrated view of motivation and emotion. *Psychological Review*, 92(3), 389-413. doi: 10.1037/0033-295X.92.3.389

- Buck, R. (1988). Nonverbal communication: Spontaneous and symbolic aspects. *American Behavioral Scientist*, 31(3), 341-354.
- Buck, R. (2014). *Emotion: A biosocial synthesis*. Cambridge, UK: Cambridge University Press.
- Buck, R. W., Savin, V. J., Miller, R. E., & Caul, W. F. (1972). Communication of affect through facial expressions in humans. *Journal of Personality and Social Psychology*, 23, 362-371.
- Buck, R., & VanLear, C. A. (2002). Verbal and nonverbal communication: Distinguishing symbolic, spontaneous, and pseudo-spontaneous nonverbal behavior. *Journal of Communication*, 52(3), 522-541.
- Buckley, K. E., Winkel, R. E., & Leary, M. R. (2004). Emotional and behavioral responses to interpersonal rejection. Anger, sadness, hurt, and aggression. *Journal of Experimental Social Psychology*, 40, 14-28.
- Buhrmester, M., Kwang, T., Gosling, S. D. (2011). Amazon's mechanical turk: A new source of inexpensive, yet high-quality, data? *Perspectives on Psychological Science*, 6(1), 3-5.  
doi: 10.1177/1745691610393980
- Buley, J., Petronio, S., Hecht, M. L., & Alberts, J. K. (1993). Interpersonal communication theory. In S. Petronio, J. K. Alberts, M. L. Hecht, & J. Buley (Eds.), *Contemporary perspectives on interpersonal communication* (pp. 3-17). Dubuque, IA: Brown/Benchmark.
- Burgoon, J. K. (1978). A communication model of personal space violation: Explication and an initial test. *Human Communication Research*, 4, 129-142.
- Burgoon, J. K. (1998). It takes two to tango: Interpersonal adaptation and implications for relational communication. In J. S. Trent (Ed.), *Communication: Views from the helm of the 21st century* (pp. 53-59). Boston, MA: Allyn & Bacon.



- Burgoon, J. K., & Dunbar, N. E. (2000). An interactionist perspective on dominance-submission: Interpersonal dominance as a dynamic, situationally contingent social skill. *Communication Monographs*, 67(1), 96-121.
- Burgoon, J. K., & Hale, J. L. (1984). The fundamental topoi of relational communication. *Communication Monographs*, 51(3), 193-214. doi: 10.1080/03637758409390195
- Burgoon, J. K., & Saine, T. (1978). *The unspoken dialogue: An introduction to nonverbal communication*. Boston, MA: Houghton Mifflin.
- Burgoon, J. K., Buller, D. B., Hale, J. L., & deTurck, M. A. (1984). Relational messages associated with nonverbal behaviors. *Human Communication Research*, 10(3), 351-378.
- Burgoon, J. K., Johnson, M. L., & Koch, P. T. (1998). The nature and measurement of interpersonal dominance. *Communication Monographs*, 65(4), 308-335. doi: 10.1080/03637759809376456
- Burleson, B. R. (2009). Understanding the outcomes of supportive communication: A dual-process approach. *Journal of Social and Personal Relationships*, 26, 21-38. doi: 10.1177/0265407509105519
- Burnham, T. C., Chapman, J. F., Gray, P. B., McIntyre, M. H., Lipson, S. F., & Ellison, P. T. (2003). Men in committed, romantic relationships have lower testosterone. *Hormones and Behavior*, 44(2), 119-122. doi: 10.1016/S0018-506X(03)00125-9
- Bushman, B. J., & Baumeister, R. F. (1998). Threatened egotism, narcissism, self-esteem, and direct and displaced aggression: Does self-love or self-hate lead to violence? *Journal of Personality and Social Psychology*, 75, 219-229.
- Buss, D. M. (1995). Evolutionary psychology: A new paradigm for psychological science. *Psychological Inquiry*, 6(1), 1-30.

- Byrne, D. (1971). *The attraction paradigm*. New York, NY: Academic Press.
- Byrne, D., & Ramey, R. (1965). Magnitude of positive and negative reinforcements as a determinant of attraction. *Journal of Personality and Social Psychology*, 2, 884-889.
- Canary, D. J., & Hause, K. S. (1993). Is there any reason to research sex differences in communication? *Communication Quarterly*, 41(2), 129-144.
- Cappella, J. N. (1987). Interpersonal communication: Definition and fundamental questions. In C. R. Berger & S. H. Chaffee (Eds.), *Handbook of communication science* (pp. 184-239). Newbury Park, CA: Sage.
- Cappella, J. (1991). The biological origins of automated patterns of human interaction. *Communication Theory*, 1(1), 4-35. doi: 10.1111/j.1468-2885.1991.tb00002.x
- Carney, D. R., & Mason, M. F. (2010). Decision making and testosterone: When the ends justify the means. *Journal of Experimental Social Psychology*, 46(4), 668-671. doi: 10.1016/j.jesp.2010.02.003
- Carney, D. R., Cuddy, A. J. C., & Yap, A. J. (2010). Power posing: Brief nonverbal displays affect neuroendocrine levels and risk tolerance. *Psychological Science*, 21(10), 1363-1368. doi: 10.1177/0956797610383437
- Carré, J. M., Campbell, J. A., Lozoya, E., Goetz, S. M. M., & Welker, K. M. (2013). Changes in testosterone mediate the effect of winning on subsequent aggressive behavior. *Psychoneuroendocrinology*, 38(10), 2034-2041. doi: 10.1016/j.psyneuen.2013.03.008
- Carré, J. M., Gilchrist, J. D., Morrissey, M. D., & McCormick, C. M. (2010). Motivational and situational factors and the relationship between testosterone dynamics and human aggression during competition. *Biological Psychology*, 84(2), 346-353. doi: 10.1016/j.biopsycho.2010.04.001

- Carré, J. M., & McCormick, C. M. (2008). Aggressive behavior and change in salivary testosterone concentrations predict willingness to engage in a competitive task. *Hormones and Behavior*, 54(3), 403-409. doi: 10.1016/j.yhbeh.2008.04.008
- Carré, J. M., McCormick, C. M., & Hariri, A. R. (2011). The social neuroendocrinology of human aggression. *Psychoneuroendocrinology*, 36(7), 935-944. doi: 10.1016/j.psyneuen.2011.02.001
- Carré, J. M., & Mehta, P. H. (2011). Importance of considering testosterone-cortisol interactions in predicting human aggression and dominance. *Aggressive Behavior*, 37(6), 489-491. doi: 10.1002/ab.20407
- Carré, J. M., & Putnam, S. K. (2010). Watching a previous victory produces an increase in testosterone among elite hockey players. *Psychoneuroendocrinology*, 35(5), 475-479. doi: 10.1016/j.
- Carter-Sowell, A. R., Chen, Z., & Williams, K. D. (2008). Ostracism increases social susceptibility. *Social Influence*, 3, 143-153.
- Cashdan, E. (1998). Are men more competitive than women? *British Journal of Social Psychology*, 37, 213-229. doi: 10.1111/j.2044-8309.1998.tb01166.x
- Cashdan, E. (2003). Hormones and competitive aggression in women. *Aggressive Behavior*, 29(2), 107-115. doi: 10.1002/ab.10041
- Celik, P., Lammers, J., van Beest, I., Bekker, M. H. J., & Vonk, R. (2013). Not all rejections are alike; competence and warmth as a fundamental distinction in social rejection. *Journal of Experimental Social Psychology*, 49, 635-642. doi: 10.1016/j.jesp.2013.02.010
- Chaiken, S. (1980). Heuristic versus systematic information processing and the use of source versus message cues in persuasion. *Journal of Personality and Social Psychology*, 39(5),

752-766.

