Competition, Power, and Testosterone: How Winning and Losing Affect Men's Empathic Accuracy and Aggression

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ABSTRACT

Competition, Power, and Testosterone: How Winning and Losing Affect Men's Empathic Accuracy and Aggression

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This thesis investigates the effects of winning and losing on men's testosterone and how these hormonal changes impact their emotion recognition ability or 'empathic accuracy' (Study 1) and their aggression (Study 2). It also explores how men's personalized power motivation – their drive to influence other people for self-aggrandizing purposes – moderates the relationships between the competitive outcomes they experienced and their accuracy and aggression. In Study 1, 84 males competed in dyads on a spatial-cognitive task that allegedly gauged their leadership potential, future earnings, and likelihood of career success after which they interpreted people's emotional expressions from static photographs. Results showed that winners' testosterone decreased while that of losers increased. Second, winners were more capable of accurately inferring others' emotions compared to losers and this ability improved with increasing personalized power. Third, testosterone change mediated the relationship between competitive outcomes and empathic accuracy, with post-competitive increases in testosterone relating to increases in accuracy. In Study 2, 72 males competed again in dyads after which they participated in two sequential tasks that measured their unprovoked ('proactive') and provoked ('reactive') aggression. As in Study 1, losers experienced a post-competitive testosterone increase, whereas winners experienced a decrease. However, neither competitive outcome nor testosterone change

had a significant effect on proactive and reactive aggression. Moreover, as men's personalized power increased, winners aggressed more proactively than losers, whereas losers aggressed more reactively than winners. Collectively, these are the first studies to explore how winning and losing interact with men's personalized power motivation to affect various empathic responses. This research is important because we know little about what happens to behaviours and cognitions in the aftermath of a status-based contest. Given that competition is encouraged in many organizations and the workplace is a social setting in which zero-sum games are played out each day, findings from this research could assist managers in fostering healthier competitive work climates. Finally, among the myriad of future avenues worth pursuing, I particularly recommend that scholars look into how competition, personalized power, and endocrine changes jointly affect women's empathic accuracy and aggression.

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CHAPTER ONE

> "Mutation and selection, the great "constructors" which make genealogical trees grow upward, have chosen, of all unlikely things, the rough and spiny shoot of intra-specific competition and aggression to bear the blossoms of personal friendship and love."
>
> − Nobel Prize winner Konrad Lorenz, *On Aggression* (1966, p. 48).

1. INTRODUCTION

Among the countless examples of human social life, the rivalry taking place between men competing for status excites the collective imagination like few others. Whether we are witnessing a current debate between Vladimir Putin and Barack Obama or one between Bill Gates and Steve Jobs from a bygone era, most people will agree that male competition arouses our senses far more than male cooperation. We are so enthralled by the competition itself and what it produces – glory and fame for winners, heartbreak and shame for losers – that we often overlook what happens to competitors' thoughts and behaviours once the competition is over. Nearly 50 years ago, ethologist and Nobel laureate Konrad Lorenz discussed how competition for social rank and power among members of the same species produces aggressive behaviour that is vital for their survival and reproduction. He used examples of behaviour from the animal kingdom to draw parallels with human behaviour, and provided evidence showing that the most aggressive social animals can also be the most caring and affiliative. Lorenz's paradoxical observation was centered largely on nonhumans, yet the idea of how intense male-male competition and its outcomes might affect one's empathy and aggression toward others was hatched.

No one can doubt that humans are an aggressive species with a long history mired in violence (Pinker, 2011). However, we are also a gregarious species and virtually all of our actions including our thoughts, attitudes, desires, and feelings are either directed toward or produced in response to others (Batson, 1990; Decety, 2007). It is not astonishing, therefore, that a person's ability to understand others and experience their thoughts and feelings in relation to oneself, i.e., to empathize with others, is tantamount in developing and maintaining genuine relationships. To be empathic is to enter another's world and to reciprocate with an appropriate emotion (Freire, 2007; Rogers, 1975), and failing to recognize and identify with others' feelings is a hallmark of psychopathy and narcissism (Blair, 1995; Rosenthal & Pittinsky, 2006).

Fortunately, most people are able to shift their attentional focus from themselves toward others, and there are numerous instances in everyday life where empathy plays a critical role. One example is the workplace because it constitutes an area where all of our basic processes, including our emotions, are expressed daily (Ashforth & Humphrey, 1995; Weiss, 2002a). Empathy has been characterized as "the *sine qua non* of all social effectiveness in working life" (Goleman, Boyatzis, & McKee, 2002, p. 63), and its investigation in the workplace has received some attention. Organizational research over the last 30 years has suggested that empathy as a personality trait is instrumental to leadership and mentoring (Bass, 1985; Luthans & Avolio, 2003; Ragins, 1997), decision making and negotiation (Detert, Treviño, & Sweitzer; 2008; Fenton-O'Creevey, Soane, Nicholson, & Willman, 2011; Galinsky, Maddux, Gilin, & White, 2008; Morris & Keltner, 2000; Vecchio, 1981), cooperation and trust (McAllister, 1995; Settoon & Mossholder, 2002; Sheppard & Sherman, 1998), and organizational citizenship behaviours (Brief & Motowidlo, 1986; Joireman, Kamdar, Daniels, & Duell, 2006; Kamdar, McAllister, & Turban, 2006; Rioux & Penner, 2001), to name just a few areas. Each of these streams has

touted the positive effects of empathic expressions in a number of relational contexts involving, for example, managers and their subordinates, marketers and their customers, and healthcare workers and their patients.

Management scholars (Sutton, 2007) and industrial-organizational psychologists (Babiak & Hare, 2006) have also documented cases where people express little or no empathy vis-à-vis their work colleagues. For instance, Sutton (2007) explained how unempathic individuals deliberately focus their aggression on less powerful coworkers and, consequently, undermine their self-esteem and self-worth. Over time, these individuals poison the work environment and provoke qualified employees to quit. Due to their effect in decreasing morale and productivity, Sutton advocated that rules be implemented to identify and screen out such toxic persons before a civilized workplace can be restored. Similarly, Babiak and Hare (2006) portrayed the corporate psychopath as someone who is incapable of empathy, guilt, or loyalty to anyone but themselves. These callous and "opportunistic corporate bullies" (Babiak & Hare, 2006, p. 188) attack powerless targets by consistently ignoring their rights and emotions and, when they are finished deriving utility from each one, they move on to their next victim.

Collectively, the literature on empathy in the workplace has provided a fairly intuitive notion, namely that being empathic leads to beneficial outcomes while being unempathic produces harmful ones (with some exceptions, see Gino & Pierce, 2009, 2010; Vorauer, 2006). Thus, it has treated empathy lopsidedly as a *trait*, with the vast majority of studies investigating the effects of individual differences in trait empathy on a given dependent variable rather than treating empathic *states* as dependent variables that merit their own attention (e.g., Dutton & Heaphy, 2003; Mahsud, Yukl, & Prussia, 2010). Since empathy is an emotional capacity, and emotions are hybrid phenomena that consist of fluctuating states around an enduring trait-like

mean level for each person (Larsen, Diener, & Lucas, 2002), it behooves researchers to study not only what external factors cause it to change, but also how this change subsequently affects the individual experiencing it. This is important because emotional states influence behaviours that have important work implications (Ashkanasy & Daus, 2002; Weiss & Cropanzano, 1996) and making inferences about emotional states necessitates that researchers use state manipulations and proper experimental, not correlational, designs (Larsen et al., 2002).

Second, the literature has also been silent in exploring social contexts that affect people's empathic states. Émile Durkheim (1938) and Max Weber (1947) noted long ago that the social environment is a constellation of persons whose actions produce an effect on any given individual. Since then, researchers have reported that a large class of human emotions – including fear, anger, sadness, guilt, and shame – resulted from either real, anticipated, imagined, or recollected outcomes of power and status relations (Kemper 1978, 1991; Kemper & Collins, 1990; Plutchik, 1980). Therefore, if socially-induced status gains and losses are capable of generating these emotions, then including empathy in this pantheon of emotional responses seems warranted, especially given its centrality to interpersonal relationships in the workplace.

Finally, many scholars have long acknowledged the integral link between social interactions, emotions, and physiology (e.g., Becker & Cropanzano, 2010; Ekman, Davidson, & Friesen, 1990; Gross, 1998; Heaphy & Dutton, 2008; Ilies, Arvey, & Bouchard, 2006; Leach & Tiedens, 2004; Weiss, 2002b). However, empirical models that speak to the biosocial nature of empathy have yet to be tested. One hormone that is of interest to social scientists given its close association with social behaviour is testosterone (Carré, 2010), and an important body of empirical work dealing with men's attempts to reach favourable positions within a social hierarchy comes from studies investigating how competitive contests between men result in

corresponding testosterone changes (in sociology, see Booth, Granger, Mazur, & Kivlighan, 2006; Mazur, 1985; Mazur & Booth, 1998; in psychology, see Archer, 2006, 2009; Carré, Putnam, & McCormick, 2009; Maner, Miller, Schmidt, & Eckel, 2008; Schultheiss, Campbell, & McClelland, 1999; and in social endocrinology, see Liening, Mehta, & Josephs, 2012; Mehta, Jones, & Josephs, 2008).

This thesis addresses the above gaps and its objective is three-fold. First, using two laboratory experiments, it explores how a competitive rivalry between men in which social status is either won or lost differentially affects their accuracy in inferring others' emotions (a cognitive response) and their aggression toward third parties (a behavioural response). Second, it examines whether a change in rivals' testosterone following competition mediates the relationship between their experienced outcome (win, loss) and each of their empathic and aggressive responses. Third, and finally, it investigates whether rivals' desire to influence other people (or their implicit power motivation) moderates the relationship between the competitive outcomes they experience and their subsequent responses. Following the above logic and using Andrew Hayes's (2013) conditional process model, this thesis will therefore determine: 1) whether there are direct effects of men's winning and losing status on their empathic accuracy and aggression, 2) whether changes in their testosterone levels mediate these direct effects, and 3) whether their implicit power motivation moderates the direct effects.

Two major contributions stem from this work. More broadly, it clarifies our understanding of how empathic accuracy and aggressive behaviour differ as a function of people's propensity for power following social status gain or loss. This classic person-situation interaction is often witnessed in occupations marked by clear winners and losers, the former being rewarded with material (e.g., financial bonus, office upgrade) and symbolic status symbols (e.g., occupational

title, preferred parking). Examples of these jobs include those in sales, financial asset trading, negotiation, litigation, and perhaps even academia. The workplace in these occupational domains is often characterized as a social arena where zero-sum games occur daily, and where both men and women acquire status through promotions or other notable achievements and accolades. It is also a place where they lose status through failure to meet their goals (e.g., sales targets), poor job evaluations, demotions, layoffs. According to O'Leary-Kelly, Griffin, and Glew (1996), personal achievement and strenuous competition are values that North American organizations consider fundamental to their culture, and which may contribute to a degradation in civil workplace behaviour and a rise in aggressive behaviour. Thus, looking into how emotionally charged competitive situations interact with men's psychophysiology will help us to better understand and anticipate organizational behaviour.

More specifically, this research is pioneering in three empirical respects. First, it clarifies the literature's mixed findings on the relationship between competitive outcomes and aggression by introducing power motivation. My findings show not only that winners and losers aggress in different ways as their power motivation increases, but also that their aggression becomes noteworthy only at high levels of power. Second, power motivation also differentiates winners from losers in their ability to accurately infer how others are feeling, a novel finding that has important implications in the workplace. Given that managers are high-power individuals, such findings can help predict how they might respond after having won or lost status. Lastly, and perhaps surprisingly, it shows that fluctuating male testosterone levels triggered by wins and losses affect men's empathic accuracy, but not their aggression. As such, it is one of the first studies to demonstrate that testosterone is more prone to affect a cognitive ability rather than a behaviour with which it is believed to be so intimately associated. Therefore, by measuring a

range of cognitive and behavioural empathic outcomes emanating from a status contest and believed to be intricately associated with androgen changes, empirical evidence is provided to contradict what many believed was written in stone, namely that testosterone and aggression go hand in hand. By doing so, this work dispels some of the bad reputation surrounding testosterone and, more importantly, shows that hormone-behaviour "if-then" associations may be too simplistic.

CHAPTER TWO

2. THEORETICAL BACKGROUND

Two assumptions must be highlighted before the focal constructs of interest are discussed. First, it is assumed that achieving higher social status is a value shared by most individuals and, second, that each will respond with a desire to emerge victoriously when competing with someone else. While status usually translates to more benefits for those possessing it, there are instances in which some people shun dominance battles for high-status positions because they lack either motivation for power and influence (Schultheiss, Dargel, & Rohde, 2003) or dispositional dominance (van Honk et al., 1999; Josephs, Sellers, Newman, & Mehta, 2006). Others might also be content with their current level of status or have enough self-esteem that precludes them from warranting more. Nevertheless, given that personal achievement and strenuous competition are cornerstones of North American culture (O'Leary-Kelly et al., 1996; Trice & Beyer, 1993), the basic assumption here is that all participants will strive to be competitive if given the opportunity. Since it is argued that status competitions will impact one's empathic responses, let us first understand what is meant by empathy.

2.1. What is Empathy? Multiple Meanings for a Complex Phenomenon

Derived from the Greek *empatheia* (*en(m)* = "in" and *pathos* = "feeling"), empathy was coined in English by Titchener (1909) to refer to the tendency of art observers and aesthetics philosophers to project themselves "into" that which they observe, typically some physical object of beauty. Merriam Webster defines empathy as "the action or the capacity of understanding, being aware of, being sensitive to, and vicariously experiencing the feelings, thoughts, and

experience of another without having them fully communicated in an objectively explicit manner" (*Empathy*, 2014). Although the word has been around since Aristotle (*Rhetoric*, 1386a22-28), it was confused for a long time with sympathy, in part because the latter garnered much attention from David Hume (1739/2000), Adam Smith (1759/2009), and Charles Darwin (1872/1998). It was only until recently that Wispé (1986) clarified this obfuscation and, according to her, sympathy referred to the awareness of another's suffering as something to be assuaged while empathy referred to "the attempt of one self-aware self to understand the subjective experiences of another self" (p. 314). Thus, whereas sympathy is a way of relating with others ("feeling for"), empathy is a way of understanding others ("feeling with").

In spite of this confusion, the study of empathy has nevertheless spawned a tradition of inquiry across fields, including psychology (Batson, 1990, 1991, 1998; Davis, 1994; Dymond, 1949; Eisenberg & Miller, 1987; Eisenberg & Strayer, 1987; Hoffman, 1982), philosophy and ethics (Bowden, 1997; Held, 2006; Stueber, 2006), morality and justice (Fuller, 1992; Hoffman, 2000; Vetlesen, 1994), psychoanalysis (Sharma, 1993; Lichtenberg, Bornstein, & Silver, 1984), economics (Fontaine, 1997; Kirman & Teschl, 2010; Stark & Falk, 1998), and neuroscience (Baron-Cohen, 2003, 2011; Decety, 2007; Preston & de Waal, 2002). As one might expect, the definitions of empathy varied according to the discipline one subscribed to, with psychologists defining empathy in micro terms that deal primarily with intraindividual processes, and economists defining it in macro terms that treat empathy on a broader societal level (e.g., game theory, welfare economics). Table 1 highlights the ten most prevalent definitions of empathy in the social and biological sciences literatures over the last 60 years.