- Christiansen, K., & Knussman, R. (1987). Androgen levels and components of aggressive behavior in men. *Hormones and Behavior*, 21, 170-180.
- Cohan, L. C., Booth, A., & Granger, D. A. (2003). Gender moderates the relationship between testosterone and marital interaction. *Journal of Family Psychology*, 17(1), 29-40. doi: 10.1037/0893-3200.17.1.29
- Coyne, S. M., Gunderson, N., Nelson, D. A., & Stockdale, L. (2011). Adolescents' prosocial responses to ostracism: An experimental study. *The Journal of Social Psychology*, 151(5), 657-661. doi: 10.1080/00224545.2010.522625
- Dabbs, J. M. Jr. (1990a). Age and seasonal variation in serum testosterone concentration among men. *Chronobiology International*, 7(3), 245-249.
- Dabbs, J. M. Jr. (1990b). Salivary testosterone measurements: Reliability across hours, days, and weeks. *Physiology & Behavior*, 48(1), 83-86. doi: 10.1016/0031-9384(90)90265-6
- Dabbs, J. M. Jr. (1991). Salivary testosterone measurements: Collecting, storing, and mailing saliva samples. *Physiology & Behavior*, 49(4), 815-817. doi: 10.1016/0031-9384(91)90323-G
- Dabbs, J. M. Jr., Campbell, B. C., Gladue, B. A., Midgley, A. R., Navarro, M. A., Read, G. F.,..., Worthman, C. M. (1995). Reliability of salivary testosterone measurements: A multicenter evaluation. *Clinical Chemistry*, 41(11), 1581-1584.
- Dabbs, J. M., & Dabbs, M. G. (2000). *Heroes, rogues, & lovers: Testosterone and behavior*. New York, NY: McGraw-Hill.
- Dabbs, J. M., Frady, R. L., Carr, T. S., & Besch, N. F. (1987). Saliva testosterone and criminal violence in young adult prison inmates. *Psychosomatic Medicine*, 49, 175-182.

- Dabbs, J. M., Jr., & Hargrove, M. F. (1997). Age, testosterone, and behavior among female prison inmates. *Psychosomatic Medicine*, 59, 477-480.
- Dabbs, J. M., Jr., Jurkovic, G., & Frady, R. (1991). Salivary testosterone and cortisol among late adolescent male offenders. *Journal of Abnormal Child Psychology*, 19, 469-478.
- Dance, F. E. X., & Larson, C. E. (1976). The functions of human communication: A theoretical approach. New York, NY: Holt, Rinehart, & Winston.
- Darwin, C. (1859). *On the origins of species by means of natural selection*. London, UK: Murray.
- DeBono, A., & Muraven, M. (2014). Rejection perceptions: Feeling disrespected leads to greater aggression than feeling disliked. *Journal of Experimental Social Psychology*, 55, 43-52.  
doi: 10.1016/j.jesp.2014.05.014
- DePue, R. A. (1995). Neurobiological factors in personality and depression. *European Journal of Personality*, 9, 413-439.
- Dickerson, S. S., Gruenewald, T. L., & Kemeny, M. E. (2004). When the social self is threatened: Shame, physiology, and health. *Journal of Personality*, 72(6), 1191-1216.
- Dillard, J. P., Solomon, D. H., & Samp, J. A. (1996). Framing social reality: The relevance of relational judgments. *Communication Research*, 23, 703-723.
- Donovan, B. T. (1985). *Hormones and Human Behavior*. Cambridge, MA: Cambridge University Press.
- Downey, G., & Feldman, S. I. (1996). Implications of rejection sensitivity for intimate relationships. *Journal of Personality and Social Psychology*, 70, 1327-1343.
- Duck, S. (1982). *Personal relationships: Dissolving personal relationships*. New York, NY:

Academic Press.

Duck, S. (1988). *Relating to others*. Chicago, IL: The Dorsey Press.

Duck, S. W. (1995). Talking relationships into being. *Journal of Social and Personal Relationships*, 12, 535-541.

Edelstein, R. S., Chopik, W. J., & Kean, E. L. (2011). Sociosexuality moderates the association between testosterone and relationship status in men and women. *Hormones and Behavior*, 60, 248-255. doi: 10.1016/j.ynbeh.2011.05.007

Edwards, D. A. (2006). Competition and testosterone. *Hormones and Behavior*, 50(5), 681-683. doi: 10.1016/j.ybeh.2006.09.005

Eisenberger, N. I. (2015). Social pain and the brain: Controversies, questions, and where to go from here. *Annual Review of Psychology*, 66, 601-629. doi: 10.1146/annurev-psych-010213-115146

Eisenberger, N. I., Lieberman, M. D., & Williams, K. D. (2003). Does rejection hurt? An fMRI study of social exclusion. *Science*, 302, 290-292.

Eisenegger, C., Haushofer, J., & Fehr, E. (2011). The role of testosterone in social interaction. *Trends in Cognitive Science*, 15(6), 263-271. doi: 10.1016/j.tics.2011.04.008

Eisenegger, C., Naef, M., Snozzi, R., Heinrichs, M., Fehr, E. (2010). Prejudice and truth about the effect of testosterone on human bargaining behavior. *Nature*, 463, 356-359. doi: 10.1038/nature08711

Elliot, A. J., Gable, S. L., & Mapes, R. R. (2006). Approach and avoidance motivation in the social domain. *Personality and Social Psychology Bulletin*, 32(3), 378-391.

Ellis, D. (1982). The epistemology of form. In C. Wilder & J. Weakland (Eds.), *Rigor and*

- imagination: Essays from the legacy of Gregory Bateson* (pp. 215-230). New York, NY: Praeger Publishers.
- Ezrakhovich, A., Kerr, A., Cheung, S., Elliot, K., Jerrems, A., & Williams, K. D. (1998). *Effects of norm violation and ostracism on working within the group*. Paper presented at the Society of Australasian Social Psychologists, Christchurch, NZ.
- Festinger, L. (1954). A theory of social comparison processes. *Human Relations*, 7, 117-140.  
doi: 10.1177/001872675400700202
- Fiske, A. P. (1992). The four elementary forms of sociality: Framework for a unified theory of social relations. *Psychological Review*, 99, 689-723.
- Fiske, A. P. (1993). Controlling other people, the impact of power on stereotyping. *American Psychologist*, 48, 621-628.
- Fiske, S. T., Cuddy, A. J. C., Glick, P. (2006). Universal dimensions of social cognition: Warmth and competence. *TRENDS in Cognitive Science*, 11(2), 77-83. doi: 10.1016/j.tics.2006.11.005
- Fitzpatrick, M. A. (1988). *Between husbands and wives: Communication in marriage*. Beverly Hills, CA: Sage.
- Floyd, K. (2011). Endocrinology in communication research. *Communication Research Reports*, 28(4), 369-372. doi: 10.1080/08824096.2011.616246
- Floyd, K., & Afifi, T. D. (2011). Biological and physiological perspectives on interpersonal communication. In M. L. Knapp & J. A. Daly (Eds.), *The sage handbook of interpersonal communication* (4<sup>th</sup> ed.), (pp. 87-130). Thousand Oaks, CA: Sage.

- Floyd, K., Hesse, C., & Haynes, M. T. (2007). Human affection exchange: XV. Metabolic and cardiovascular correlates of trait expressed affection. *Communication Quarterly*, 55, 79-94. doi: 10.1080/01463370600998715
- Floyd, K., Mikkelsen, A. C., Hesse, C., & Pauley, P. M. (2007). Affectionate writing reduces total cholesterol: Two randomized, controlled studies. *Human Communication Research*, 33, 119-142. doi: 10.1111/j.1468-2958.2007.00293.x
- Floyd, K., & Riforgiate, S. (2009). Affectionate communication received from spouses predicts stress hormone levels in healthy adults. *Communication Monographs*, 75, 351-368. doi: 10.1080/03637750802512371
- Floyd, K., & Roberts, J. B. (2009). Principles of endocrine system measurement in communication research. In M. J. Beatty, J. C. McCroskey, & K. Floyd (Eds.), *Biological dimensions of communication: Perspectives, Methods, and Research* (pp. 95-116). Cresskill, NJ: Hampton Press.
- Fredrickson, B. L. (1998). What good are positive emotions? *Review of General Psychology*, 2, 300-319. doi: 10.1037/1089-2680.2.3.300
- Fredrickson, B. L. (2001). The role of positive emotions in positive psychology. The broaden-and-build theory of positive emotions. *American Psychologist*, 56(3), 218-226. doi: 10.1037/0003-066X.56.3.218
- Gable, S. L., & Gosnell, C. L. (2013). Approach and avoidance in interpersonal relationships. *Emotion Review*, 5(3), 269-274.
- Geniole, S. N., Carré, J. M., McCormick, C. M. (2011). State, not trait neuroendocrine function predicts costly reactive aggression in men after social exclusion and inclusion. *Biological Psychology*, 87(1), 137-145.



- Gerber, J. & Wheeler, L. (2009). On being rejected: A meta-analysis of experimental research on rejection. *Perspectives on Psychological Science*, 4, 468-488.
- Gillath, O., Hart, J., Nofle, E. E., & Stockdale, G. D. (2009). Development and validation of a state adult attachment measure (SAAM). *Journal of Research in Personality*, 43, 362-373.
- Gladue, B. A. (1992). Aggressive behavioral characteristics, hormones, and sexual orientation in men and women. *Aggressive Behavior*, 17, 313-326.
- Gladue, B., Boechler, M., & McCaul, K. D. (1989). Hormonal response to competition in human males. *Aggressive Behavior*, 15, 409-422.
- Gleason, E. D., Fuxjager, M. J., Oyegbile, T. O., & Marler, C. A. (2009). Testosterone release and social context: When it occurs and why. *Frontiers in Neuroendocrinology*, 30, 460-469. doi: 10.1016/j.yfrne.2009.04.009
- Goffman, E. (1959). *The presentation of self in everyday life*. New York: Bantam Doubleday.
- Goffman, E. (1967). *Interaction ritual: Essays in face-to-face behavior*. Chicago: Aldine Publishing.
- Goodman, H. M. (2009). *Basic medical endocrinology* (4<sup>th</sup> ed.). Waltham, MA: Academic Press.
- Goymann, W., & Wingfield, J. C. (2004). Allostatic load, social status, and stress hormones: The costs of social status matter. *Animal Behaviour*, 67, 591-602.
- Greenberg, J., Solomon, S., & Arndt, J. (2007). A basic but uniquely human motivation: Terror management. In J. Shah, & W. Gardner (eds.), *Handbook of motivation science* (pp. 114-134). New York, NY: Guilford.
- Greene, J. O., & Burleson, B. R. (2003). *Handbook of communication and social interaction skills*. Mahwah, NJ: Lawrence Erlbaum Associates.

- Grice, H. P. (1975). Logic and conversation. In P. Cole & J. L. Morgan (Eds.) *Speech Acts* (pp. 41-58). New York, NY: Academic Press.
- Gruenewald, T. L., Dickerson, S. S., & Kemeny, M. E. (2007). A social function for the self-conscious emotions: Social-self preservation theory. In J. Tracy, R. Robins, & J. Tangney (Eds.), *Self-conscious emotions* (2nd ed., pp. 68–87). New York, Guilford Press.
- Gruenewald, T. L., Kemeny, M., E., & Aziz, J. (2006). Subjective social status moderates cortisol responses to social threat. *Brain, Behavior, and Immunity*, 20(4), 410-419. doi: 10.1016/j.bbi.2005.11.005
- Gruenfeld, D. H., Inesi, M. E., Magee, J. C., & Galinsky, A. D. (2008). Power and objectification of social targets. *Journal of Personality and Social Psychology*, 95, 111-127.
- Hamilton, M. A. (2012). Verbal aggression: Understanding the psychological antecedents and social consequences. *Journal of Language and Social Psychology*, 31(1), 5-12. doi: 10.1177/0261927X11425032
- Hamilton, M. A., Buck, R. W., Chory, R. M., Beatty, M. J., & Patrylak, L. A. (2009). Individualistic and cooperative affective systems as determinants of aggressive or collaborative message choice. In M. J. Beatty, J. C. McCroskey, & K. Floyd (Eds.), *Biological dimensions of communication: Perspectives, Methods, and Research* (pp. 95-116). Cresskill, NJ: Hampton Press.
- Harris, J. A., Rushton, J. P., Hampson, E., & Jackson, D. N. (1996). Salivary testosterone and self-report aggressive and pro-social personality characteristics in men and women. *Aggressive Behavior*, 22, 321-331.
- Haslam, N. (1999). Taxometric and related methods in relationships research. *Personal*
- Heatherton, T. F. & Polivy, J. (1991). Development and validation of a scale for measuring state