Table 1

Ten Most Cited Definitions of Empathy in the Biological and Social Sciences (1949-2011)

Author(s)	Definition	Focus
Dymond (1949)	"…transposing of oneself into the thinking, feeling and acting of another and so structuring the world as he does." (p. 127)	Cognitive
Hogan (1969)	"…constructing for oneself another person's mental state" (p. 308)	Cognitive
Stotland (1969)	"…reacting emotionally because he perceives that another is experiencing or is about to experience an emotion." (p. 272)	Affective
Mehrabian & Epstein (1972)	"…responsiveness to another's emotional experience." (p. 526)	Affective
Hoffman (1981)	"…affective response appropriate to someone else's situation rather than one's own." (p. 44)	Affective
Eisenberg & Miller (1987)	"…emotional matching and the vicarious experiencing of a range of emotions consistent with those of others." (p. 91)	Affective
Batson et al. (1995)	"…other-oriented feelings congruent with the perceived welfare of another individual." (p. 621)	Affective
Davis (1994)	"…include the processes taking place within the observer and the affective and nonaffective outcomes which result from those processes." (p. 12)	Both
Baron-Cohen (2011)	"…ability to identify what someone else is thinking or feeling and to respond to their thoughts and feelings with an appropriate emotion." (p. 16)	Both
de Waal (2008)	"…the capacity to be affected by and share the emotional state of another, assess the reasons for the other's state, and identify with the other, adopting his or her perspective." (p. 281)	Both

From these definitions, it becomes clear that psychologists first conceptualized empathy as a cognitive process (e.g., role taking, accuracy in perception) before describing it in affective terms (e.g., other-oriented feelings of concern or compassion) and, over time, researchers moved away from this balkanization and began approaching empathy as a multifaceted construct. Davis (1983, 1994, 2006) was the first to define empathy as a sequence of interrelated constructs that included antecedents (e.g., person, situation), processes (e.g., simple to advanced cognitive mechanisms), and outcomes (e.g., both intra- and interpersonal). According to him, an empathic episode begins each time an observer is exposed to a target in a particular situation. The observer is not only a biological being that possesses an innate capacity for empathizing, but also a socialized being whose culture reinforces a myriad of empathy-related values and attitudes that become aroused in specific contexts. The observer then engages in some form of cognitive processing that enables him or her to generate an empathic response, and this processing varies in terms of its complexity, ranging from unconscious processes like motor mimicry, to simple cognitive processes such as classical conditioning, and eventually to more advanced cognitive processes like perspective taking. Finally, these cognitive processes result in outcomes that can be interpersonal or directed toward the target (e.g., aggression, helping), as well as intrapersonal or residing within the target and involving either little emotion (e.g., empathic accuracy) or much of it (e.g., personal distress). Hence, Davis's (1994, 2006) conceptualization of empathy is one that encompasses a spectrum of empathy-related constructs, and researchers wishing to study empathy may choose to focus on any one of these components.

This thesis follows Davis's approach to empathy, and the two studies featured here address one nonaffective or cognitive intrapersonal outcome (empathic accuracy) and two interpersonal

behavioural outcomes (proactive and reactive aggression), each of which is described in greater detail in the sections below.

2.2. What is this Person Feeling? A Primer on Empathic Accuracy

According to psychologist William Ickes (1997), a pioneer in the development of methods used to gauge people's empathy during dyadic interactions, empathic accuracy is the measure of one's skill in empathic inference or, simply put, everyday mind reading. Specifically, it is "a form of complex psychological inference in which observation, memory, knowledge, and reasoning are combined to yield insights into the thoughts and feelings of others" (Ickes, 1997, p. 2). The study of emotional display is a descriptive enterprise with a long history (Keltner & Lerner, 2010) and decoding studies in which observers make inferences about emotion from nonverbal displays are well known (Ekman, 1993; Ekman, Friesen, & Ellsworth, 1982; Matsumoto, Keltner, Shiota, O'Sullivan, & Frank, 2008).

This ability to accurately infer others' emotions and mental states predicts not only successful negotiations (Elfenbein, Foo, White, Tan, & Aik, 2007) and leadership effectiveness (Bell & Hall, 1954; Rubin, Munz, & Bommer, 2005), but also happier marriages (Noller, Feeney, Bonnell, & Callan, 1994), social adjustment in children and adults (Gleason, Jensen-Campbell, & Ickes, 2009), and lower cardiovascular activation during social interactions (Levenson & Ruef, 1992). This cognitive ability to decipher people's emotional expressions has been shown to be related to aggressive tendencies since having poor accuracy could lead some observers to overstep their boundaries and wrongfully provoke targets. The next section digs deeper into a behavioural dimension of empathy that is a polar opposite of helping, and differentiates between its two types.

2.3. The Two Faces of Aggression: Proactive versus Reactive Aggression

Aggression is defined as "any form of behaviour directed toward the goal of harming or injuring another living being who is motivated to avoid such treatment" (Baron & Richardson, 1994, p. 7). In recent years, psychologists have further classified aggressive behaviour into two types, *proactive* and *reactive*, which correspond to distinct behaviours (Carré, McCormick, & Hariri, 2011; Poulin & Boivin, 2000).

Proactive aggression, also referred to as instrumental aggression, occurs without direct provocation and is a goal-oriented offensive behaviour aimed at acquiring valued resources by dominating others and securing a social position. It is generally believed to manifest itself in the absence of heightened physiological arousal, and individuals exercising this type of aggression are informally described as being cold-blooded. An example would be a schoolyard bully who strides over and strikes a vulnerable child to steal his lunch (Dodge & Coie, 1987). In contrast, reactive aggression, referred to as hostile aggression, is a defensive response whenever an individual either perceives or directly experiences overt provocation. Commonly known as hot-blooded aggressors, these individuals retaliate with anger and impulsivity. Contrary to its proactive counterpart, reactive aggression is accompanied by high levels of physiological arousal, and one example is the victimized child who takes a stand against the bully and fights back. Clearly, each of these examples includes an element of power to actively aggress or to retaliate. However, power connotes something much more complex than what our everyday use of the term would suggest. As we will see next, an individual's motivation for power affects a plethora of important social outcomes.

2.4. Power Motivation: A Desire for Status and Impact

Power as a key feature of human affairs has a long history in scholarly thought. Many Western thinkers have written about power in social interactions, dating to Plato who described the rise of the despotic man after the fall of the ideal state (*The Republic of Plato*, Chapter 32, VIII. 562 A-IX. 576B). In later ages, scholars like Machiavelli, Hobbes, Nietzsche, and Adler reckoned that striving for power lay at the base of man's nature and the origins of society (Winter, 1973, 1992a).

Derived from the Latin root *potere* and the Old French verb *povoir*, "to be able," the term *power* has been the subject of many definitions according to a given intellectual stream, much like empathy. In sociology, power has been described variously as "the probability that one actor within a social relationship will be in a position to carry out his own will despite resistance" (Weber, 1947, p. 152), or "the production of effects despite possible resistance" (Schmalt & Heckhausen, 2008, p. 204). In organizational psychology, power has been defined as "the ability to provide or withhold valued resources or administer punishments" (Anderson & Berdahl, 2002, p. 1362), or concomitantly as "the ability to control resources, own or others', without social interference" (Galinsky, Gruenfeld, & Magee, 2003, p. 454). Thus, whereas sociologists are chiefly concerned with existing power relationships that contribute to the maintenance and consolidation of social hierarchies, psychologists and organizational scholars tend to be more interested in the ways in which a person having power makes decisions that ultimately determine the outcomes of another person (Galinsky et al., 2003; Keltner, Gruenfeld, & Anderson, 2003; Schmalt & Heckhausen, 2008).

Seeking power is therefore thought to be one of many reasons, or *motives*, that explains human behaviour. According to Winter (1973, 1992a), a motive involves several components.

First, it is a way of explaining behaviours that cannot be explained by external factors alone. Hence, a motive relates one's immediate behaviour to a more general disposition or tendency. Second, implied in the motive is the actual act that fulfills the goal's accomplishment. Third, from a person's motive, it becomes possible to make inferences or predictions about his or her future behaviour. Finally, a motive enables a person to adjust his or her behaviour according to the context encountered, and to persevere until his or her goal is reached.

Veroff (1957) was one of the first to define the power motive, or *n* Power, as "that disposition, directing behaviour toward satisfactions contingent upon the control of the means of influencing another person" (p. 1). Later in his book *The Power Motive*, Winter (1973) defined it as an enduring inclination that individuals feel for the degree to which they have impact on others or even society at large. This impact has to do with either "establishing, maintaining, or restoring prestige in the eyes of the world" (p. 69) through direct, forceful, and unrestrained actions that can be negative (attacks, sexual exploitation) and positive behaviours (helping, counseling) that arouse others' feelings, as well as explicit concerns about one's reputation. Individuals' *n* Power is determined by many factors including one's life experiences in asserting dominance over others, parental childrearing styles, and familial genetics, in addition to physiological factors like testosterone (McClelland, 1987; Stanton & Schultheiss, 2009).

Individuals possessing a strong power motive experience the prospect of exercising their impact as hedonic and rewarding in itself, whereas those having a weak one derive little such pleasure. Accordingly, the former have a greater propensity than the latter to identify and exploit opportunities that will enable them to achieve impact on others. High-power motivated people, therefore, tend to gravitate toward occupations allowing them to exercise this need, such as teaching, social work, and journalism (Winter, 1973; Winter & Stewart, 1978), management

(Chusmir & Parker, 1984; McClelland & Burnham, 1976), entrepreneurship (Hornaday & Bunker, 1970; Wainer & Rubin, 1969), and politics (House, Spangler, & Woycke, 1991; Winter, 1987). Compared to their lower-power motivated counterparts, those high in *n* Power are more likely to prefer highly competitive sports where they can showcase their athletic prowess, are seen as being more influential and persuasive to others in discussion groups, and report a greater frequency of precocious sexual relations (for a review of the behavioural correlates of high power motivation, see Schmalt & Heckhausen, 2008). Since its inception, the power motive has been conceptualized as a desire not only to control, influence, or impress others, but also to receive acclaim and social status recognition (Fodor, 2010).

As we will see, our motives are present even when we are not aware of them. More importantly, this unawareness does not signify that they have no effect on our behaviours.

2.4.1. Not all motives are the same: Implicit versus explicit motives

More than 25 years ago, McClelland, Koestner, and Weinberger (1989) revealed that two types of motives coexisted. On one hand, they described implicit motives as being largely inaccessible to introspection, meaning that they operate outside people's conscious awareness but nonetheless influence their thoughts and behaviours. On the other hand, they characterized explicit motives as being reflective of people's self-image and these are assessed by conscious self-report measures. Over time, findings have confirmed that these two motives do not correlate with one another and that each predicts different types of behaviours (Brunstein, 2008; Kehr, 2004; Schultheiss, Yankova, Dirlikov, & Schad, 2009; Vongas, Schattke, Al Hajj, Aldon, & Oppenheimer, 2014). For instance, implicit motives are better suited to predict spontaneous behaviour and behavioural trends over time, whereas explicit motives are better able to predict

deliberate choices. McClelland (1980) referred to the former set of behaviours as "operant" behaviours and to the latter as "respondent" behaviours. Operant behaviours are those that a person generates without premeditation and they involve repeated preferences for specific experiences over lengthy time periods. They are activated by implicit motives which result from incentives experienced in doing something that is pleasurable in and of itself (e.g., interesting and challenging task). Respondent behaviours, however, are brought on by environmental incentives (e.g., rewards and expectations), and are believed to be directly influenced by a person's conscious thought. For this reason, explicit motives are thought to be expressed in respondent behaviours (Brunstein, 2008).

According to McClelland et al. (1989), the two motives are independent of each other because they emerge from different types of incentives that were acquired at different stages in a person's development. Implicit motives were shaped by a person's affective experiences with "natural" incentives (e.g., having impact on others) early in life when conceptualization of language was minimal. Studies on implicit power motivation have found that high-powered individuals are more likely to rouse other people's attention through their risky choices and behaviours (McClelland & Watson, 1973), to have a greater likelihood of ascending to upper managerial corporate levels (McClelland & Boyatzis, 1982), and to pursue more successful career paths (McClelland & Franz, 1992).

As such, this thesis focuses on whether individuals who differ in implicit power motivation – not in the explicit or more self-aware kind – will experience differing levels of empathic accuracy and aggression after a status win or loss. And, just as motives are not all the same, implicit power motivation also comes in two different forms.

2.4.2. Not all implicit power is the same: Personalized versus socialized power

An important development in implicit power motivation came about when McClelland and his colleagues conceptualized it as being made up of two separate desires that correspond to distinct types of influence (McClelland, 1970; McClelland, Wanner, & Vanneman, 1972; McClelland & Wilsnack, 1972). One stemmed from a need to sway others for self-serving purposes, and was given the name *personalized power* (or p Power). People having a high personalized power motive are driven by decisions serving their own interests at the expense of others' welfare (Magee & Langner, 2008). Studies have shown that these people engage in risky and impulsive behaviours (e.g., gambling, substance abuse), negotiate in an exploitative manner, and signal their status through conspicuous consumption (Hofer, Busch, Bond, Campos, Li, & Law, 2010). McClelland (1970) pithily described p Power as follows:

> …[p Power] is turned toward seeking to win out over active adversaries. Life tends to be seen as a "zero-sum game" in which "if I win, you lose" or "I lose, if you win." The imagery is that of the "law of the jungle" in which the strongest survive by destroying their adversaries. (p. 36)

The second conceptualization corresponds with a desire to influence others not through one's dominance, but rather through prosocial acts and behaviours directed for others' benefit and, as such, was coined *socialized power* (or s Power). Individuals in organizations who hold leadership positions and who have a high socialized power motive are thought to be empire builders because they "are able to create high morale and expand the organizations they head" (McClelland & Burnham, 1976, p. 109). Unlike those with high p Power, these individuals sacrifice their own self-interests for the welfare of the organizations they serve and, for this

reason, this type of power is generally viewed more favourably. In spite of the substantial body of research dealing with the power motive, few studies have segregated it into its two types.

Chusmir and Parker (1984) and Chusmir (1986) found that managerial and non-managerial and professional women had significantly higher s Power needs than their male colleagues, and reasoned that women were socialized to place the welfare of others ahead of their own, and that this social expectation crossed over to shape women's greater nurturing management style. More recently, Magee and Langner (2008) went beyond looking at gender differences and studied how people who are motivated by either p or s Power differ in their decisions and actions when exercising their influence. The authors set up two role-playing scenarios, each designed to trigger one of two power motives. One was a simulation of the Cuban Missile Crisis (p Power activation) wherein participants were asked to help US President Kennedy draft a reply to Soviet leader Khrushchev. As predicted, participants scoring higher on p Power deliberated less about the consequential policy response and were more likely to escalate the conflict than those lower on p Power. The other role play required participants to act as US Food and Drug Administration decision-makers, a position having the ability to affect people's wellbeing (s Power activation) by either approving or rejecting a new drug that prevents fatal blood clots. Again, as predicted, those scoring higher on s Power were significantly more likely to approve and introduce the drug to market than were participants lower in s Power, a decision that translates to more lives saved.

Motivational processes, such as power, are not the only ones studied when it comes to determining what causes behaviour and decision making. When it comes to men, most people would concur that few other hormones define the essence of masculinity like testosterone. Let us now turn the discussion to testosterone and its role in social behaviour.

2.5. Testosterone and Social Behaviour

2.5.1. The biology of testosterone

Testosterone is a 19-carbon molecule derived from cholesterol and acts as a precursor to 17β-estradiol, commonly known as estrogen and found predominantly in women (Winters, 2004). In men, testosterone is produced almost entirely by the testes which synthesize 12-14 milligrams per day. Approximately 95% of total male testosterone is manufactured in the testicular Leydig cells, with the remaining 5% being produced by the adrenal glands (Weinbauer, Luetjens, Simoni, & Nieschlag, 2010). Although it circulates in the bloodstream of both sexes, with eight to 10 times more so in men, approximately 97% of the total concentration found in the body produces no observable effects because it is bound to two proteins which render it inactive: albumin and sex hormone-binding globulin. However, the freely circulating 3% is believed to be partly responsible for aggression (Archer, 2006; Van Vugt, De Cremer, & Janssen, 2007), social dominance (Mazur & Booth, 1998; Rada, Kellner, & Winslow, 1976), and power motivation (Schultheiss, 2007; Schultheiss et al., 2003; Schultheiss & Rohde, 2002). This free form is present in saliva, and the vast majority of studies over the last 40 years stem from salivary samples (Baxendale & James, 1984; Dabbs, 1990a, 1990b, 1991, 1992, 1993; Dawes, 1974; Lipson & Ellison, 1989; Navazesh, 1993; Schultheiss, Schiepe, & Rawolle, 2012).

There are many advantages to measuring hormones when studying behaviour. First, hormonal changes match the ebb and flow of social behaviour (Dabbs, 1992). Humans make instantaneous decisions about whether they like or dislike other persons, but the majority of their daily interactions do not have such an instant quality about them. Their anxiety increases slowly as they approach a novel social setting, and their anticipation of a conflict and its effects may last for several hours, days, or even weeks. Hormone measures are thus conceptually appealing

when studying behaviour. Second, such measures are robust because their slower nature compared to neuronal action potentials prevents them from being affected by fast-moving error signals. Third, participants come into contact with simple equipment and provide samples that are easily stored for analysis. Finally, data collection is facilitated because technological advances allow participants to carry out their duties with little restriction.

All men possess baseline testosterone levels that are attributable to genetic and environmental factors (Bernstein, Rose, & Gordon, 1974; Meikle, Stringham, Bishop, & West, 1988; Weinbauer et al., 2010). These levels are influenced by a 24-hour circadian cycle in which they are highest in the early morning and drop over the course of the day (Dabbs, 1990b). Lastly, testosterone differentiates men's sexual organs from those of women, and it endows men with secondary sex characteristics that are both physical (e.g., growth of facial hair, muscle mass; Weinbauer et al., 2010) and behavioural (e.g., aggression and dominance, heightened competitiveness, and status seeking; Burnham, 2007). Although it is widely believed that testosterone becomes activated at the onset of puberty, its primary effects actually take place before a child is even born.

2.5.2. Prenatal testosterone and 'masculinizing' behaviours

Exposure to high testosterone concentrations during fetal development can predict stereotypically masculinizing behaviours later in life, including a reduction in one's empathizing ability (Auyeung et al., 2009a, 2009b; Knickmeyer, Baron-Cohen, Raggatt, & Taylor, 2005; Lutchmaya & Baron-Cohen, 2002; Udry, 2000). For example, fetuses exposed to greater amounts of testosterone naturally *in utero* make less eye contact as infants in their first year (Lutchmaya & Baron-Cohen, 2002), and socialize less with their fellow kindergarten classmates

in their fourth year (Knickmeyer et al., 2005). In one study, Udry (2000) analyzed data from adult women whose mothers' placental testosterone had been measured during their second pregnancy trimester, a period when sex-typing is believed to occur. Findings showed that women subjected to more testosterone during embryological development exhibited fewer stereotypically feminine behaviours as adults (e.g., infant care, preoccupation with feminine appearance) regardless of their parents' efforts to socialize them as 'typical' females. More recently, Auyeung et al. (2009b) obtained testosterone measures from mothers' amniotic fluid to study the effects of fetal exposure to testosterone on child development. Parents were then asked to assess their child's gender role behaviour and, as expected, male and female infants' exposure to higher testosterone concentrations in the womb correlated positively with male-typical behaviour, examples of which were the preference for toy guns and cars over dolls and jewelry, climbing activities and sports over playing house or taking care of babies, and rough-and-tumble play over games avoiding risks.

Collectively, the above sections were meant to offer a preamble on testosterone's association with competitiveness and status seeking. Since one of the arguments made here is that competition and the outcomes it brings, victory and defeat, impacts one's empathic accuracy and aggression, it is plausible to suspect that its effects might occur via testosterone. We must be cautious, however, when making simplistic claims that a hormone like testosterone will *always* be responsible in inducing a particular behaviour. As in most situations in which behaviour manifests itself, understanding the context becomes paramount (Johns, 2006).

2.5.3. Context is key: Testosterone and the challenge hypothesis

Some scholars portend that although testosterone's association with dominant and aggressive behaviour is widely confirmed (Harris, 1999; Liening et al., 2012), the notion that testosterone has an effect on behaviour is not irrefutable in every situation. One of the most influential models to explain this context-dependent relationship is known as the *challenge hypothesis* (Archer, 2006; Wingfield, Hegner, Dufty, & Ball, 1990; Wingfield et al., 2000). Originally meant to account for the relationship between testosterone and aggression in monogamous birds (Wingfield et al., 1990), this theory holds that increases in testosterone levels related to aggression are context-dependent, with levels rising at the outset of the breeding season to support reproductive physiology, and rise even further during challenges with other males. This phenomenon is thought to facilitate aggression in both territory formation and maintenance, dominance clashes, and mate protection (Wingfield et al., 2000). In bird species where males are expected to provide parental care for offspring, their testosterone levels decrease similar to those of higher-order primates, including humans (Gray, Kahlenberg, Barrett, Lipson, & Ellison, 2002).

The challenge hypothesis has been recently extended to humans, and researchers have confirmed that human physiology and psychology interact in ways that are consistent with its basic tenets. In his comprehensive review, Archer (2006) used the challenge hypothesis to propose that adult males would not only show testosterone sensitivity to competitive challenges with other males, but also experience increased aggression if provoked in a manner that is relevant to reproductive competition. This can either be direct, involving a dispute over a woman or her reputation, or indirect involving a dispute over resources or status. Liening et al. (2012) also argued that testosterone should not affect behaviour if the situation does not

ostensibly present either a status threat or an opportunity to increase one's status. In other words, if testosterone is the catalyst that drives aggressive behaviour, it should have no effect on such behaviour when there is no status to be gained. In situations where social hierarchies are entrenched and there are no opportunities to acquire or lose status, any influence testosterone could have on behaviour will vanish. Contrarily, situations characterized by an unstable hierarchy where high-status positions are obtainable through competition would more readily showcase testosterone's influence on behaviour.

CHAPTER THREE

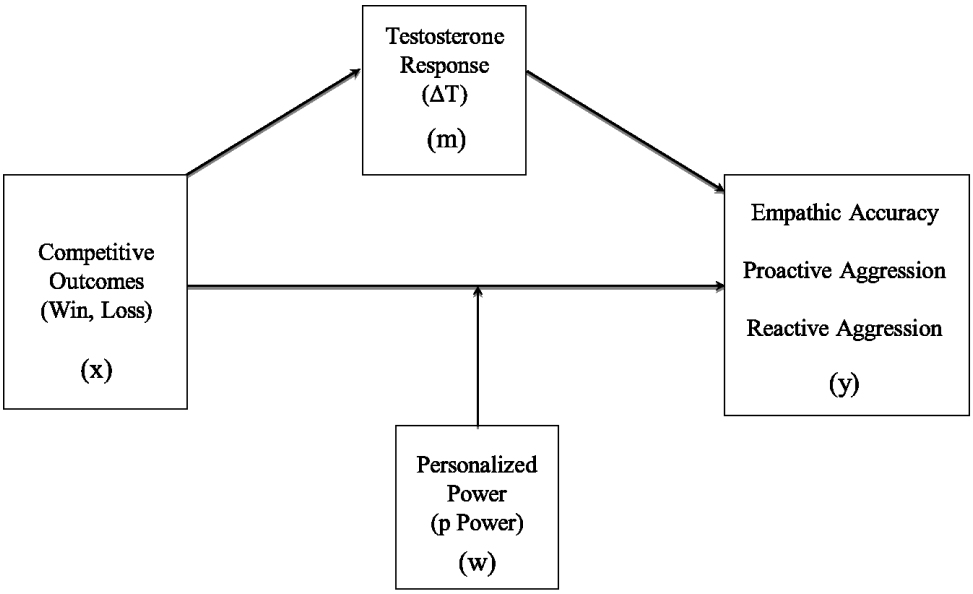
3. RESEARCH MODEL AND HYPOTHESIS DEVELOPMENT

To summarize briefly, this thesis investigates the effects of winning and losing on men's testosterone and assesses whether this hormonal reactivity subsequently affects their ability to accurately judge others' emotions and their propensity to aggress in two distinct ways. It also explores how men's implicit power motivation – their drive to influence other people – would moderate the direct relationships between the competitive outcomes of winning and losing and their empathic accuracy and aggression. Figure 1 on the next page illustrates the model to be tested here and includes the outcomes that are expected to occur in both empathic accuracy (Study 1) and proactive and reactive aggression (Study 2).

Quantitative psychologist Andrew Hayes (2013) justifies the use of his conditional process model stating that all effects a) function through some kind of mechanism (mediation) and b) are contingent on something (moderation). If the above are true, any analysis focusing only on mediation or moderation but not both is going to be incomplete in some way. Therefore, Hayes' conditional process model 5 was employed in both the empathic accuracy and reactive/proactive studies.

Figure 1

A Conditional Process Model of the Effect of Male-Male Competition on Empathic Accuracy and Aggression



Variables: x = independent, y = dependent, m = mediator, w = moderator

Direct effect:	x → y
Indirect effect:	x → m → y
Conditional direct effect:	w * xw

3.1. Direct Effects of Competitive Outcomes on Empathic Accuracy

Academicians (Kraus, Côté, & Keltner, 2010; Kraus & Keltner, 2009) and social critics (Rifkin, 2009) alike have become increasingly interested in what happens to people's empathic accuracy as they gain social status. Studies have shown that an individual's social class can predict how empathic he or she will be towards others. In one experiment, Kraus and Keltner (2009) recruited university students from diverse socioeconomic status (SES) backgrounds and had them engage in a five-minute dyadic interaction with a stranger. Two judges then viewed 60-second video slices of these interactions and coded them for nonverbal cues of engagement (e.g., head nods, eyebrow raises, laughter, and gazes at the partner) and disengagement (e.g., turning one's attention away, self-grooming, object manipulation, doodling). Moreover, the authors assigned seven undergraduate students the role of naïve observers who viewed the videos and provided estimates of what they believed were participants' SES using the MacArthur Scale of Subjective SES (Adler, Epel, Castellazzo, & Ickovics, 2000). In other words, they wanted to probe whether SES impacted one's ability to decode others' nonverbal gestures and to assess whether third parties could accurately guess the SES of interacting individuals simply by watching their gestures. Confirming their hypotheses, Kraus and Keltner (2009) found that lower- and upper-SES people were associated with nonverbal behaviours of engagement and disengagement, respectively, and that observers' estimates of participants' SES corresponded accurately with their nonverbal behaviours.

Another experiment showed that individuals who are associated with a group from a higher social class scored lower in empathic accuracy than those belonging to a group from a lower class. Kraus and his colleagues (2010) measured participants' social class using objective (e.g., their level of education, income and material possessions, and occupational prestige) and

subjective measures (e.g., their own perceptions of SES rank relative to society), and reasoned that, compared with higher-class individuals, those from lower classes possess fewer resources and thus must rely more on agents from the external social context for sustenance and, more generally, as a means to adapt to a precarious environment (see also Keltner et al., 2003; Kraus, Piff, & Keltner, 2009; Piff, Kraus, Côté, Cheng, & Keltner, 2010). The different dependencies that high- and low-SES individuals have on their environments form the basis for Keltner et al.'s approach/inhibition theory of power (2003) which holds that lower-class individuals "tend to focus their attention disproportionately on the context and, in particular, on other people, relative to their upper-class counterparts" (Kraus et al., 2010, p. 1717). By extension, this implies that lower-status individuals place a greater emphasis on the emotions of others. Conversely, higher-status individuals have access to bountiful resources and are thus less reliant on others for support, spawning patterns of social cognition and behaviour that are focused more on the self (see also Piff, Stancato, Côté, Mendoza-Denton, & Keltner, 2012). Across three studies, Kraus et al. (2010) demonstrated that lower-class individuals indeed scored higher on empathic accuracy tests, and gauged more accurately the emotions of a partner with whom they interacted.

Together, these studies show that, by virtue of their independence from having to rely on the external environment to the same extent as lower-status individuals, those high in status may be less motivated to tune into others' feelings and needs. In all probability, such so-called high-rollers could afford the occasional blunder when making inferences about others' mental states because they would receive little, if any, castigation for doing so. Much like social class, competition creates a social stratification that, on a smaller scale, could trigger similar cognitive processes in winners (i.e., having achieved status relative to another) and losers (i.e., having lost status). Moreover, the positive affect resulting from a victory might spur winners to rely on

heuristic information processing, whereas the negative affect of losers might elicit them to engage in more careful, systematic processing (Isen, 2000; Lord & Kanfer, 2002). Thus, the first hypothesis posits the following:

Hypothesis 1a: Compared to losers, winners will score lower in empathic accuracy.

3.2. Direct Effects of Competitive Outcomes on Aggression

What is the theoretical rationale explaining why competition would be associated with aggression? Van den Berghe (1974) and Durham (1976) applied principles of evolution to argue that aggression evolved from a struggle for resource competition. Accordingly, competition produces aggression that is partially mediated by hierarchy and so humans maximize their survival and reproduction by cohabiting in social groups and by participating in collective aggression whenever resources are limited. Aggressive behaviour may therefore be adaptive for individuals under conditions of resource competition, and this helps to partially explain the prevalence of warfare among human societies which, some argue, is chiefly the province of men (Buss, 2005; Ghiglieri, 2000; Pinker, 2002). Buss and Shackelford (1997) added that, apart from coopting others' resources, aggression also evolved to serve the particular interests of individual men in their mission to negotiate status and power, defend against attack, and deter rivals from future aggression.

Given its damaging effects, it is not surprising that a growing body of empirical research is being focused on the association between aggression and competition. Studies on male rodents like the California mouse (*Peromyscus californicus*) have revealed that a 'winner effect' occurs: a victory against a competitor, and the androgenic and neural changes accompanying it,

significantly enhance the mouse's subsequent aggression and elevate its chance to win future competitions (Fuxjager et al., 2010; Gleason, Fuxjager, Oyegbile, & Marler, 2009; Trainor, Bird, & Marler, 2004). For example, Fuxjager et al. (2010) found that when male mice win fights, in addition to testosterone rises, they experience an increase in androgen receptors in the medial anterior bed nucleus of the stria terminalis, a brain area devoted to social aggression.

In humans, research on the effects of winning and losing on aggression per se has been surprisingly scarce with some exceptions. Muller, Bushman, Subra, and Ceaux (2012) showed that people were more likely to aggress against downward comparison targets (i.e., losers whom they defeated) than against upward comparison targets (i.e., those against whom they lost). The authors had participants compete in same-sex dyads on performance tasks and measured aggression and a reaction time task. In this latter task, participants were told that they would be presented with a cue immediately after which they had to press a button as fast as possible, for a total of 25 sequential trials. Whoever was slower would be regarded as the loser and receive a noise blast through headphones that would be inflicted by the winner. Muller et al. (2012) found that people aggressed more against an opponent they outperformed than against someone who outperformed them, and cautioned that attention be paid to winners' behaviour in light of the fact that losers bear the brunt of post-competitive aggressive attacks.

Other empirical evidence exists that demonstrates how competition in general leads to aggression, with studies on video game competitions (Adachi & Willoughby, 2011; Williams & Clippinger, 2002), European football teams at various competitive levels (i.e., national, regional, and departmental; Coulomb & Pfister, 1998), and even after participants have read competitive stories in which they imagine being implicated (Griskevicius et al., 2009). Even early studies in child development show that competition among five- and six-year old children increases their

aggression (Nelson, Gelfand, & Hartmann, 1969; Rocha & Rogers, 1976). These studies, however, were concerned solely with the effect of competition on overall aggression without probing further into whether the competitive outcome produced variations in aggressive behaviour. One recent study on aggression did, in fact, segregate winners from losers and found no direct effect of competitive outcomes on aggression (Carré, Campbell, Lozoya, Goetz, & Welker, 2013). It should be noted, however, that participants in this study competed against a fictitious opponent on an Xbox Kinect ™ video game after which they were assessed only on reactive aggression. It is possible that winning or losing against a phantom player may have been too impersonal to spur aggression and, while they distinguished between who won and lost, they did not take into account proactive aggression.