- self-esteem. *Journal of Personality and Social Psychology*, 60(6), 895-910. doi: 10.1037/0022-3514.60.6.895
- Heatherton, T. F., & Vohs, K. D. (2000). Interpersonal evaluations following threats to self: Role of self-esteem. *Personality Processes and Individuals Differences*, 78(4), 725-736. doi: 10.1037/AM22-3514.78.4.725
- Heider, F. (1958). *The Psychology of Interpersonal Relations*. New York: Wiley.
- Hellhammer, D. H., Hubert, W., & Schurmeyer, T. (1985). *Psychoneuroendocrinology*, 10(1), 77-81. doi: 10.1016/0306-4530(85)90041-1
- Hermans, E. J., Putman, P., Baas, J. M., Koppeschaar, H. P., & van Honk, J. (2006). A single administration of testosterone reduces fear-potentiated startle in humans. *Biological Psychiatry*, 59, 872-874.
- Hermans, E. J., Putman, P., & van Honk, J. (2006). Testosterone administration reduces empathetic behavior: A facial mimicry study. *Psychoneuroendocrinology*, 31, 859-866.
- Hermans, E. J., Ramsey, N. F., & van Honk, J. (2008). Exogenous testosterone enhances responsiveness to social threat in the neural circuitry of social aggression in humans. *Biological Psychiatry*, 63(3), 263-270. doi: 10.1016/j.biopsych.2007.05.013
- High, A. C. & Dillard, J. P. (2012). A review and meta-analysis of person-centered messages and social support outcomes. *Communication Studies*, 63, 99 – 118. doi: 10.1080/10510974.2011.598208
- Hinde, R. A. (1979). *Towards Understanding Relationships*. New York, NY: Academic Press.
- Hinde, R. A. (1996). Describing relationships. In A. E. Aughagen & M. von Salisch (Eds.), *The diversity of human relationships* (pp. 7-35). Cambridge: Cambridge University Press.

- Horvath, C. W. (1995). Biological origins of communicator style. *Communication Quarterly*, 43(4), 394-407. doi: 10.1080/01463379509369987
- Hovland, C. I., Janis, I. L., & Kelley, H. H. (1953). *Communication and persuasion*. New Haven, CT: Yale University Press.
- Kelley, H. H. (1973). The process of causal attribution. *American Psychologist*, 28, 107-128. doi: 10.1037/h0034225
- Kelley, H. H. (1979). *Personal relationships: Their structures and processes*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Kelley, H. H., & Michela, J. L. (1980). Attribution theory and research. *Annual Review of Psychology*, 31, 457-501.
- Kelley, H. H., Berscheid, E., Christensen, A., Harvey, J. H., Huston, T. L., Levinger, G., McClintock, E., Peplau, L. A., & Peterson, D. R. (1983). *Close relationships*. New York, NY: W. H. Freeman.
- Keltner, D., Gruenfeld, D. H., & Anderson, C. (2003). Power, approach, and inhibition. *Psychological Review*, 110, 265-284.
- Kemper, T. D. (1973). The fundamental dimensions of social relationships: A theoretical statement. *Acta Sociologica*, 16(1), 41-58.
- Kemper, T. D. (1990). *Social structure and testosterone: Explorations of the socio-bio-social chain*. New Brunswick, NJ: Rutgers University Press.
- Kemper, T. D. (1991). Predicting emotions from social relations. *Social Psychology Quarterly*, 54, 330-342.

- Kenrick, D. T., & Simpson, J. A. (1997). Why social psychology and evolutionary psychology need each other. In J. A. Simpson & D. T. Kenrick (Eds.), *Evolutionary social psychology* (pp. 1-20). Mahwah, NJ: Lawrence Erlbaum.
- Kernis, M., Grannemann, B., & Barclay, L. (1989). Stability and level of self-esteem as predictors of anger arousal and hostility. *Journal of Personality and Social Psychology*, 56, 1013-1022. doi: 10.1037/0022-3514.56.6.1013
- Khan-Dawood, F. S., Choe, J. K., & Dawood, M. Y. (1984). Salivary and plasma bound and “free” testosterone in men and women. *American Journal of Obstetrics and Gynecology*, 148(4), 441-445.
- Kirkpatrick, L. A., & Ellis, B. J. (2001). Evolutionary perspectives on self-evaluation and self-esteem. In G. Fletcher, & M. Clark, (eds.), *The Blackwell Handbook of Social Psychology. Vol. 2: Interpersonal Processes* (pp.411-436). Oxford, UK: Blackwell.
- Kirkpatrick, L. A., Waugh, C. E., Valencia, A., & Webster, G. (2002). The functional domain-specificity of self-esteem and the differential prediction of aggression. *Journal of Personality and Social Psychology*, 825, 756-767.
- Klopfer, P. H. (1981). On the evolution of aggression. In P. F. Brian, & D. Benton (eds.) *The biology of aggression*. (pp. 3-15). Rockville, MD: Sijthoff & Noordhoff.
- Knapp, M. L. (1972). *Nonverbal communication in human interaction*. New York, NY: Holt, Rinehart, & Winston.
- Knapp, M. L. (1984). *Interpersonal communication and human relationships*. Boston, MA: Allyn & Bacon.
- Knapp, M. L., & Daly, J. A. (2011). *The sage handbook of interpersonal communication* (4<sup>th</sup> ed.). Thousand Oaks, CA: Sage.

- Knapp, M. L., Ellis, D. G., & Williams, B. A. (1980). Perceptions of communication behavior associated with relationship terms. *Communication Monographs*, 47, 362-378.
- Knobloch, L. K., & Solomon, D. H. (2003). Manifestations of relationship conceptualizations in conversation. *Human Communication Research*, 29(4), 482-515.
- Koerner, A. F., & Fitzpatrick, M. A. (1997). Family type and conflict: The impact of conversation orientation and conformity orientation on conflict in the family. *Communication Studies*, 48, 59-75.
- Kramer, R. M. (1994). The sinister attribution error: Paranoid cognition and collective distrust in groups and organizations. *Motivation and Emotion*, 18, 199-229.
- Lammers, J., Galinsky, A. D., Gordijn, E. H., & Otten, S. (2012). Power increases social distance. *Social Psychology and Personality Science*, 3(3), 282-290. doi: 10.1177/1948550611418679
- Leary, T. (1957). *Interpersonal diagnosis of personality*. New York, NY: Ronald Press.
- Leary, M. R. (2005). Sociometer theory and the pursuit of relational value: Getting to the root of self-esteem. *European Review of Social Psychology*, 16(1), 75-111. doi: 10.1080/10463280540000007
- Lear, M. R., Koch, E., & Hechenbleikner, N. (2001). Emotional responses to interpersonal rejection. In M. R. Leary (Ed.), *Interpersonal Rejection* (pp.145-166). New York, NY: Oxford University Press.
- Leary, M. R., Kowalski, R. M., Smith, L., & Phillips, S. (2003). Teasing, rejection, and violence: Case studies of the school shootings. *Aggressive Behavior*, 29, 202-214.
- Leary, M. R. & Springer, C. (2000). Hurt feelings: The neglected emotion. In R. M. Kowalski (Ed.), *Behaving badly: Aversive behaviors in interpersonal relationships* (pp. 151-175).

Washington, DC: American Psychological Association.

- Leary, M. R., Twenge, J. M., & Quinlivan, E. (2006). Interpersonal rejection as a determinant of anger and aggression. *Personality and Social Psychology Review*, 10(2), 111-132. doi:
- LeDoux, J. E. (1996). *The emotional brain*. New York, NY: Simon & Schuster.
- Lerner, J. S., Li, Y., Valdesolo, P., & Kassam, K. Emotion and decision making. *Annual Review of Psychology*, 66(33), 1-33. doi: 10.1146/annurev-psych-010213-115043
- Levinson, C. A., Langer, J. K., & Rodebaugh, T. L. (2013). Reactivity to exclusion prospectively predicts social anxiety symptoms in young adults. *Behavior Therapy*, 44(3), 470-478. doi: 10.1016/j.beth.2013.04.007
- Lewis, M. (1993). Self-conscious emotions: Embarrassment, pride, shame and guilt. In M. Lewis & J. M. Haviland (Eds.) *Handbook of Emotions* (pp.563-594). New York, NY: Guilford Press.
- Lieberman, J. D., Solomon, S., Greenberg, J., & McGregor, H. A. (1999). A hot new way to measure aggression: Hot sauce allocation. *Aggressive Behavior*, 25(1), 331-348. doi: 10.1002/(SICI)1098-2337(1999)25:5<331::AID-AB2>3.0.CO;2-1
- Lopreato, J., & Alston, L. (1970). Ideal types and the idealization strategy. *American Sociological review*, 35(1), 88-96.
- Lorr, M., & McNair, D. M. (1963). An interpersonal behavior circle. *The Journal of Abnormal and Social Psychology*, 67(1), 68-75. doi: 10.1037/h0049326
- Loving, T. J., Heffner, K. L., & Kiecolt-Glaser, J. K. (2006). Physiology and interpersonal relationships. In A. L. Vangelisti & D. Perlman (Eds.), *The cambridge handbook of personal relationships*, (pp. 385-405). Cambridge, NY: Cambridge University Press.

- Lundberg, U., & Frankenhaeuser, M. (1980). Pituitary-adrenal and sympathetic-adrenal correlates of distress and effort. *Journal of Psychosomatic Research*, 24(3-4), 125-130. doi: 10.1016/0022-3999(80)90033-1
- MacDonald, G., & Leary, M. R. (2005). Why does social exclusion hurt? The relationship between social and physical pain. *Psychological Bulletin*, 131(2), 202-223. doi: 10.1037/0033-2909.131.2.202
- Mackinnon, S. P., Jordan, C. H., & Wilson, A. E. (2011). Birds of a feather sit together: Physical similarity predicts seating choice. *Personality and Social Psychology Bulletin*, 37(7), 879-892. doi: 10.1177/0146167211402094
- Magee, J., & Galinsky, A. (2008). Social hierarchy: The self-reinforcing nature of power and status. *The Academy of Management Annals*, 2, 351-398.
- Maner, J. K., DeWall, C. N., Baumeister, R. F., & Schaller, M. (2007). Does social exclusion motivate interpersonal reconnection? Resolving the “porcupine problem.” *Journal of Personality and Social Psychology*, 92, 42-55.
- Maner, J. K., Miller, S. L., Schmidt, N. B., & Eckel, L. A. (2010). The endocrinology of exclusion: Rejection elicits motivationally tuned changes in progesterone. *Psychological Science*, 21(4), 581-588. doi: 10.1177/0956797610362676
- Mark, R. A. (1971). Coding communication at the relationship level: *Journal of Communication*, 21(3), 221-232.
- Maslow, A. H. (1943). A theory of human motivation. *Psychological Review*, 50(4), 370-396. doi: 10.1037/h0054346



- Masten, C. L., Morelli, S. A., & Eisenberger, N. I. (2011). An fMRI investigation of empathy for 'social pain' and subsequent prosocial behavior. *Neuroimage*, 55(1), 381-388. doi: 10.1016/j.neuroimage.2010. 11.060
- Mazur, A. (1985). A biosocial model of status in face-to-face primate groups. *Social Forces*, 64(2), 377-402.
- Mazur, A., Booth, A., & Dabbs Jr, J. M. (1992). Testosterone and chess competition. *Social Psychology Quarterly*, 55(1) 70-77. Retrieved from: <http://www.jstor.org/stable/2786687>
- Mazur, A., & Lamb, T. A. (1980). Testosterone, status, and mood in human males. *Hormones and Behavior*, 14, 236-246.
- MacLean, P. D. (1973). *A triune concept of the brain and behavior*. Toronto, Canada: University of Toronto Press.
- Marteau, T. M., & Bekker, H. (1992). The development of a six-item short-form of the state scale of the Spielberger state-trait anxiety inventory (STAI). *British Journal of Clinical Psychology*, 31, 301-306.
- Mehrabian, A. (1972). *Nonverbal communication*. Chicago, IL: Aldine-Atherton.
- McAndrew, F. T. (2009). The interacting roles of testosterone and challenges to status in human male aggression. *Aggression and Violent Behavior*, 14(5), 330-335. doi: 10.1016/j.avb.2009.04.006
- McCaul, K. D., Gladue, B. A., & Joppa, M. (1992). Winning, losing, mood, and testosterone. *Hormones and Behavior*, 26, 486-504.
- McAuley, E., & Russell, D., & Gross, J. B. (1983). Affective consequences of winning and losing: An attributional analysis. *Journal of Sport Psychology*, 5, 278-287.

- McCroskey, J. C., & Teven, J. J. (1999). Goodwill: A reexamination of the construct and its measurement. *Communication Monographs*, 66(1), 90-103. doi: 10.1080/03637759909376464
- Mehta, P. H., & Josephs, R. A. (2010). Testosterone and cortisol jointly regulate dominance: Evidence for a dual-hormone hypothesis. *Hormones and Behavior*, 58, 898-906. doi: 10.1016/j.yhbeh.2010.08.020
- Michels, G., & Hoppe, U. C. (2008). Rapid actions of androgens. *Frontiers in Neuroendocrinology*, 29(2), 182-198. doi: 10.1016/j.yfme.2007.08.004
- Millar, F. E., & Rogers, L. E. (1987). Relational dimensions of interpersonal dynamics. In M. Roloff & F. R. Miller (Eds.), *Explorations in interpersonal processes: New directions in communication research* (pp. 117-140). Newbury Park, CA: Sage.
- Miller, G. R. (1978). State of the art: The current status of theory and research in interpersonal communication. *Human Communication Research*, 4(2), 164-178. doi: 10.1111/j.1468-2958.1978.tb00606.x
- Miller, G. R., & Steinberg, M. (1975). *Between people: A new analysis of interpersonal communication*. Chicago, IL: Science Research Associates.
- Miller, G., Tybur, J. M., & Jordan, B. D. (2007). Ovulatory cycle effects on tip earnings by lap dancers: Economic evidence for human estrus? *Evolution and Human Behavior*, 28(6), 375-381. doi: 10.1016/j.evolhumbehav.2007.06.002
- Montoya, R. M., & Horton, R. S. (2004). On the importance of cognitive evaluation as a determinant of interpersonal attraction. *Journal of Personality and Social Psychology*, 86, 696-712.