Indeed, authors have generally neglected to differentiate between reactive and proactive aggression and it seems conceivable that, following a competitive bout, winners and losers might be driven by different motivations with the result being distinct forms of aggression. For example, winners may wish to perpetuate their winning streak and, since they are free from the anxiety and stress engendered in a loss, they might be better equipped to harness the cognitive, affective, and physiological resources needed to confront future rivals. Since proactive aggression is planned behaviour not typically associated with an emotionally laden response (Siever, 2008; van Honk, Harmon-Jones, Morgan, & Schutter, 2010), one might thus expect winners to be inclined to aggress in proactive ways.

Conversely, losing against a formidable rival and the feelings of inferiority brought on by the loss can be a hurtful experience because people have a tendency to strive toward a positive self-image and to feel competent in order to comply with society's expectations (Muller & Fayant, 2010; Steele, 1988; Tesser, 1988). In fact, competence, or one's ability to do something

successfully, is a fundamental component of a person's psychological health and regarded as one of the three innate human needs in self-determination theory (Deci & Ryan, 2000; Gagné & Deci, 2005). This theory holds that social contexts and individual differences supporting these needs lead a person toward personal growth and intrinsic motivation, whereas those that forestall them result in poorer motivation and performance. Deci and Ryan (2000) insist that these basic needs are so critical to a person's overall wellbeing, self-esteem, and general health that they specify the conditions under which people can most fully realize their potential. Feeling competent is hindered when people compare themselves to or find themselves in the presence of someone who is more competent than they are. In such cases, people might become frustrated when this individual outperforms them and robs them of this feeling (Muller & Fayant, 2010). And certainly, the aggression literature has found that frustrated people seek to restore balance by lashing back at those who obstruct their goal-directed behaviour (Baron & Richardson, 1994; Berkowitz, 1965). It is thus incumbent upon researchers to ponder about the ways in which both winners and losers aggress. That said, it is posited that men will be aggressive when they are both better off (i.e., after a victory) and worse off (i.e., after a loss), but in different ways:

Hypothesis 3a: Winners (losers) will be more inclined to engage in proactive (reactive) aggression against a third party than losers (winners).

3.3. Mediation by Testosterone of Win/Loss on Empathic Accuracy and Aggression

3.3.1. Social hierarchy, competition, and men's testosterone

One of the most fundamental pursuits and outcomes of social life involves the attainment of status in the groups to which we belong (Anderson, John, Keltner, & Kring, 2001; Sapolsky,

2004, 2005). Social hierarchy is so pervasive that even when attempts are made to minimize it, via communal sharing for example, it surfaces persistently both within and between groups (Fiske, 1992; Sidanius & Pratto, 1999). Surprisingly, in spite of it being a key feature of organizations and of human relations in general, there exists a paucity of research devoted to this topic in management.

Nicholson and de Waal-Andrews (2005) drew from the literatures in comparative anthropology and evolution to argue that status and rank constitute 'objective' measures of success, along with material success (e.g., earning capacity), social reputation (e.g., prestige), and knowledge and skills. Magee and Galinsky (2008) also examined the concept of social hierarchy by surveying the literatures on power (Emerson, 1962; Pfeffer, 1992), inequality (Baron & Pfeffer, 1994; Marx, 1844/1964), influence (Cialdini, 1993), stratification (Stinchcombe, 1986), and social structure (Burt, 1992), among others. They defined hierarchy as "an implicit or explicit rank order of individuals or groups with respect to a valued social dimension" (Magee & Galinsky, 2008, p. 354). This definition comprises several interconnected ideas. First, social hierarchy's nature of being implicit or explicit insinuates that it expresses an awareness that people have regarding their location within a particular ranking system. Whereas some hierarchies are defined according to specific rules on which everyone agrees, others are nuanced. Second, a rank order indicates that at least one person within the group must be subordinate to one other. Finally, a valued social dimension is any characteristic or resource that is generally understood to confer important benefits to the individual or group possessing it.

Social hierarchy serves three major functions in organizations to the extent that rank is established by a criterion or dimension related to organizational performance. First, it creates social order by acting as a remedy for uncertainty and chaos (Durkheim, 1893/1997; Parsons,

1961). Second, it eases social coordination because unclear hierarchical relations lead to work that is confusing and inefficient even in cases where the majority of group members are high-status performers or "stars" (Groysberg, Polzer, & Elfenbein, 2011). This is not to say that the establishment of hierarchy does not result in dysfunctional organizational consequences such as the institutionalization of amoral reasoning and corruption (Brief, Buttram, & Dukerich, 2001; Leavitt, 2005; Magee & Galinsky, 2008). Finally, social hierarchy offers incentives for individuals who are motivated to achieve a higher rank because they can either profit materially from their positions (Tannenbaum, Kavčič, Rosner, Vianello, & Wieser, 1974) or satisfy other needs such as autonomy (Deci & Ryan, 1987), internal control (Rotter, 1966), and power (McClelland, 1975; Winter, 1973, 1992a).

Studies have demonstrated that a man's testosterone levels are sensitive to changes in his relative position within a social hierarchy (Archer, 2006; Mazur & Booth, 1998). Moreover, this relationship appears to be reciprocal (Mazur, 1985). Sociologist Allan Mazur first proposed that the link between social status and testosterone flows bidirectionally, with men's rising/elevated testosterone levels facilitating attempts to either achieve or maintain status, and falling/depressed testosterone levels inhibiting such attempts. Second, this causation is reciprocal such that gaining status increases testosterone, while losing it decreases testosterone. Edwards (2006) lauded Mazur's model because it specifies not only how short-term changes in men's testosterone levels affect cognitive processes related to their perception of status, but also how their perception of status itself may influence testosterone secretion.

Numerous studies over the last 30 years that analyzed men's testosterone levels across various status contests have shown that testosterone levels rose in victorious men and dropped in defeated ones in athletic competitions (Booth, Shelley, Mazur, Tharp, & Kittok, 1989; Edwards,

Wetzel, & Wyner, 2006; Elias, 1981; Neave & Wolfson, 2003; Salvador, Suay, Martínez-Sanchís, Simon, & Brain, 1999), non-athletic competitive laboratory tasks (Gladue, Boechler, & McCaul, 1989; McCaul, Gladue, & Joppa, 1992), intellectual competitions such as chess (Mazur, Booth, & Dabbs, 1992), medical school graduation (Mazur & Lamb, 1980), and imprisonment, i.e., the ultimate status-depleting event (Thompson, Dabbs, & Frady, 1990).

Studies have also shown that testosterone levels fluctuate whenever individuals witness their own performance in a previously recorded video (elite hockey players; Carré & Putnam, 2010), and the performance of their favourite politicians (Stanton, Beehner, Saini, Kuhn, & LaBar, 2009) and athletic teams seen on television (Bernhardt, Dabbs, Fielden, & Lutter, 1998). For example, Bernhardt and his colleagues (1998) captured the hormonal fluctuations from the vicarious experiences of loyal football fans at the 1994 FIFA World Cup™ final match between the Brazilian and Italian national teams. They recruited 26 male fans in Atlanta (12 Brazilian supporters and 14 Italian supporters) gathered to watch the live match, and collected saliva samples from each participant roughly between 15 and 30 minutes before and after the game. Results showed that Brazilian fans, while basking in their winning team's glory, exhibited increases in their testosterone whereas the Italian fans saw a drop in theirs, prompting the researchers to conclude that merely witnessing the competitive outcome of one's heroes has physiological effects that go beyond simple changes in mood (for a comprehensive review of studies on the impact of competition on hormonal responses in men, see Salvador, 2005).

Some studies, however, failed to replicate these testosterone-level changes between male winners and losers and showed no significant changes in the hormone according to competitive outcome (Carré et al., 2009; González-Bono, Salvador, Serrano, & Ricarte, 1999; Mazur & Lamb, 1980; Mazur, Susman, & Edelbrock, 1997; Mehta & Josephs, 2006; Salvador, Simón,

Suay, & Llorens, 1987; Schultheiss & Rohde, 2002). Several reasons explain why this was the case. First, some of the laboratory-contrived competitive manipulations were deemed too short (10 minutes or less) to elicit a potent hormonal response. Second, these competitions resulted in wins and losses that were neither salient to nor significant for the participants (Carré et al., 2009). In other words, these male participants may have perceived the experimentally induced contests as bearing only a "superficial resemblance to the real world" (Highhouse, 2009, p. 554), and thus were weak in their ability to bestow them with proper status recognition. This belabors the point that beating an opponent on a task wherein the winners receive no status rewards other than the victory itself may simply be ineffective in generating a measurable testosterone response. A third reason is that some men may differ with respect to whether they attribute the outcome of the competition to either internal (e.g., personal merit) or external attributions (e.g., errors committed by the opponents, sheer luck, and decisions made by referee officials) (González-Bono et al., 1999; González-Bono, Salvador, Ricarte, Serrano, & Arnedo, 2000; Mazur & Lamb, 1980). For instance, Mazur and Lamb's (1980) pioneering work on the effects of social contexts on testosterone changes demonstrated that male participants who won a $100 lottery prize – simply with a luck of the draw – did not show subsequent testosterone rises compared with those who did not win the prize money, suggesting that achieving success with little or no personal effort is not likely to be met with a noteworthy change in testosterone.

In another study involving men's professional basketball teams in Spain, González-Bono et al. (1999) reported no significant differences between mean post-game testosterone of winners and losers. However, the authors found that for the winning team, the greater a player's inclination to attribute the victory to chance, the lower was his testosterone after the game. Similarly, for losing teammates, the higher a player's tendency to attribute the defeat to

deficiencies in his own performance, the lower was his testosterone. Clearly, these results show that humans' hormonal responses to competition are not in themselves linked directly to winning or losing, but are instead influenced by complex psychological processes (Salvador, 2005). Such results are consistent with the established notion that the effects of reward on behaviour depend in part on whether the person perceives the reward as contingent on his own behaviour or independent of it (Rotter, 1966).

Therefore, a paradigm seeking to generate appropriate testosterone responses that are in line with Mazur's bidirectional model should: 1) be easy to execute in a laboratory setting yet remain salient for participants; 2) leave little room for chance or luck as determining the competition's outcome, i.e., men should attribute their victory or loss as a result of their own doing; 3) endow the winners with visible status markers, e.g., formal recognition, awards, or symbols; and 4) last between 20 and 30 minutes, long enough to produce an endocrine response (Riad-Fahmy, Read, Walker, Walker, & Griffiths, 1987). Methodologically, such a paradigm would directly address the three main limitations plaguing laboratory competitions, namely the lack of status endowment in winners, the short length of competitive involvement between participants, and the chance-versus-ability of participants as determinants of the competitive outcomes (see also van Anders & Watson, 2006).

Theoretically, the argument made here runs parallel to the views of scholars who propound that competition for status to procure resources has an evolutionary biological etiology (Liening et al., 2012; van Anders & Watson, 2006). As they point out, competition assists in the promulgation of the fittest genes to future generations, implying that by competing for high-status positions, the most able individuals are the ones having the greatest likelihood to reproduce. By virtue of their high status, individuals who have emerged victorious in repeated

social competitions have better health and nutrition, and are more likely to produce offspring that will live long enough to reach sexual maturity and to reproduce thereafter. In short, "high status yields a life style that is generally more pleasant, healthier, and more productive, and thus is generally more desirable than a life of low status" (Liening et al., 2012, retrieved from http://www.spelab.org/uploads/2/7/8/4/27842457/liening_mehta__josephs_2012.pdf). Since competitions are a means by which a social hierarchy is established, and this hierarchy determines how limited resources are allocated throughout a group, high status should therefore grant an individual increased access to limited resources.

Although the evolutionary rationale explains why winners might experience a rise in their testosterone levels relative to losers, the physiological process by which this occurs needs to be specified. Schultheiss's (2007) biobehavioural model of male reward/frustration outlines a mechanism by which winning and losing a contest would elicit a specific directional change in men's testosterone. Winning brings about a release of sympathetic catecholamines (dopamine, adrenaline, noradrenaline) and a diminution of glucocorticoids (cortisol) in the bloodstream. Dopamine is a neurotransmitter emitted by nerve cells to help them communicate with other nerve cells, and it is involved with the brain's reward system to provide feelings of enjoyment and reinforcement that motivate a person to perform certain activities. Adrenaline (or epinephrine) is a hormone manufactured by the chromaffin cells in the adrenal medulla, the interior portion of the adrenal gland, and is commonly known for bringing about surges in energy and helping to trigger the fight-or-flight response. The effects of these two chemicals are partly why people use the colloquial expression "being on a high" when describing the feeling that persists following victory or achievement.

Cortisol is a hormone produced by the adrenal cortex, the outer layer of the adrenal gland, and is secreted during stressful events. Its effects, among others, are blood vessel constriction leading to higher blood pressure, and suppression of the immune and reproductive systems. While dopamine and adrenaline facilitate the production of testosterone, cortisol thwarts it and, contrary to winning, losing produces a reduction in dopamine and adrenaline, and an increase in cortisol (win $\rightarrow \uparrow$ adrenaline $\rightarrow \uparrow$ testosterone; loss $\rightarrow \uparrow$ cortisol $\rightarrow \downarrow$ testosterone). Therefore, acknowledging the litany of findings on the association between men's testosterone and competition, one would expect that winners' and losers' testosterone will differ accordingly:

Hypothesis 2: Competition outcome elicits changes in testosterone, such that winners (losers) show testosterone increases (decreases) after a win (loss).

3.3.2. Testosterone's effect on empathic accuracy

Researchers have only begun to unearth the relationship between testosterone and empathy, and preliminary evidence exists showing that, relative to low-testosterone individuals, those with high testosterone are more deficient in empathizing with others, and this phenomenon can be witnessed across settings. Neuroscience research on autism and Asperger syndrome has revealed that one's exposure to testosterone while in the womb is responsible for shaping the brain to preferentially 'systemize' rather than 'empathize' (Baron-Cohen, 2002; Auyeung et al., 2009a). According to Baron-Cohen (2002), empathizing is the drive to deduce others' mental states and to respond with a suitable emotion, whereas systemizing is the drive to analyze the variables in a system and to construe the principal rules that govern its functioning. The human brain is known to deconstruct countless systems, examples of which are technical (e.g.,

machines, instruments), natural (e.g., weather patterns, geological arrangements), abstract (e.g., mathematics, computer programs), and organisable (e.g., stamp and card collections). In light of these observations, Baron-Cohen (2002) developed the empathizing-systemizing (E-S) theory to explain how autistic children, the majority of which are boys, developed cognitive superiority in systemizing at the expense of empathizing (see also Baron-Cohen & Belmonte, 2005).

While both sexes display systemizing and empathizing skills across a spectrum, the E-S theory posits that, on average, males are more likely to spontaneously systemize and females are more likely to empathize (Baron-Cohen, Knickmeyer, & Belmonte, 2005). Studies supporting this argument have shown that, compared with females, males significantly underperform in a host of behavioural and cognitive measures related to empathizing, such as sharing and turn-taking (Charlesworth & Dzur, 1987), responding empathically to the distress of other people (Hoffman, 1977), showing sensitivity to facial expressions (Hall, 1978), and inferring what people might be thinking or intending (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001; Happé, 1995). The notion that fetal exposure to testosterone plays a role in these differences was shown in studies comparing archival testosterone data from amniotic fluid of mothers with their children's assessment on the Childhood Autism Spectrum Test (CAST) and the Child Autism Spectrum Quotient (AQ-Child) (Auyeung et al., 2009a). This study provided both psychometric and physiological support for the E-S theory by showing significant positive associations between fetal testosterone and the CAST and AQ-Child, with boys scoring higher on both.