- Montoya, R. M., Horton, R. S., & Kirchner, J. (2008). Is actual similarity necessary for attraction? A meta-analysis of actual and perceived similarity. *Journal of Social and Personal Relationships*, 25(6), 889-922. doi: 10.1177/0265407508096700
- Nass, C., & Moon, Y. (2000). Machines and mindlessness: Social responses to computers. *Journal of Social Issues*, 56(1), 81. doi: 10.1111/0022-4537.00153
- Neave, N., & Wolfson, S. (2003). Testosterone, territoriality, and the “home advantage.” *Physiology and Behavior*, 78, 269-275.
- Paolacci, G., Chandler, J., & Ipeirotis, P. G. (2011). Running experiments on amazon mechanical turk. *Judgment and Decision Making*, 5(5), 411-419.
- Paulsel, M. L., & Mottet, T. P. (2004). Interpersonal communication motives: A communibiological perspective. *Communication Education*, 52(2), 182-195.
- Pearce, W. B., & Cronen, V. (1980). *Communication, action, and meaning: The creation of social realities*. New York, NY: Praeger Publishing.
- Pearlman, D., & Duck, S. (2006). The seven seas of the study of personal relationships: From “the thousand islands” to interconnected waterways. In A. L. Vangelisti & D. Perlman (Eds.), *The cambridge handbook of personal relationships*, (pp. 11-34). Cambridge, NY: Cambridge University Press.
- Persky, H., Smith, K., & Bassu, G. K. (1971). Relation of psychological measures of aggression and hostility to testosterone production in man. *Psychosomatic Medicine*, 33, 265-277.
- Petronio, S. (2000). *Balancing the secrets of private disclosures*. Mahwah, NJ: Erlbaum and Associates.
- Petronio, S. (2002). *Boundaries of privacy: Dialectics of disclosure*. Albany, NY: State University of New York Press.

- Popma, A., Vermeiren, R., Geluk, C., Rinne, T., van den Brink, W., Knol, D. L...Doreleijers, T. (2007). Cortisol moderates the relationship between testosterone and aggression in delinquent male adolescents. *Biological Psychiatry*, 61(3), 405-411. doi: 10.1016/j.biopsych.2006.06.006
- Reeves, B., & Nass, C. (1996). *The media equation: How people treat computers, television, and new media like real people and places*. New York, NY: Cambridge University Press.
- Reiss, H. T. (2008). Reinvigorating the concept of situation in social psychology. *Personality and Social Psychology Review*, 12(4), 311-329. doi: 10.1177/1088868308321721
- Relationships*, 6, 519-534.
- Rogers, E. M. (1999). Anatomy of two subdisciplines of communication study. *Human Communication Research*, 25(4), 618-631. doi: 10.1111/j.1468-2958.1999.tb00465.x
- Rogers, L. E. (1998). The meaning of relationship in relational communication. In R. L. Conville & L. E. Rogers (Eds.), *The meaning of "relationship" in interpersonal communication* (pp. 69-82). Westport, CT: Praeger Publishers.
- Rogers, L. E., & Farace, R. V. (1975). Analysis of relational communication in dyads: New measurement procedures. *Human Communication Research*, 1, 222-239.
- Ronay, R., & Carney, D. R. (2013). Testosterone's negative relationship with empathetic accuracy and perceived leadership ability. *Social Psychological and Personality Science*, 4(1), 92-99. doi: 10.1177/1948550612442395
- Rook, K. S. (1984). The negative side of social interaction: Impact on psychological well-being. *Journal of Personality and Social Psychology*, 46, 1097-1108.

- Rowe, R., Maughan, B., Wothman, C. M., Costello, E. J., & Angold, A. (2004). Testosterone, antisocial behavior, and social dominance in boys: Pubertal development and biosocial interaction. *Biological Psychiatry*, 55, 546-552. doi: 10.1016/j.biopsych.2003.10.010
- Rubin, R. T., Reinisch, J. M., & Haskett, R. F. (1981). Postnatal gonadal steroid effects on human behavior. *Science*, 211(4488), 1318-1324.
- Ruesch, J., & Bateson, G. (1951). *Communication: The social matrix of psychiatry*. New York, NY: Norton.
- Russell, B. (1938). *Power: A new social analysis*. London, UK: Allen and Unwin.
- Salvador, A., & Costa, R. (2009). Coping with competition: Neuroendocrine responses and cognitive variables. *Neuroscience and Biobehavioral Reviews*, 33(2), 160-170. doi: 10.1016/j.neubiorev.2008.09.005
- Schultheiss, O. C., & Stanton, S. J. (2009). Assessment of salivary hormones. In E. Harmon-Jones & J. S. Beer (Eds.), *Methods in Social Neuroscience* (pp. 17-44). New York, NY: Guilford.
- Schutz, W. C. (1958). *FIRO: A three-dimensional theory of interpersonal behavior*. New York, NY: Rinehart.
- Sciences*, 21(3), 353-397.
- Seidel, E. M., Silani, G., Metzler, H., Thaler, H., Lamm, C., Gur, R. C.,...& Derntl, B. (2013). The impact of social exclusion vs. inclusion on subjective and hormonal reactions in males and females. *Psychoneuroendocrinology*, 38(1), 2925-2932. doi: 10.1016/j.psyneuen.2013.07.021

- Shea, J. L., Wong, P., & Chen, Y. (2014). Free testosterone: Clinical utility and important analytical aspects of measurement. In G. Makowski (Ed.), *Advances in Clinical Chemistry*, V. 63, (pp. 59-84). Boston, MA: Academic Press.
- Siever, L. J. (2008). Neurobiology of aggression and violence. *American Journal of Psychiatry*, 165(4), 429-442. doi: 10.1176/appi.ajp.2008.07111774
- Simpson, K. (2001). The role of testosterone in aggression. *McGill Journal of Medicine*, 6, 32-40.
- Small, D. A., & Loewenstein, G. (2003). Helping a victim or helping the victim: Altruism and identifiability. *Journal of Risk and Uncertainty*, 26, 5-16.
- Smith, P. K., & Trope, Y. (2006). You focus on the forest when you're in charge of the trees: Power priming and abstract information processing. *Journal of Personality and Social Psychology*, 90, 578-596.
- Soler, H., Vinayak, P., & Quadagno, D. (2000). Biosocial aspects of domestic violence. *Psychoneuroendocrinology*, 25, 721-739.
- Solomon, D. H., & Knobloch, L. K. (2004). A model of relational turbulence: The role of intimacy, relational uncertainty, and interference from partners in appraisals of irritations. *Journal of Social and Personal Relationships*, 21(6), 795-816. doi: 10.1177/0265407504047838
- Spoor, J. R., & Williams, K. D. (2007). The evolution of an ostracism detection system. In J. P. Forgas, M. G. Haselton, and W. von Hippel (Eds.). *The evolution of the social mind: Evolutionary psychology and social cognition*. (pp.279-292). New York, NY: Psychology Press.
- Sullivan, H. H. (1953). *The interpersonal theory of psychiatry*. New York, NY: Norton.