The argument made in this thesis is that testosterone changes triggered by outcomes in male-male competition will produce differences in how the men will respond to empathic cues. Hence, empirical evidence derived from adults is warranted to support this conjecture. In one study, Harris, Rushton, Hampson, and Jackson (1996) asked 306 university students (155 males)

to dispense saliva samples after which they completed self-reports measuring prosocial personality traits, including empathy (Emotional Empathy Scale; Mehrabian & Epstein, 1972) and nurturance (Nonverbal Personality Questionnaire; Paunonen & Jackson, 1988). The authors found that men averaged five times the amount of salivary testosterone as compared to women (99 versus 18.5 picograms per milliliter of saliva), and rated themselves as significantly less empathic and nurturing.

A comparatively smaller but burgeoning literature is emerging that describes the correlation between testosterone and the accuracy with which people predict others' thoughts and emotions. Ronay and Carney (2013) examined the relationship between individuals' baseline testosterone and their empathic accuracy. They randomly assigned 40 MBA students to dyads (28 males) and instructed them to engage in a 30-minute interaction. Before the interaction, participants provided a saliva sample and were informed that they would be involved in a negotiation role-play exercise where one member would play the role of a salesperson and the other that of a buyer. The purpose of this exercise was for both parties to agree on the sale of a fictional consumer goods company to a larger international company seeking global expansion, and for each party to obtain the best possible terms for the company they represented. The authors also explicitly instructed all participants beforehand that they would have to pay close attention to their partner's verbal and nonverbal cues. Following the interaction, they measured the accuracy with which they were able to identify each other's thoughts and feelings as they systematically unfolded over the 30-minute interaction. Consistent with predictions, participants with higher baseline testosterone were found to be less attuned to their partners' thoughts and feelings, regardless of sex and in spite of receiving explicit directions to take the other's perspective.

Convincing evidence comes from other studies that administered exogenous (i.e., artificial) testosterone to adult subjects and later measured their empathic accuracy (Hermans, Putman, & van Honk, 2006; van Honk & Schutter, 2007; van Honk et al., 2011). For instance, van Honk and Schutter (2007) investigated whether testosterone affected how individuals processed others' threatening facial expressions. Signals such as fear and anger provoke an empathic response in the observer which helps to modulate his or her behaviour. The authors argued that high testosterone levels would impair one's ability to consciously recognize and decode others' emotional expressions. Therefore, a high-testosterone individual might be poised to engage in aggression because of a deficiency in decoding ability. To test their hypothesis, they used a double-blind crossover within-subjects design, where testosterone (0.5 mg) and a placebo were administered two days apart to 16 females ranging between 19 and 26 years of age. The emotion-recognition task involved presenting the participants with a series of morphed video images ranging from a neutral face (0% emotion) to a full-blown expression (100% emotion) that changed in 10%-incremental steps. Six different emotions were presented in total, three threatening (anger, disgust, fear) and three non-threatening (happiness, sadness, surprise). For each emotion, participants were asked to indicate the exact moment at which they recognized the emotion on the screen. Results showed that a significant difference in the morphing needed to recognize the emotion was found between participants in the placebo and testosterone conditions; when participants received the testosterone dose, they lost their sensitivity to recognize others' emotions and needed to be shown more increments to decode a threatening facial expression. With this experiment, van Honk and Schutter (2007) provided the first causal evidence that testosterone reduces individuals' conscious detection of threatening facial expressions.

A more recent study, again by van Honk and colleagues (2011), exposed female participants to artificial testosterone to assess whether they would experience a reduction in their ability to infer others' feelings by evaluating solely the region surrounding the eyes. Developed by Baron-Cohen, Joliffe, Mortimore, and Robertson (1997), the Reading the Mind in the Eyes Test (RMET) measures subtle variations in one's skill at accurately interpreting other people's mental states from the region of the eyes (for a revised version, see Baron-Cohen et al., 2001). The RMET is presented on a computer screen as 36 pictures of the eye region from different faces, and participants are forced to choose one word from a list of four that best describes the target person's feeling or thought. Again, as predicted, the women's scores on the RMET were significantly impaired under a single testosterone dose, thereby providing additional causal evidence that testosterone negatively influences an important component of social intelligence.

Each of the studies above chose female participants because of their superiority in decoding facial affect, and infused the women with enough testosterone to sufficiently bring their levels as close to men's average baseline testosterone levels. In spite of this well-documented sex difference, the authors clearly state that there is little reason to believe that men would respond differently if their testosterone levels had suddenly risen. Therefore, to the extent that men's victory or loss will engender a shift in their testosterone levels, their subsequent empathic accuracy should also be impacted. Hence, the next hypothesis posits that:

Hypothesis 1b: Changes in testosterone negatively relate to empathic accuracy, with testosterone increases (decreases) being associated with less (more) accuracy.

Competition affects individuals' testosterone which, in turn, is potentially responsible for influencing one's ability to read others' emotions. As such, testosterone is thought to act as one of the mediating mechanisms by which victory and defeat lead to different levels of accuracy:

Hypothesis 1c: Testosterone change mediates the relationship between competition outcome and empathic accuracy.

3.3.3. Testosterone's effect on aggression

Evidence for the link between testosterone and human aggression has existed for over 40 years based on samples drawn from a variety of male populations, such as college students and military veterans, prison inmates, healthy adolescents and adults, and hospitalized patients (Archer, 1991, 2006; Dabbs, 2000). In sum, these studies found that high-testosterone individuals were more likely to be associated with more aggression and hostility of various sorts, including the infliction of electric shocks on fictitious opponents in laboratory settings (Berman, Gladue, & Taylor, 1993), crime convictions and violent crime records dating to adolescence (Dabbs, Frady, Carr, & Besch, 1987; Ehrenkranz, Bliss, & Sheard, 1974; Kreuz & Rose, 1972), peer ratings on aggressive traits and behaviours (Olweus, Mattsson, Schalling, & Low, 1980), and self-reported aggression (Dabbs & Morris, 1990; Persky, Smith, & Basu, 1971).

Other studies have looked at high-testosterone men when married and found that those with higher baseline testosterone levels were more likely to have extramarital affairs, and to physically abuse or abandon their spouses, all reasons conducive to higher divorce rates among these men (Booth & Dabbs, 1993; Mazur & Michalek, 1998; Soler, Vinayak, & Quadagno, 2000). More recently, Cohan, Booth, and Granger (2003) studied the concordance of newlywed

couples' testosterone levels ($N = 92$ couples) to understand how hormone-behaviour relationships unfold in a marriage. They measured husbands' and wives' testosterone and examined their problem-solving behaviours (e.g., constructiveness) and social supportive behaviours (e.g., offering help). When both partners were concordant for lower testosterone levels, husbands exhibited adaptive behaviours that were marked by reduced aggression. Not surprisingly then, being less competitive and dominant and more interpersonally sensitive serves to ease marital adjustment.

While these studies should be praised as they constitute some of the foremost empirical attempts connecting androgens to social behaviour, their findings are deduced primarily from cross-sectional designs and are largely correlational (for a review of correlations between testosterone and measures of aggression, see Archer, 1991). To circumvent this limitation, recent experiments tried to establish a causal link between testosterone and aggression by administering exogenous testosterone to participants from which its effects on behaviour were later assessed (Hermans, Ramsey, & van Honk, 2008; Pope, Kouri, & Hudson, 2000). Until now, these studies provide the most compelling evidence for androgen-behaviour causality (for a review, see Stanton & Schultheiss, 2009).

For instance, in a randomized placebo-controlled study, Pope et al. (2000) followed 53 men aged between 20 and 50 years of age from various ethnicities over 25 weeks. They were randomized to receive either testosterone or a placebo through intragluteal injections under double-blind conditions according to the following schedule: for weeks 1-6, they received the first treatment, either testosterone or sesame oil; for weeks 7-12, they received no treatment (i.e., first "wash-out" period); for weeks 13-18, they received the opposite treatment to the one received initially; and for weeks 19-25, they again received no treatment (i.e., second "wash-out"

period). Throughout the 25-week observation, men were assessed using a battery of tests that included Buss and Perry's Aggression Questionnaire (AQ; Buss & Perry, 1992) and asked to complete a 17-item daily diary covering manic and depressive symptoms experienced during the previous 24 hours. Furthermore, spouses and significant others were also asked to rate the participants' behaviour using an identical diary, albeit weekly. As predicted, the authors found that men treated with testosterone had significant increases in aggressive and manic symptoms when compared to control treatments.

One of the major weaknesses in this study, as with the majority of studies on testosterone-aggression relationships, lies in its use of rating scales (e.g., AQ as well as the more popular Buss-Durkee Hostility Inventory; see Buss & Durkee, 1957). In reviews on testosterone's effect on aggressive behaviour, both Rada et al. (1976) and Archer (1991) argued that researchers should instead use behavioural assessments in lieu of rating scales that focus on measuring traits. To address this limitation, several studies published since have employed these methods.

For example, Hermans et al. (2008) studied how testosterone affects neural circuits that are commonly associated with aggression when individuals encounter cues indicating social threat. They administered testosterone sublingually to 12 female participants who were then exposed to a functional magnetic resonance imaging (fMRI) scan while viewing angry and happy faces. Women were chosen to participate in this study because they have lower baseline testosterone levels than men and would therefore require a more modest dose to generate the same observable effects. The other reason is that no evidence exists to support the claim that testosterone's effect on affective responding to social threatening stimuli would be any different in men than in women. The authors reasoned that angry facial expressions constitute an important signal of defiance during social exchanges, and that such expressions had always been involved in

structuring social hierarchies, as well as evoking affective responses in observers according to their social status. The authors hypothesized that higher testosterone would enhance responsiveness to angry faces in the brain regions corresponding to aggression, such as the orbitofrontal cortex (Brodmann area 47) and subcortical regions (amygdaloid region, hypothalamus). As predicted, the authors found that participants receiving exogenous testosterone responded to angry faces with greater activation of neural circuits implicated in aggression.

Finally, Zak et al. (2009) recruited 48 males in a double-blind cross-over experiment and had them apply either 10 grams of Androgel® (1% testosterone gel) or a placebo on their shoulders and upper back. The men were then asked to play the ultimatum game where participants decide how to divide money that is awarded to them in multiple rounds of exchanges. Participants were told that they would play randomly with others in pairs, and that they would be paid a percentage of their final earnings after completing all rounds. In each case, one of the participants was assigned the role of proposer who initiated the game by making an offer on how to divide the $10, while the other player was the responder who either accepted or rejected the offer. If accepted, the $10 would be divided as proposed; if rejected, both players would receive nothing. In addition to how money was to be allocated, the authors measured the extent to which participants would punish their partners for making stingy offers. Therefore, they asked participants to state a minimal threshold below which they would be inclined to punish them. As predicted, Zak et al. (2009) found that infusing men with testosterone not only increased the rate of rejections when offers were given to them (i.e., aggression), but also decreased the amount of money that they offered to others (i.e., generosity) when their role was switched from responder to proposer. Beyond these findings, the authors also discovered that the

punishment threshold of those receiving testosterone was significantly lower compared to that when receiving placebo, suggesting that high-testosterone men show a greater tendency to punish more severely those making ungenerous offers to them.

Three additional studies support the above results using behavioural measures of aggression, although they did not artificially imbue participants with testosterone. First, Mehta and Beer (2010) tested the hypothesis that participants' baseline testosterone would influence aggression through activation of the orbitofrontal cortex. Participants' (17 men) neural activity was measured using fMRI while they played the ultimatum game during which they were told that they would play with 40 other players in one-time interactions where they would divide $10 each time. Participants were also informed that they would be paid a percentage of their final earnings following the 40 rounds of exchanges. In each case, the other players were the proposers, and the participants were the responders who either accepted or rejected the offer. In reality, the other player was a computerized program designed to randomly make 20 fair offers ($5 or $4) and 20 unfair ones ($3, $2, or $1). Consistent with the prediction that high-testosterone individuals would be more likely to reject low ultimatum game offers if these were interpreted as challenges, Mehta and Beer (2010) found that high-testosterone men and women rejected low offers more frequently than their lower-testosterone counterparts, an indication of their aggressive behaviour, and that reduced activity in the orbitofrontal cortex mediated the association between testosterone and aggression.

In a second study, Carré and McCormick (2008) had 38 male participants provide saliva samples before and after performing the Point Subtraction Aggression Paradigm (PSAP) used to measure reactive aggression in which participants interact with a virtual male player online (in reality, a computer program). During the course of the PSAP, participants accumulate points in

exchange for money by pressing a certain button on the keyboard and, at several unexpected times, have some points stolen from them by their "partner." They can choose to either continue accumulating points or press another button to punish their partner by docking some of his points, i.e., reactive aggression in response to provocation. In line with predictions, Carré and McCormick (2008) found that participants with the highest aggressive responses not only possessed the largest percentage increase in testosterone, but were also more likely to choose to compete again versus the same rival. Their findings however, do not specify causal directionality: is it the rise in testosterone that causes an increase in aggression or vice versa? Second, as they point out, the PSAP is not a conventional form of competition and using it as a paradigm to both differentiate winners from losers and measure reactive aggression is problematic.

Finally, Klinesmith, Kasser, and McAndrew (2006) examined whether men who interacted with a handgun would experience rises in their testosterone levels and, subsequently, parallel increases in proactive aggression. Using the challenge hypothesis as a framework, the authors conjectured that the handling of a Desert Eagle™ automatic handgun versus the control object (a children's toy called Mouse Trap™) would act as a stimulus suggestive of a competition or power associated with one's status. Using 30 male college students, the researchers measured proactive aggression with the Hot Sauce Paradigm, a procedure asking participants to anonymously pour hot sauce into a cup of lukewarm water that a third party who allegedly dislikes spicy food would then have to drink. Therefore, the amount of sauce poured into the cup represents a valid measure of unprovoked aggression. Consistent with their reasoning, Klinesmith and her colleagues (2006) found that men who interacted with the gun demonstrated an increase in their testosterone and added more hot sauce to the cup. In other words, merely

interacting with the gun increased aggressive behaviour. Second, the amount of sauce poured was positively correlated with testosterone changes. Finally, the size of the correlation between the treatment (gun versus toy) and the sauce allocation dropped significantly after controlling for testosterone changes, suggesting that the effect of gun manipulation on aggression was mediated by testosterone-level changes.

So far, I have argued that victory and defeat engender a shift in people's testosterone, and that changes in testosterone subsequently impact their aggression. In line with the logic by which testosterone relates competitive outcomes to empathic accuracy, the following main effects and mediation are believed to be at play here:

Hypothesis 3b: ***Changes in testosterone are positively related to aggression, with higher testosterone increases (decreases) being associated with more (less) aggression than lower testosterone increases (decreases).***

Hypothesis 3c: ***Testosterone-level change mediates the relationship between competition outcome and aggression.***

3.4. Personalized Power: A 'Powerful' Moderator

3.4.1. Personalized power moderates the direct effects of competition on empathic accuracy

If winning or losing status has an effect on one's empathic accuracy, would this relationship change depending on one's implicit power motivation? To answer this question, another body of literature has been devoted to investigating dispositional variables, in particular power, as important factors to consider in measuring empathic outcomes (Côté et al., 2011;

Ebenbach & Keltner, 1998; Keltner et al., 2003; Schultheiss, Wirth, Waugh, Stanton, Meier, & Reuter-Lorenz, 2008).

In a recent study, Schultheiss et al. (2008) had 24 individuals, 12 high and 12 low in *n* Power, participate in an fMRI séance during which they viewed high-dominance (e.g., angry faces), low-dominance (e.g., surprised faces), and control stimuli (e.g., neutral faces). The researchers rationalized that power-motivated people would be keen at detecting social cues that serve to signal others' dominance because they are especially concerned with dominating the hierarchy and/or avoiding others' authority. Angry and surprise faces are valuable cues that act as motivational incentives for perceivers who are high in power, whereas neutral faces have no such effect (see also Schultheiss & Hale, 2007). On the one hand, angry faces signal a sender's dominance and high status (Tiedens, 2001) and, as such, should be perceived as a threatening challenge to those high in *n* Power. Surprise, on the other hand, indicates that the target's (i.e., the surpsisee's) demands have been violated without notice, and the person committing the violation is likely the perceiver (i.e., the surprisor). Therefore, following a social interaction, Schultheiss et al. (2008) argued that such a violation and the surprise it entails will be interpreted as a power differential between the two parties, with the perceiver having more power over the target. In line with their hypothesis, the authors found that high-power individuals showed a greater activation of brain areas associated with emotion and motivation than their low-power cohort when viewing emotional faces (i.e., the insula, dorsal striatum, and orbitofrontal cortex, but not the amygdala and accumbens).

Field research has also found that individuals high in power show different patterns of social cognition when they experience threatening emotions (Keltner et al., 2003). A study by Ebenbach and Keltner (1998) examined the attitudes of gay and heterosexual Christian college

students embroiled in a conflict over the beating of a gay member by the religious group. During this controversy, defending gay students reported higher levels of power than the Christian students because they received support from the student body and the school's administration. As expected, the high-power gay partisans who experienced hostile and negative emotions judged their opponents' attitudes more accurately than those who did not feel the same emotions.

Finally, in three experiments, Côté et al. (2011) tried to understand whether people's propensity for power influences the relationship between their prosocial orientation and their empathic accuracy. Prosocially-oriented individuals focus on the needs of others and possess an inclination to enhance their welfare (Batson & Shaw, 1991). Not surprisingly, they are more likely to attend to the emotions of others as a means of figuring out how best to help improve their welfare and meet their needs (Goetz, Keltner, & Simon-Thomas, 2010). Given a heightened awareness of others' emotions, prosocial individuals may be more accurate in identifying these emotions. Côté and his colleagues (2011) found mixed results in the literature, and attempted to reconcile the findings by showing that power behaves as a moderator in the relationship between prosocial orientation and empathic accuracy. They argued that individuals high in power behave more freely and independently of others' wishes, and possess emotional independence that allows them to be guided by their inherent dispositions. Hence, they are more likely to concentrate their thoughts and actions in ways that are consistent with their goals and internal motivations. Elevated power should therefore enable individuals who are prosocially oriented to focus more on their prosocial goals and, consequently, to address and identify others' emotions more accurately. After measuring key variables using both forced-choice and naturalistic methods, Côté et al. (2011) found that prosocial orientation indeed predicted empathic accuracy more strongly in high- versus low-power individuals.

Two limitations in the above studies need to be highlighted. First, some of the studies used traditional self-report questionnaires to assess power (e.g., Capacity for Power Scale; Anderson & Galinsky, 2006), a choice that McClelland (1975) and Winter (1973) would highly contest because asking people explicitly about their power motive falls short of their true desire for power. Second, none of the authors made the differentiation between socialized and personalized forms of the power motive (s and p Power). Given empathy's palpable association with 'connecting with others,' one can only suspect that its relationship with predictor variables would be different for s Power holders than for p Power holders.

Following a competitive win, I hypothesized that men would score lower in empathic accuracy and that, conversely, they would score higher following a loss (hypothesis 1a). However, these conditions will not hold equally for both men high and low in the power motive. Let us first compare the empathic accuracy of winners who are either high or low in power motivation. Following a victory, it is likely that high-power motivated men will welcome the chance to influence others contrary to their low-power motivated cohort, leading to a steep increase in empathic accuracy with increasing levels of power motivation. This may be because assessing others' emotional expressions is a motivation in its own right for these individuals. On the contrary, low-power motivated men do not possess the same fervent drive to have an impact on others and so, following a victory, will likely perform much worse in empathic accuracy compared to those high in power motivation. These individuals derive little pleasure from influencing others and winning may make them more indifferent toward others' thoughts and feelings.

Let us now turn to the empathic accuracy of losers. A competitive loss sustained by men high in power motivation would prevent them from dominating others, the result of which would

lead to an increase in negative affect. However, in their resistance to losing status and influence, these men might be motivated to accurately interpret others' emotions as a means of either avoiding further relegations in rank or, rather optimistically, possibly "regaining" a foothold in the hierarchy thereby attenuating the felt negative affectivity. For losers low in power motivation, missing out on the chance to influence others will not be met with nearly as much anxiety and, consequently, their empathic accuracy will likely not be as high as that of their higher-power cohort. However, this differential in the affective reaction to loss will not be large between high- and low-power motivated men because even for the latter, a loss is *still* a negative outcome albeit less anxiety producing. Therefore, I expect that the difference in empathic accuracy between the two loss conditions (i.e., high-power loss, low-power loss) to be small leading to a less pronounced increase in empathic accuracy with increasing power motivation among losers.

One final point must be added that considers the distinction between personalized (p Power) and socialized forms of power (s Power). Both high s- and p-Power individuals share the same tendency to seek their influence whenever possible. However, compared to those high in p Power, those high in s Power have a greater predisposed interest in helping other people rather than using them as instruments to advance their goals. This then would make the role of s Power less important than that of p Power because the more sincere and altruistic s Power holders would rely less on others' facial cues to direct their behaviour. These individuals are less prone to modifying their behaviour according to others' cues. Contrarily, because p Power holders rely heavily on personal information gained from others, including facial expressions, as vital input with which they can advance their agenda, it is suspected that p Power rather than s Power will moderate the relationship between competitive outcomes and empathic accuracy. Thus:

Hypothesis 1d: ***Personalized power moderates the direct effect of the relationship between competition outcome and men's empathic accuracy; as personalized power increases, winners will show a steeper increase in empathic accuracy than losers.***

This thesis began by chronicling the meaning of empathy. It then journeyed through the effects of competition on empathic accuracy and aggressive behaviour, and the possible mediating mechanism that testosterone might play in these relationships. Individuals, however, differ with respect to their need for power over others, and this implies that they will not respond to status wins and losses in the same fashion. The question then becomes whether men with varying power will differentially experience androgen changes and, subsequently, different cognitive (empathic accuracy) and behavioural (aggression) empathic outcomes.

3.4.2. Personalized power moderates the direct effects of competition on aggression

If engaging in aggressive behaviours were an adaptive response for individuals under conditions of resource competition, then one would expect that individuals' dispositional differences would influence this competition-aggression relationship. It is generally understood in psychology that behaviour is a joint function of individuals and their environment. In other words, behaviour stems not only from aspects of the external social context in which individuals interact, but also from the emotional states, dispositions, and experiences that they bring to these situations. The prevailing zeitgeist among psychology and organizational scholars who study human aggression suggests that strong and direct links between personality and aggression have been difficult to demonstrate (for arguments, see pp. 201-244 in Baron & Richardson, 1994;

Neuman & Baron, 1998). An important reason for this is because, even though people differ in their aggressivity proneness, situations seem to exert a stronger impact on aggression. One such example is the stifling of one's goals resulting from competition with others.

Consider some experimental studies where participants were placed in situations in which they were primed for power and later assessed on various aggressive behaviours (Gruenfeld, Inesi, Magee, & Galinsky, 2008; Kipnis, 1972; Lammers, Stapel, & Galinsky, 2010). For example, Kipnis (1972) primed students with power by having them assume managerial roles, and found that they viewed their subordinates as objects of manipulation, devalued the worth of their performance, and expressed a desire to maintain a psychological distance from them (for a more recent example on how the priming of power leads to the objectification of people, see Gruenfeld et al., 2008). In another study, Lammers et al. (2010) explored whether power increases moral hypocrisy, a milder form of aggression. The authors epitomized hypocrites as people who demand others to follow and uphold strict moral norms even though they themselves violate such norms. First, they primed students for power by having them recall an experience of either high power or low power, and asked half of them whether cheating was acceptable (judgment) while giving the other half the chance to actually cheat (behaviour). Findings showed that, compared with the powerless, the powerful condemned others for cheating yet were more likely to cheat themselves.

In each of these experiments, participants were placed in situations that afforded them power or status, situations that were also responsible for producing more aggressive responses. Here, it is argued that male-male competitive outcomes leading to desirable social rewards, such as an elevation in one's hierarchical position relative to others, will produce aggression and that the strength of this relationship will depend on the extent to which the men derive pleasure from

exercising their influence, particularly the personalized or egoistic and self-serving form of power (or p Power). Following a loss, high-p Power men will aggress more reactively than low-p Power men because they will feel more frustrated at being prevented from legitimizing their influence over others who they believe should be subservient to them, as well as foregoing the chance to collect highly prized status symbols. Following a victory, however, high-p Power men will aggress more proactively than low-p Power men because they will experience a greater sense of entitlement from their elevated status and, consequently, be more likely to aggress if they face no repercussions for doing so.

This logic mirrors that of Schultheiss and Rohde (2002), who reasoned that if men high in p Power derive a particular reward from beating an opponent, then higher levels of power should be related to an increase in behaviours believed to be instrumental in maintaining the winning streak. In the argument made in this thesis, aggression might very well be one such behaviour. This is also consistent with Keltner et al.'s (2003) approach-inhibition theory of power, which states that power influences behaviour by causing a change to occur between approach and inhibition systems. Approach systems are the behavioural systems associated with the seeking of rewards (e.g., food, achievement, sex, social attachment), whereas inhibition systems are those associated with the avoidance of threats (e.g., heightened vigilance, anxiety, avoidance) (see Carver & White, 1994; Higgins, 1997, 1998). People high in power are more likely to activate the approach system for two reasons. One is because power enables them to access the rewards they seek, and the other is that it lessens their concern of having to encounter interference from others when approaching those rewards (Anderson & Berdahl, 2002). Since the approach system modulates processes related to consumption, aggression, and sex, one would therefore expect the powerful to increase their engagement in such behaviours whenever the situation is opportune.

Taking these theoretical and empirical considerations into account, and adhering to a recent counsel by Carré et al. (2011) that future research should consider personality as a moderating factor in situation-behaviour relationships, the following hypothesis is proposed:

Hypothesis 3d: ***Personalized power moderates the direct relationship between competition outcome and men's aggression; as personalized power increases, winners (losers) show more proactive (reactive) aggression than losers (winners).***

A summary of my research's hypotheses are presented in Table 2 below.

Table 2

Summary of Hypotheses

Hypothesis 1a	Compared to losers, winners will score lower in empathic accuracy.
Hypothesis 1b	Changes in testosterone negatively relate to empathic accuracy, with testosterone increases (decreases) being associated with less (more) accuracy.
Hypothesis 1c	Testosterone change mediates the relationship between competition outcome and empathic accuracy.
Hypothesis 1d	Personalized power moderates the direct effect of the relationship between competition outcome and men's empathic accuracy; as personalized power increases, winners will show a steeper increase in empathic accuracy than losers.
Hypothesis 2	Competition outcome elicits changes in testosterone, such that winners (losers) show testosterone increases (decreases) after a win (loss).
Hypothesis 3a	Winners (losers) will be more inclined to engage in proactive (reactive) aggression against a third party than losers (winners).
Hypothesis 3b	Changes in testosterone are positively related to aggression, with men having higher testosterone increases (decreases) being associated with more (less) aggression than those with lower testosterone increases (decreases).
Hypothesis 3c	Testosterone-level change mediates the relationship between competition outcome and aggression.
Hypothesis 3d	Personalized power moderates the direct relationship between competition outcome and men's aggression; as personalized power increases, winners (losers) show more proactive (reactive) aggression than losers (winners).

CHAPTER FOUR

4. METHOD FOR THE STUDY OF EMPATHIC ACCURACY (STUDY 1)

4.1. Participants

This research was approved by Concordia University's Human Research Ethics Committee (dossier # UH2012-080). Male participants were recruited from COMM 222, an organizational behaviour course taught at Concordia University in Montreal. Males were chosen because men produce eight to ten times more testosterone than women (Kivlighan, Granger, & Booth, 2005), and there are sex differences in both empathy (Baron-Cohen et al., 2001; Hoffman, 1977; Rueckert & Naybar, 2008) and power motivation (Chusmir, 1986; Chusmir & Parker, 1984).

Several precautions were taken during the recruitment and experimental processes to ensure that testosterone assays were carried out under optimal conditions. First, participants had to abstain from smoking at least one hour prior to experimentation as tobacco affects salivary testosterone concentrations (Attia, el-Dakhly, Halawa, Ragab, & Mossa, 1989). Second, those reporting endocrine dysfunction and anabolic steroid use would be excluded, as were those who had not visited a dentist over the last 12 months or had recent dental complications and/or oral cavity injuries or wounds. These exclusion measures were decided upon because performance-enhancing steroids impair normal testosterone, and because prolonged neglect of oral hygiene may result in blood leaching inside the mouth from abscesses or caries that taint saliva samples. Third, prior to arrival, participants would be asked to dispense any chewing gum or candy, and to rinse their mouths with water to minimize test tube contamination. Fourth, they would be required to put away mobile phones because conversations leading to a verbal argument could adversely affect testosterone production. Finally, alcohol consumption was strongly discouraged

on the days the experiments took place because ethanol also interferes with its production (Lindman, Järvinen, & Vidjeskog, 1987).

Of the initial sample of 92 male undergraduate students who participated in this study (mean age of $M = 22.11$ years, $SD = 3.46$), 84 constituted the final sample from which analyses were conducted (mean age of $M = 22.01$years, $SD = 3.42$). In line with recommendations from Tabachnick and Fidell (2007), four participants with missing data were discarded from the final sample because their item nonresponse exceeded 5%. Outliers were tested using box-plot graphs and none were found. During debriefing, four participants admitted that they had a priori knowledge of the research's hypotheses because they had been informed from participants who had already taken part in the experiment, and were thus excluded from the final sample. Therefore, in total, eight participants were removed from the final analyses.

4.2. Procedures and Materials

Participants were informed that the research's goal was to explore men's biochemical and behavioural responses across various exercises played both alone and in dyads. The competitive basis for the experiment was not disclosed at the outset and, to incentivize participation, students were told that this was a unique opportunity in which to understand how their body's chemistry reacted in both solitary conditions and during interactions with others. The ones agreeing to participate would have to provide three (3) saliva samples over a period of about two hours and would receive course credit upon the experiment's completion. Please consult the recruitment speech in Appendix A.

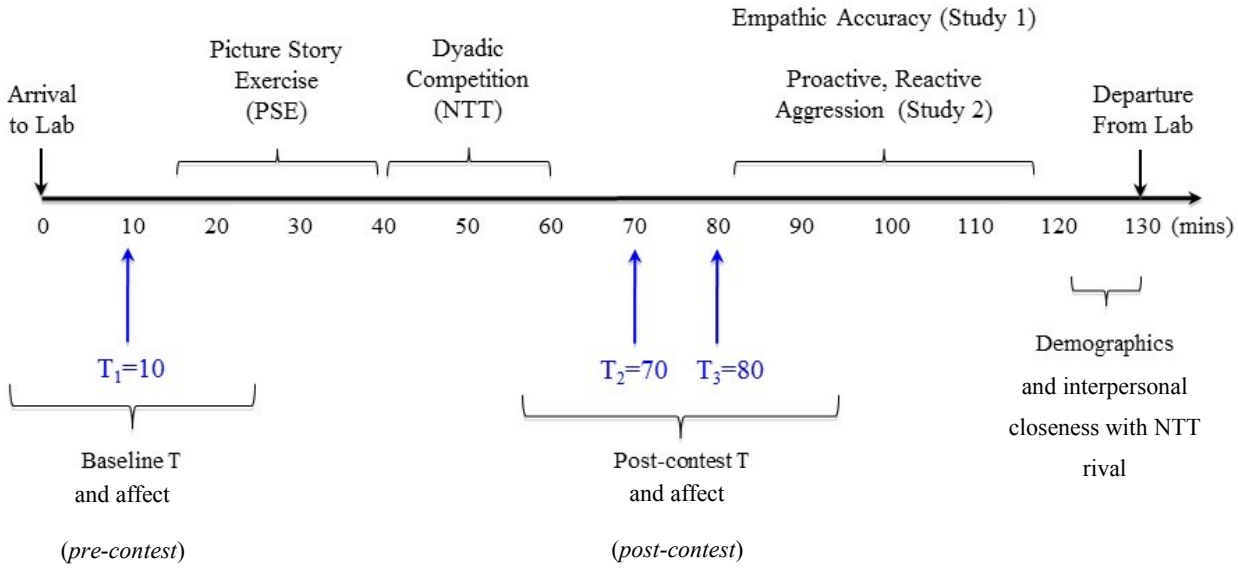
All participants came to the laboratory twice and provided data on two distinct occasions. On Day 1, participants were placed in a quiet room where they completed a consent form

(Appendix B) as well as questionnaires measuring the Dark Triad of personality (Jonason & Webster, 2010) and the Big Five personality (Donnellan, Oswald, Baird, & Lucas, 2006). These are shown in Appendix C, in the order in which participants completed them, and described in detail in the measures section. Once finished, they were informed that they would have to return on another day to complete the experiment in order to receive full course credit. They were told that, on Day 2, they would be assigned to one of several experiments some of which would ask them to engage in solitary tasks while others would have them interact in groups on either cooperative or competitive exercises. This "multiple study" ruse is often used in laboratory experiments to minimize the degree to which participants could conceivably connect the independent variable(s) with the dependent one(s) (Wilson, Aronson, & Carlsmith, 2010). They were then given instructions on the competitive Number Tracking Test (NTT), explained in greater detail below, and were asked to play one round of the NTT in which their time would be recorded. Given that the NTT is rigged, such that there is a clear winner each time, it is still possible for a participant in the losing condition to outperform his rival in the winning condition. Therefore, this problem was averted by recording a precompetitive time for each participant on the first trial and then pairing participants into dyads who scored similarly on this trial on Day 2 to ensure the methodological validity of the contest outcome manipulation (O.C. Schultheiss, personal communication, October 24, 2012).