- Tajfel, H. (1970). Experiments in intergroup discrimination. *Scientific American*, 223, 96-102.
- Tajfel, H., & Turner, J. C. (1985). The social identity theory of intergroup behavior. In S. Worchel and W. G. Austin (Eds.), *Psychology of intergroup relations* (pp. 7-24). New York, NY: Burnham, Inc.
- Tamres, L., Janicki, D., & Helgeson, V. S. (2002). Sex differences in coping behavior: A meta-analytic review. *Personality and Social Psychology Review*, 6, 2-30.
- Taylor, S. E. (2002). *The tending instinct: How nurturing is essential to who we are and how we live*. New York, NY: Holt.
- Taylor, L. S., Fiore, A. T., Mendelsohn, G. A., & Cheshire, C. (2011). "Out of my league": A real-world test of the matching hypothesis. *Personality and Social Psychology Bulletin*, 37(7), 942-954. doi: 10.1177/0146167211409947
- Thibault, J. W., & Kelley, H. H. (1952). *The social psychology of groups*. New York, NY: John Wiley & Sons.
- Tiedens, L. Z., Ellsworth, P. C., & Mesquita, B. (2000). Stereotypes about sentiments and status: Emotional expectations for high and low status group members. *Personality and Social Psychology Bulletin*, 26, 560-574.
- Tremblay, R. E., Schall, B., Boulerice, B., Arseneault, L., Soussignan, R. G., Paquette, D., & Laurent, D. (2001). Testosterone, physical aggression, dominance, and physical development in early adolescence. *International Journal of Behavioral Development*, 22(4), 753-777. doi: 10.1080/016502598384153

- Tremblay, R. E., Schall, B., Boulerice, B., Arseneault, L., Soussignan, R. G., Paquette, D., & Laurent, D. (2001). Testosterone, physical aggression, dominance, and physical development in early adolescence. *International Journal of Behavioral Development*, 22(4), 753-777. doi: 10.1080/016502598384153
- Trujillo, N. O. (1981). Relational communication: A comparison of coding systems. *Communication Monographs*, 48, 91-105.
- Twenge, J. M., Baumeister, R. F., Tice, D. M., Stucke, T. S. (2001). If you can't join them, beat them: Effects of social exclusion on aggressive behavior. *Journal of Personality and Social Psychology*, 81(1), 31-46.
- Twenge, J. M., Baumeister, R. F., DeWall, C. N., Ciarocco, N. J., & Bartels, J. M. (2007). Social exclusion decreases prosocial behavior. *Journal of Personality and Social Psychology*, 92(1), 56-66. doi:10.1037/0022-3514.92.1.56
- Twenge, J. M., Catanese, K. R., Baumeister, R. F. (2002). Social exclusion causes self-defeating behavior. *Journal of Personality and Social Psychology*, 83(3), 606-615.
- Udry, J. R., & Talbert, L. M. (1988). Sex hormone effects on personality at puberty. *Journal of personality and social psychology*, 54(2), 291-295. doi: 10.1037/0022-3514.54.2.291
- van Anders, S. M., & Watson, N. V. (2006). Social neuroendocrinology: Effects of social contexts and behaviors on sex steroids in humans. *Human Nature*, 17(2), 212-237.
- van Anders, S. M., Goldey, K. L., Conley, T. D., Snipes, D. J., & Patel, D. A. (2011). Safer sex as the bolder choice: Testosterone is positively correlated with safer sex behaviorally relevant attitudes in young men. *The Journal of Sexual Medicine*, 9(3), 722-734. doi: 10.1111/j.1743-6109.2011.02544.x



- van Honk, J., Montoya, E. R., Bos, P. A., van Vugt, M., & Terburg, D. (2012). New evidence on testosterone and cooperation. *Nature*, 485, E4-E5. doi: 10.1038/nature11136
- van Honk, J., Terburg, D., & Bos, P. A. (2011). Further notes on testosterone as a social hormone. *Trends in Cognitive Sciences*, 15(7), 291-292. doi: 10.1016/j.tics.2011.05.003
- van Honk, J., Tuiten, A., Verbaten, R., van den Hout, M., Koppeschaar, H., Thijssen, J., & de Haan, E. (1999). Correlations among salivary testosterone, mood, and selective attention to threat in humans. *Hormones and Behavior*, 36, 17-24. doi
- van Honk, J., Tuiten, A., van den Hout, M., Koppeschaar, H., Thijssen, J., de Haan E., & Verbaten R. (1998). Baseline salivary cortisol levels and preconscious selective attention for threat. *Psychoneuroendocrinology*, 23(7), 741-747.
- van Wingen, G. A., Zylicz, S. A., Pieters, S., Mattern, C., Verkes, R. J., Buitelaar, J. K., & Fernandez, G. (2009). Testosterone increases amygdala reactivity in middle-aged women to a young adulthood level. *Neuropsychopharmacology*, 34, 539-547.
- VanLear, C. A. (1991). Testing a cyclical model of communicative openness in relationship development: Two longitudinal studies. *Communication Monographs*, 58, 337-360.
- VanLear, C. A., Koerner, A., & Allen, D. (2006). Relationship typologies. In A. L. Vangelisti & D. Perlman (Eds.), *Cambridge handbook of personal relationships* (pp. 91-110). New York, NY: Cambridge University Press.
- Vermeersch, H., T'Sjoen, G., Kaufman, J. M., & Vincke, J. (2008a). Estradiol, testosterone, differential association and aggressive and non-aggressive risk taking in adolescent girls. *Psychoneuroendocrinology*, 33(7), 897-908. doi: 10.1016/j.psyneuen.2008.03.016

- Vermeersch, H., T'Sjoen, G., Kaufman, J. M., & Vincke, J. (2008b). The role of testosterone in aggressive and non-aggressive risk taking in adolescent boys. *Hormones and Behavior*, 53(3), 463-471. doi: 10.1016/j.yhbeh.2007.11.021
- Virkkunen, M. (1985). Urinary free cortisol secretion in habitually violent offenders. *Acta Psychiatrica Scandinavica*, 72, 40-44.
- Vittek, J., L'Hommedieu, D. G., Gordon, G. G., Rappaport, S. C., & Southren, A. L. (1985). Direct radioimmunoassay (RIA) of salivary testosterone: Correlation with free and total serum testosterone. *Life Science*, 37, 711-716.
- Vlau, V. (2002). Functional cross-talk between the hypothalamic-pituitary-gonadal and adrenal axes. *Journal of Neuroendocrinology*, 14, 506-513. doi: 10.1046/j.1365-2826.2002.00798.x
- Wallen, K. & Hassett, J. (2009). Neuroendocrine mechanisms underlying social relationships. In P. T. Ellison & P. B. Gray (Eds.), *Endocrinology of social relationships*. Cambridge, MA: Harvard University Press.
- Walther, J. B. (1992). Interpersonal effects in computer-mediated interaction: A relational perspective. *Communication Research*, 19(1), 52-90. doi: 10.1177/009365092019001003
- Walther, J. B. (1996). Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Communication Research*, 23(1), 3-43.
- Wang, C., Plymate, S., Nieschlag, E., & Paulsen, C. A. (1981). Salivary testosterone in men: further evidence of a direct correlation with free serum testosterone. *The Journal of Clinical Endocrinology & Metabolism*, 53, 1021-1024.
- Warburton, W. A., Williams, K. D., & Cairns, D. R. (2006). When ostracism leads to aggression: The moderating effects of control deprivation. *Journal of Experimental Social Psychology*, 42(2), 213-220. doi: 10.1016/j.jesp.2005.03.005