On Day 2, two participants who scored similarly on the NTT during the trial run arrived to the laboratory in pairs at one of the following time slots: 9:55 am to 12:05 pm, 10:40 am to 12:50 pm, 12:55 pm to 3:05 pm, 1:40 pm to 3:50 pm, and 3:45 pm to 5:55 pm. The sequence describing what participants did from the time they arrived to the laboratory until the time they left is shown in Figure 2.

Figure 2

Timeline of Experimental Procedures



All testing took place between these times to control for diurnal variation in testosterone concentrations due to the body's circadian rhythm (Dabbs, 1990b). The room in which they sat was divided in half with a Japanese shōji screen to prevent participants from communicating with each other. Each participant sat at a desk equipped with a computer. Unbeknownst to participants, given that the outcome of the competitive game is predetermined (see below for details), the seating arrangements ensured randomization on the independent variable: whoever sat at the desk closest to the room's entrance was assigned the 'winner' condition. It is worth mentioning that a participant arriving first did not always select to choose the seat closest to the entrance. Hence, the selection of winners and losers followed a randomized protocol.

Once seated, they rested for 10 minutes to quell anxiety arising from anticipating an interaction with the researcher, the task itself, or the ambivalent surroundings. Since androgens

are ephemeral, this time lag between participants' arrival to the laboratory and the collection of saliva is consistent with previous work (Carré, Gilchrist, Morrissey, & McCormick, 2010; Saad & Vongas, 2009).

They then deposited their first saliva sample (T_1 = 10 min) into a 5-ml sterile plastic vial, and completed a shortened version of the Profile of Mood States as a measure of affect (POMS-SV; Shacham, 1983) included in Appendix C. Although some studies have employed cotton swabs as aids in collecting saliva, this technique was not employed because cotton artificially inflates testosterone (Dabbs, 1991). Instead, participants were asked to provide saliva through passive drooling, pictured in Appendix D, which has recently been shown to be the best data collection method for hormonal assaying (Schultheiss, 2013). Tubes collected from each participant were stored on ice and, when data collection ended each day, were transferred to a minus-20°C conventional refrigerator freezer until assaying took place.

Participants were then given the Picture Story Exercise (PSE) consisting of six pictures depicting people in various social situations and were asked to write a five-minute story about each (Winter, 1973, 1992a; Schultheiss & Pang, 2007). These pictures, shown in Appendix E, were used from which participants' personalized power was measured. The PSE exercise, lasting roughly 25 minutes, was done on the computer using Inquisit© software licensed to Concordia University's Centre for Multidisciplinary Behavioural Business Research. While seated, each participant was shown the first picture for 10 seconds on a computer screen. Recalling what they had seen without having access to the picture any longer, participants were instructed to write a short story in a space indicated on the computer and given five minutes to do so. They were advised to write freely whatever came to mind without exerting pressure because social pressure influences participants' motives in ways that render the scores invalid (Lundy,

1988). The researcher then left the room until all six stories were completed. With Inquisit© software, the task was programmed to ensure picture randomization and to notify participants when their time was up. Details of the PSE measure are included in the methods section.

Following this, they were escorted inside another room and introduced to a female confederate who would administer a game in which they were going to compete, namely the number tracking test (NTT) they had seen on Day 1. They were told that they would compete on 12 rounds of the NTT, and that this "game" is used currently to measure people's spatial and cognitive skills in the German armed forces where it was originally developed. Specifically, they were made to believe that the NTT gauged their leadership potential, future earnings, and likelihood of career success, and that excelling in it would depend on their own merit rather than sheer luck. In the real world, from what could be inferred by the NTT's applied use, winners would be considered managers and losers would be their subordinates. Winners from this competition would receive an official letter from the university attesting to their performance, and have their photos and short biographies, if they so wanted, featured in a university newsletter and on the electronic bulletin board in the entrance lobby of the business school. Participants were advised to stay focused on the task and to do their best, and that communicating with their rival during the competition was prohibited and violating this rule would lead to expulsion. Finally, they were seated with their backs to each other because research in nonverbal communication has shown that sudden face-to-face interactions between two unacquainted men elicit confrontational mechanisms that prime them for competition (Knapp & Hall, 2002; Manusov, 2005). Hence, since participants here knew that they would compete with one another, this seating arrangement was designed to prevent unwanted testosterone fluctuations.

More importantly, given that the competition was rigged, placing them with their backs to each other further helped conceal the winner's unfair advantage.

The NTT is a speed-based cognitive task requiring participants to trace a line with a pen in order to make a continuous path through consecutive ascending numbers (1, 2, 3, 4 …) on a grid filled with distractor numbers and arranged in a matrix (Carré et al., 2009; Schultheiss et al., 1999; Schultheiss & Rohde, 2002). Its objective is to connect numbers as fast as possible until participants reach a highlighted number that signals them to stop, e.g., "16" as shown in the example featured in Appendix F. The competition is rigged such that two versions of the NTT were created with the winning condition being easier than the losing one: winners received 9 short (i.e., easier) number sequences and 3 long (i.e., harder) ones, while losers received 3 short sequences and 9 long ones. Thus, the winner is slated to win 9 out of 12 times while the loser wins only three times. As mentioned above, participants who had performed similarly on the NTT on Day 1 were paired together and were randomly assigned to either the winning or losing conditions. Competition began immediately after instructions were given. In total, 12 rounds of the NTT were played in which the female moderator tracked and recorded the outcome of each round. Participants who finished first in each round said "Done!" after which their opponents had to stop immediately, and those winning the majority of trials would be declared winners. This exercise took about 25 minutes to complete during which the female moderator took copious qualitative notes on the participants' nonverbal behaviour (e.g., nervous twitching, foot tapping, and breathing frequency) and recorded the men's individual times on each of the 12 rounds.

Once the competition ended, both the female confederate and I performed a ceremonial ritual to honor the winner. Comments related to the loss were not mentioned to the loser, except:

"Good try! Better luck next time." About a minute was taken to inspect the times recorded for each round on the NTT, and to congratulate the winner on his time. It was then openly announced that the winner had recorded the fastest time among a group of 10 men in his cohort, and that he was eligible to have his picture, biography, and performance on the NTT featured in the business school's lobby and in a university newsletter.

Both participants were thanked for competing and taken to their original room where they documented their post-competitive affect. There, they provided their second (T_2 = 70 minutes) and third (T_3 = 80 minutes) saliva samples (Figure 2). During this time, the female moderator entered the room and gave each participant a mock organizational chart illustrating their position on the hierarchy with respect to the NTT. Illustrated in Appendix G with fictitious names to conceal identities, this chart was given to each participant to clearly signal the winner's dominant position relative to the loser's. The winner also received an officially endorsed letter attesting to his performance, shown in Appendix H.

Once they recorded their post-competitive affect and provided two additional saliva samples, participants were asked to complete a final computer-based exercise which involved accurately identifying the facial expressions of male and female young adult actors. These photographs were chosen from the Montreal Set of Facial Displays of Emotion (MSFDE; Beaupré & Hess, 2005). Six facial expressions included happiness, anger, sadness, fear, disgust, and shame. These expressions were portrayed by male and female young adults who had been properly instructed via a directed facial action task. These adults represented one of the following three ethnicities: French Canadian, Chinese, and sub-Saharan African. A total of 36 stimuli (3 expresser groups or ethnicities × 6 different facial expressions × 2 gender of expresser × 1 actor) were presented randomly to each participant. Each image or stimulus was presented

as a 7.6 × 12.6 cm digital black-and-white photograph on a 15-inch computer screen using Inquisit© software. Examples of facial expressions as well as a glossary given to participants to help them understand what is meant by each emotion are featured in Appendix I. This exercise took 30 minutes to complete. Once done, the men provided demographic information (Appendix J) and completed the Inclusion of the Other in the Self Scale (Aron, Aron, & Smollan, 1992) that captures how interpersonally connected the men felt with their NTT rivals (Appendix K). Finally, before exiting, each of the participants was asked whether he had any questions or concerns about the study. This served as a manipulation check to confirm whether participants had guessed the hypotheses, and whether they had suspicions concerning the competition rigging.

4.3. Measures

4.3.1. Treatment of competition outcome

Competitive outcome (win, loss), the independent variable ("x") shown in Figure 1, was transformed into a dummy variable "win" with 0 = losers and 1 = winners. In total, there were 42 winners and losers alike in the study of empathic accuracy.

4.3.2. Testosterone measures

As illustrated in the experimental timeline in Figure 2, participants provided three saliva samples from which testosterone was measured, namely T_1 = 0 minute or baseline testosterone, T_2 = 70 minutes (or 10 minutes following the winner's announcement), and T_3 = 80 minutes (or 10 minutes after T_2). Having participants provide several saliva samples was intended to maximize the likelihood of measuring testosterone's fluctuation as it occurred following the

winner's announcement, which is consistent with previous literature specifying that the ideal time at which concentrations appear in saliva after a manipulated social interaction is 10 to 15 minutes (Elias, 1981; Riad-Fahmy et al., 1987; Schultheiss & Rohde, 2002; Salvador et al., 1999). Thus, to maximize the likelihood of capturing this optimal window of hormonal change, another saliva sample was collected at T_3. However, in the end, time T_2 was used as the post-competitive testosterone because it captured desired variability and is consistent with previous literature. Second, the difference score T_2 minus T_1 was used as the unit of analysis for testosterone measures which is consistent with many studies of salivary testosterone and human behaviour (see meta-analysis by Archer, 2006; see also Bateup, Booth, Shirtcliff, & Granger, 2002; Book, Starzyk, & Quinsey, 2001; Carré et al., 2013; Edwards et al., 2006; Mehta & Josephs, 2006; van Anders & Watson, 2007). In addition to difference scores, the regressor variable method was used in which T1 scores were statistically controlled for in a regression as advocated by some statisticians (Allison, 1990; Cronbach & Furby, 1970). My findings, discussed in the following chapter, were consistent using this alternative method as well.

Third, because the sample size was above 50, a Kolmogorov-Smirnov test was computed to assess the null hypothesis that the actual distribution of testosterone change is normally distributed. This test proved to be nonsignificant, $D(84) = .08$, $p = .20$, thus the null hypothesis cannot be rejected. Skewness (-.212) and kurtosis (2.677) values were also computed, and were both found to fall within acceptable ranges (for skewness, between -1 and +1; for kurtosis, between -3 and +3). Finally, a two-dimensional graph was plotted and this confirmed normal distribution of raw T_2–T_1 data.

Testosterone change represented the mediating variable in Figure 1 ("m"). All saliva samples were measured in duplicate and on the same day. Of the original total of 276 saliva

samples collected, analyses included those from 84 participants or 252 samples. Frozen samples were first warmed to room temperature and then centrifuged (3000 rpm) for 15 minutes. Duplicate 100 μL aliquots of saliva were assayed according to DRG International's kit instructions, and optical densities were determined using a Biotek Synergy™ plate reader at 450 nm. The intra-assay coefficient of variation for the current sample was 7.17%.

4.3.3. Assessment of implicit power motivation

To measure personalized power, the moderator ("w") shown in Figure 1, the revised *n* Power scoring system was used (Winter, 1994). This system was originally developed within the McClelland-Atkinson tradition of motives and described in Winter's (1994) manual for scoring motive imagery in running text. The power motive is a relatively stable disposition that drives individuals to exercise influence over others, and which is assessed through thematic content analysis of verbal material using the Picture Story Exercise or PSE (McClelland, 1975; Winter, 1973, 1992a). Previous studies have established the validity and reliability of the PSE (for a review, see Schultheiss & Pang 2007), which in this case consisted of the following six pictures which are shown in Appendix E along with sample instructions on how to elicit thematic apperception stories: 1) ship captain; 2) bicycle race; 3) hooligan attack; 4) women in laboratory; 5) boxer; and 6) woman and man arguing.

These pictures were chosen for a number of reasons highlighted by Schultheiss and Pang (2007). First, six pictures were used because this number corresponds to the recommended range that scholars ought to use (i.e., between 5 and 8). Having more than eight pictures reduces validity due to fatigue setting in from test length (Reitman & Atkinson, 1958). More importantly, administering up to six pictures increases the PSE's reliability and hence its validity

(O.C. Schultheiss, personal communication, June 11, 2012). The point is to use as many pictures as participants are willing to write stories about in a session, while not sacrificing validity. On the other hand, having too few is suboptimal because variance of scores is affected as the number of pictures drops to zero, i.e., degree of dispersion of scores within a population increases proportionally with the number of PSE pictures used in a test.

Second, these pictures were chosen due to their sufficiently high cue strength for the power motive (Pang, 2010; Schultheiss & Pang, 2007). Pictures differ considerably in their ability to elicit motive imagery. While some are able to entice respondents to write about one kind of imagery (e.g., power), others are more appropriate for assessing two or more motives (e.g., power and affiliation, power and achievement). Furthermore, some pictures represent a motivational theme so obvious that participants will permeate their stories with only one kind of motivational imagery, making the picture unsuitable in its purpose to differentiate low- versus high-motive individuals. For instance, a picture featuring a boxer landing an upper cut against another boxer will generate stories infused with high power because respondents will all write a story about the fighter dominating his weaker opponent. However, a picture portraying a boxer who is gazing thoughtlessly into space would induce participants to write different stories. High-power individuals may choose to write about the fighter pondering his last knockout that won him a title championship, whereas low-power individuals might write about the boxer taking a break from his routine training to think about possible retirement. Others may even shy away from the power motive entirely, and write about the fighter looking forward to spending a romantic evening with his companion (e.g., individuals lower in power and higher in affiliation). Thus, the PSE's validity can be increased if one carefully chooses pictures that encompass a range of situations in which the motive can be expressed (Pang, 2010).