- Watzlawick, P., Beavin, J. H., & Jackson, D. D. (1967). *Pragmatics of human communication*. New York, NY: W. W. Norton.
- Welker, K. M., Oberleitner, D. E., Cain, S., & Carré, J. M. (2013). Upright and left out: Posture moderates the effects of social exclusion on mood and threats to basic needs. *European Journal of Social Psychology*, 43, 355-361. doi: 10.1002/ejsp.1944
- Wesselmann, E. D., Bagg, D., & Williams, K. D. (2009). "I feel your pain": The effects of observing ostracism on the ostracism detection system. *Journal of Experimental Social Psychology*, 45(6), 1308-1311. doi: 10.1016/j.jesp.2009.08.003
- Wesselmann, E. D., Butler, F. A., Williams, K. D., & Pickett, C. L. (2010). Adding injury to insult: Unexpected rejection leads to more aggressive responses. *Aggressive Behavior*, 36(4), 232-237. doi: 10.1002/ab.20347
- Wibral, M., Dohmen, T., Klingmüller, D., Weber, B., & Falk, A. (2012). Testosterone administration reduces lying in men. *PLoS ONE*, 7(10), 1-5. doi: 10.1371/journal.pone.0046774
- Wicker, A. W., & Bushweiler, G. (1970). Perceived fairness and pleasantness of social exchange situations: Two factorial studies of inequity. *Journal of Personality and Social Psychology*, 15(1), 63-75.
- Williams, K. D. (1997). Social ostracism: In R. Kowalski (Ed.), *Aversive interpersonal behaviors* (pp. 133-170). New York, NY: Plenum Press.
- Williams, K. D. (2007). Ostracism. *Annual Review of Psychology*, 58, 425-452.
- Williams, K. D. (2009). Ostracism: Effects of being excluded and ignored. In M. P. Zanna (ed.) *Advances in Experimental Social Psychology* (Vol. 41). New York: Academic Press, pp. 275-314.

- Williams, K. D., Yeager, D. S., Cheung, C. K. T., & Choi, W. (2012). *Cyberball 4.0* [Software].
- Williams, K. D., & Zardo, L. (2001). Ostracism: On being ignored, excluded, and rejected. In M. R. Leary (ed.) *Interpersonal Rejection*. (pp. 21-XX). Oxford University Press.
- Wilson, G. V., & Kerr, J. H. (1999). Affective responses to success and failure: A study of winning and losing in competitive rugby. *Personality and Individual Differences*, 27, 85-99.
- Wingfield, J. C., Hegner, R. E., Dufty, A. M. & Ball, G. F. (1990). The “challenge hypothesis”: Theoretical implications for patterns of testosterone secretion, mating systems, and breeding systems. *The American Naturalist*, 136(6), 829-846.
- Wingfield, J. C., Jacobs, J. D., Tramontin, A. D., Perfito, N., Meddle, S., Maney, D. L. & Soma, K. (2000). Toward an ecological basis for hormone-behavior interactions in reproduction in birds. In K. Wallen & J. E. Schneider (Eds.), *Reproduction in context: Social and environmental influences on reproductive physiology and human behavior*. Cambridge, MA: MIT Press.
- Wirth, M. M., & Schultheiss, O. C. (2007). Basal testosterone moderates responses to anger faces in humans. *Physiology & Behavior*, 90(2-3), 496-505. doi: 10.1016/j.physbeh.2006.10.016
- Wirth, M. M., Welsh, K. M., & Schultheiss, O. C. (2006). Salivary cortisol changes in humans after winning or losing a dominance contest depend on implicit power motivation. *Hormones and Behavior*, 49(3), 346-352. doi: 10.1016/j.ybeh.2005.08.013
- Wish, M., Deutsch, M., & Kaplan, S. J. (1976). Perceived dimensions of interpersonal relations. *Journal of Personality and Social Psychology*, 33(4), 409-420.

- Wojciszke, B., Abele, A. E., & Baryla, W. (2009). Two dimensions of interpersonal attitudes: liking depends on communion, respect demands agency. *European Journal of Social Psychology*, 39, 973-990. doi: 10.1002/ejsp.595
- Wojciszke, B., Bazinska, R., & Jaworski, M. (1998). On the dominance of moral categories in impression formation. *Personality and Social Psychology Bulletin*, 24(12), 1251-1263.
- Wood, R. I., & Stanton, S. J. (2012). Testosterone and sport: Current perspectives. *Hormones and Behavior*, 61(1), 147-155. doi: 10.1016/j.yhbeh.2011.09.010
- Wood, W., & Eagly, A. H. (2012). Biosocial construction of sex differences and similarities in behavior. *Advances in Experimental Social Psychology*, 46(1), 55-123. doi: 10.1016/B978-0-12-394281-4.00002-7
- Woodmann, D. D., Hinton, J. W., O'Neil, M. T. (1978). Cortisol secretion and stress in maximum security hospital patients. *Journal of Psychosomatic Research*, 22, 133-136.
- Wrench, J. S., & McCroskey, J. (2003). A communibiological examination of ethnocentrism and homophobia. *Communication Research Reports*, 20(1), 24-33. doi: 10.1080/08824090309388796
- Yu, Y., & Shi, J. (2009). Relationship between levels of testosterone and cortisol in saliva and aggressive behaviors of adolescents. *Biomedical and Environmental Sciences*, 22(1), 44-49. doi: 10.1016/S0895-3988(09)60021-0
- Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist*, 35, 151-175. doi: 10.1037/0003-066X.35.2.151
- Zak, P. J., Kurzban, R., Ahmadi, S., Swerdloff, R. S., Park, J., Efremidze, L.,...& Matzner, W. (2009). Testosterone administration decreases generosity in the ultimatum game. *PLoS ONE*, 4(12), e8330. doi: 10.1371/journal.pone.0008330.

- Zardo, L., Williams, K. D., & Richardson, R. (2004). How long can you go? Ostracism by a computer is sufficient to lower self-reported levels of belonging, control, self-esteem, and meaningful existence. *Journal of Experimental Social Psychology*, 40(4), 560-567. doi: 10.1016/j.esp.2003.11.006
- Zilioli, S., & Watson, N. V. (2012). The hidden dimension of the competition effect: Basal cortisol and basal testosterone jointly predict changes in salivary testosterone after social victory in men. *Psychoneuroendocrinology*, 37(11), 1855-1865. doi: 10.1016/j.psyneuen.2012.03.022
- Zoller, C., Maroof, P., Weik, U., & Deinzer, R. (2010). No effect of social exclusion on salivary cortisol secretion in women in a randomized controlled study. *Psychoneuroendocrinology*, 35(1), 1294-1298. doi: 10.1016/j.psyneuen.2010.02.019
- Zwolinski, J. (2008). Biopsychosocial responses to social rejection in targets of relational aggression. *Biological Psychology*, 79(2), 260-267. doi: 10.1016/j.biopsycho.2008.06.006