A final consideration for the selection of the six pictures is that they are related to the situation in which the dependent variables are assessed. In the research here, male participants having different power motives will compete in dyads from which their androgen levels, empathic accuracy, and reactive and proactive aggression will be measured. According to studies reporting on the cue strength of commonly used PSE pictures, the majority of the chosen pictures focus on power (for a summary, see Table 5.2 in Pang, 2010, p. 127). The PSE was chosen because implicit motives are more likely to be aroused by and respond to nonverbal cues than to verbal stimuli (McClelland, 1975; Schultheiss, 2001). Power was scored each time that a story character showed concern about exercising impact or influence over others or even society-at-large (Winter, 1994), with two independent coders verifying for one or more of the following power subcategories, from P1 to P6: Strong and forceful actions, e.g., hitting, shooting, shouting at, insulting someone (P1); control or regulation, e.g., checking up on others (P2); influencing, persuading, and convincing others, e.g., arguing for or against (P3); unsolicited help or advice, e.g., what you endure from family (P4); impressing others, e.g., concern with fame and prestige (P5); and eliciting strong emotional responses in others, e.g., surprising, startling others (P6).

As one might expect from coding analysis, the validity of the PSE is based on interrater agreement scores. To be able to code, an undergraduate student and I undertook extensive PSE training after which practice tests were taken individually and which were compared with Winter's (1994) expert scores. An agreement level of .85 (or 85% agreement) was achieved by each individual coder, and the agreement score between coders was also high, as demonstrated by an overall intercoder reliability of .90. Any discrepancies between coders were resolved through discussion. Since participants varied with respect to story length, some would show inflated power motive scores simply by virtue of writing longer stories. To address this issue,

this difference in word count was controlled for by regressing total personalized power on the total number of words and using the standardized residuals as a measure of personalized power, as has been previously recommended (Pang & Schultheiss, 2005). In total, 1,008 picture stories were coded for Study 1 (84 participants × 6 stories each × 2 raters), each taking between five and seven minutes to code.

4.3.4. Treatment of empathic accuracy

Emotion recognition accuracy, the dependent measure ("y") in Figure 1, followed the approach of Beaupré and Hess (2005) who calculated it from the intensity scales such that when the target scale received the highest score, the judgment was considered accurate and Inquisit© automatically gave a score of one (1); otherwise, it gave a score of zero (0). Put simply, participants were presented with a series of Likert-type scales ranging from 0 to 100 next to which each of the names of the emotions were written. When a facial expression disappeared from the screen, they indicated on these scales how much of the emotion was present; the emotion receiving the highest score that matched with the actual emotion was given a value of one (1). If not, it was given a value of zero (0). Again, skewness (-.182) and kurtosis (-.454) values were obtained, both of which fell within acceptable ranges. Finally, a two-dimensional graph was plotted and confirmed normal distribution. Thus, statistical analyses were done using the raw measures of empathic accuracy.

4.3.5. Controls

Three potentially confounding variables were controlled for in this study: extraversion, Machiavellianism, and anxiety.

Extraversion. Extraverts are friendly, gregarious, and assertive individuals who have had many more social opportunities than their quieter introverted counterparts to develop their emotion recognition capability. Therefore, one might expect extraverts to be better able than introverts to accurately interpret others' emotional expressions. Extant studies in leadership have found that extraversion indeed allows leaders to utilize their emotion recognition ability more effectively (Rubin et al., 2005). As such, a subscale of Donnellan et al.'s (2006) Mini-IPIP was used to measure extraversion. The Mini-IPIP is a 20-item short version of the larger 50-item International Personality Item Pool−Five-Factor Model (Goldberg, 1999) that comprises four items per Big Five trait. Participants indicated whether they agreed or disagreed with statements about their level of extraversion using a five-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Sample items included "I talk to a lot of different people at parties" and "I keep in the background" (reverse scored item). Cronbach's alpha for the extraversion subscale of four items was found to be .75.

Machiavellianism. Individuals who score high on Machiavellianism, i.e., high Machs, are skilled at manipulating, exploiting, and deceiving others. Due to this ability, one can assume that high Machs would be particularly good at understanding others in social situations. Recent nonclinical studies, however, have found significant negative correlations between Machiavellianism and one's ability to infer others' emotions in both adults (Ali & Chamorro-Premuzic, 2010) and children (Barlow, Qualter, & Stylianou, 2010). As such, I controlled for the effect of this trait on emotion recognition. Therefore, a subscale of Jonason and Webster's (2010) 12-item 'Dirty Dozen' scale was used to measure Machiavellianism, one of the three components of the Dark Triad. Using a five-point scale from 1 (*not at all*) to 5 (*very much*), participants were asked to judge the extent to which a series of statements applied to themselves.

Sample items for Machiavellianism included "I have used flattery to get my way" and "I tend to exploit others towards my own ends." Cronbach's alpha for the Machiavellianism subscale of four items was found to be .79.

Anxiety. Unlike the above two control measures which are trait-like, this one was intended to capture a state believed to adversely affect empathic accuracy. Anxiety is an aversive affective state that individuals might experience following a threatening situation like a competition and, as such, temporarily disrupt their ability to effectively execute some tasks that require even a modicum of cognitive effort. In fact, psychologists have theorized that anxiety impairs processing efficiency because it reduces attentional control which, in turn, increases the likelihood that whatever resources are used in processing tasks will be diverted elsewhere (Eysenck, Derakshan, Santos, & Calvo, 2007). Here, anxiety was measured using a subscale of the shortened version of the Profile of Mood States (SV-POMS; Shacham, 1983), in which participants rated their felt tension/anxiety following the competition with a five-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Sample items included adjectives such as "on edge," "restless," and "nervous." Cronbach's alpha for the anxiety subscale comprised of six items was found to be .85.

4.3.6. General statistical approach

Given that the two experiments are identical with the exception of the dependent variables, this section highlights the general statistical approach used for both studies. There exist several ways to test the hypotheses made herein. Optimally, one would employ structural equation modeling with bootstrapping, which would take into account errors associated with the inter-rater reliability of the personalized power measure, as well as the reliability and non-normality of

other measures and their respective interactions, e.g., competitive outcome, a dichotomous variable that is not normally distributed. However, due to sampling limitations ($N < 100$ participants), conditional process analysis (Hayes, 2013) was used for both studies (version 2.12) which can be freely added to SPSS software. This feature makes the simultaneous calculation of all links possible, solving partly the non-normality of interaction terms with the use of bootstrapping through repeated sampling with replacement. The model developed here, shown in Figure 1 at the outset of Chapter 3, is mirrored in Hayes's (2013) Model 5 with the independent variable being the competitive outcome, the dependent variable being empathic accuracy, the mediator being the change in testosterone levels from before to after the competition, and the moderator being personalized power.

4.3.7. Descriptive statistics

Shown on the next page, Table 3a presents means, standard deviations, and intercorrelations for testosterone change, empathic accuracy and its respective control variables, and standardized residuals for personalized power. Tables 3b and 3c present similar descriptive statistics for the reactive and proactive aggression study described in detail in Chapter 6[1].

[1] Note to reader: To minimize the number of tables throughout this thesis, it was decided that data from both studies be presented together. All tables henceforth will be reproduced in Chapters 6 and 7 that deal with the study on aggression.

Table 3

Descriptive Statistics and Intercorrelations

Study		Mean (*SD*)	1	2	3	4	5	6
(a) Empathic Accuracy *N*=84	1. Competitive Outcome (Win/Loss)	0.50 (0.50)						
	2. Testosterone Change	-1.85 (25.13)	-0.25*					
	3. Empathic Accuracy	14.21 (6.31)	0.16	0.35***				
	4. Personalized Power	0.00 (1.00)	0.42***	-0.09	0.17			
	5. Extraversion	3.40 (0.79)	-0.17	0.20	0.14	-0.07		
	6. Machiavellianism	2.67 (0.83)	-0.19	0.01	0.06	0.2	0.29**	
	7. Anxiety	2.50 (0.86)	-0.18	0.1	-0.08	-0.07	0.12	0.24
(b) Proactive Aggression *N*=72	1. Competitive Outcome (Win/Loss)	0.50 (0.50)						
	2. Testosterone Change	-5.77 (34.95)	-0.31**					
	3. Proactive Aggression	27.33 (14.25)	0.05	0.22				
	4. Personalized Power	0.00 (1.00)	-0.07	0.21	0.47***			
	5. Anger	1.90 (0.77)	-0.21	0.02	-0.22	-0.17		
	6. Psychopathy	3.06 (0.82)	0.17	-0.07	-0.15	-0.22	0.02	
(c) Reactive Aggression *N*=72	1. Competitive Outcome (Win/Loss)	0.50 (0.50)						
	2. Testosterone Change	-5.77 (34.95)	-0.31**					
	3. Reactive Aggression	35.97 (41.87)	-0.10	0.09				
	4. Personalized Power	0.00 (1.00)	-0.07	0.21	0.51***			
	5. Anger	1.90 (0.77)	-0.21	0.02	-0.05	-0.17		
	6. Psychopathy	3.06 (0.82)	0.18	-0.07	-0.21	-0.22	0.02	

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

CHAPTER FIVE

5. RESULTS FOR THE EMPATHIC ACCURACY STUDY (STUDY 1)

5.1. Tests of Hypotheses

All hypotheses were tested controlling for extraversion, Machiavellianism, and anxiety. The first step involved testing the direct effect of competitive outcomes on empathic accuracy. Hypothesis 1a predicted that compared to losers, winners will score lower in empathic accuracy. As shown from the process output in Table 4a on the next page, although the link was significant ($b = 3.21$, $p < .05$), its direction was opposite to expected indicating that winners (coded as 1) actually scored higher on accuracy than losers (coded as 0). Therefore, H1a was not supported. [Please note that data for Study 2 is also included in this table from parsimony. This table is again replicated in Chapter 7 which presents Study 2's results.]

Table 4

Dependent Variable Model, (a) Mediator Variable Model (b), and Mediation (c)

a) Dependent Variable Model
(Dependent Variables = Empathic Accuracy, Proactive and Reactive Aggression)

	Empathic Accuracy		**Proactive Aggression**		**Reactive Aggression**	
Predictor	*b (SE)*	*t*	*b (SE)*	*t*	*b (SE)*	*t*
Competitive Outcomes (Win/Loss)	3.21 (1.47)	2.18*	2.51 (3.14)	.80	-1.64 (8.85)	-.19
Testosterone Change	.08 (.03)	2.80**	.03 (.05)	.63	.09 (.13)	.75
Personalized Power	-1.88 (1.29)	-1.45	2.28 (2.02)	1.13	33.96 (5.70)	5.96***
Interaction (Competitive Outcomes × Personalized Power)	3.66 (1.62)	2.26*	8.25 (3.07)	2.69**	-30.20 (8.65)	-3.43***

b) Mediator Variable Model (Dependent Variable = Testosterone Change)

Competitive Outcomes (Win/Loss)	-11.62 (5.50)	-2.11*	-22.41 (8.30)	-2.70**	-22.41 (8.30)	-2.70**

c) Mediation (Unconditional Indirect Effect)

Bootstrap Indirect Effect	Effect *(SE)*	*CI* (*LL, UL*)	Effect *(SE)*	*CI* (*LL, UL*)	Effect *(SE)*	*CI* (*LL, UL*)
	-.92 (.61)	(-2.5299, -.0642) †	-.66 (1.01)	(-3.1150, 1.1241)	-2.2 (3.27)	(-10.3224, 3.3084)

† Bootstrap 95% confidence interval does not include zero (*LL* = Lower level, *UL* = Upper level)
* $p < .05$, ** $p < .01$, *** $p < .001$

Testing for the unconditional indirect effect was then carried out to determine whether testosterone change acts as a mediator of the relationship between competitive outcomes and empathic accuracy (i.e., win/loss → testosterone change → empathic accuracy). Prior to doing so, however, the above two linkages were more closely inspected.

Hypothesis 2 predicted an increase in testosterone after a win and a decrease after a loss. Contrary to expectations, winners' mean testosterone levels decreased from T_1 to T_2 (for winners = -8.11) while losers' testosterone increased following competition (for losers = 4.41) ($t = 2.35$, $p < .05$). As shown in Table 4b, there was a significant regression coefficient between competitive outcome and testosterone change but in the opposite direction ($b = -11.62$, $p < .05$).

Hypothesis 1b further predicted that testosterone change will be negatively related to empathic accuracy. Here, a significant relationship between testosterone change and empathic accuracy was found but also in the opposite direction ($b = .08$, $p < .01$) (Table 4a). This signifies that increases in post-competitive testosterone are accompanied by increases in empathic accuracy.

Hypothesis 1c predicted that testosterone change would mediate the relationship between competitive outcomes and accuracy. Table 4c illustrates that the bootstrap indirect effect produced an effect of -.92 and a 95% confidence interval void of zero (*C.I.* = -2.5299, -.0642). Therefore, testosterone change indeed mediated the relationship between competitive outcomes and accuracy, confirming H1c. However, this indicates that the lower testosterone levels triggered by winning significantly reduced the direct effect of winning on accuracy.

Finally, the conditional direct effect was tested to better understand the moderating role of personalized power on the direct link between win/loss and empathic accuracy. Hypothesis 1d stated that personalized power would moderate this relationship such that, as personalized power

increases, winners will show a sharper increase in accuracy as power increases compared to losers. As predicted, a significant positive interaction was found ($b = 3.66$, $p < .05$) (Table 4a). Table 5 elucidates the nature of the moderation. The conditional direct effect at -1 standard deviation (SD) shows that losers are more empathically accurate than winners at a low power motive, but the difference ($EA_{win}–EA_{loss}$) is small and nonsignificant (-.4330, $p = .84$). Winners' accuracy becomes larger than that of losers and this difference in accuracy becomes increasingly positive and significant from medium (mean) to high power motivation (+1 SD) (3.2077, $p < .05$, and 6.8484, $p < .05$ respectively).

Table 5

Conditional Direct Effect of Competitive Outcomes on Empathic Accuracy, Proactive Aggression, and Reactive Aggression at Different Values of the Moderator Personalized Power

Study	Moderator (Personalized Power)	Conditional Direct Effect *(SE)*	*p* value	Bootstrap 95% Confidence Interval Lower and Upper Level†	
Empathic Accuracy	-1 *SD*	-.4330 (2.127)	.84	-4.6692	3.8031
	At the mean	3.2077 (1.473)	.03	.2734	6.1421
	+1 *SD*	6.8484 (2.099)	.00	2.3891	11.3077
Proactive Aggression	-1 *SD*	-5.6813 (4.563)	.22	-14.7935	3.4309
	At the mean	2.5076 (3.137)	.43	-3.7575	8.7727
	+1 *SD*	10.6965 (4.172)	.01	2.3646	19.0284
Reactive Aggression	-1 *SD*	28.3405 (12.866)	.03	2.6455	54.0355
	At the mean	-1.6425 (8.4860)	.85	-19.3093	16.0242
	+1 *SD*	-31.6256 (11.764)	.01	-55.1203	-8.1308

† Bootstrap 95% confidence interval does not include zero (*LL* = Lower level, *UL* = Upper level)

In other words, personalized power moderates the positive direct effect of winning on empathic accuracy. Losers, on the other hand, showed decreases in accuracy with increasing personalized power, thereby lending H1d partial support.

CHAPTER SIX

6. METHOD FOR THE AGGRESSION STUDY (STUDY 2)

6.1. Participants

As in Study 1, this research received approval from Concordia University's Human Research Ethics Committee (dossier # UH2012-080). Male participants were recruited from the same organizational behaviour course, underwent the same screening process (e.g., endocrine health check including anabolic steroid use, dental hygiene) and were given the same guidelines prior to their arrival to the laboratory (e.g., no cigarette or food at least one hour prior; no alcohol consumption on the day of the study). An additional screening measure was implemented in Study 2 which involved potentially excluding participants prone to having allergic reactions to spicy food given that one exercise exposes participants to a taste sensitivity test. None of the candidates in Study 2, however, reported such a food allergy.

From the 90 male undergraduate students who were recruited for this study (mean age of 21.39 years, *SD* = 2.66), 72 were included in the final sample (mean age of 21.28 years, *SD* = 2.63). Again, and in line with recommendations from Tabachnick and Fidell (2007), 12 participants with missing data were discarded from the final sample because their item nonresponse exceeded 5%. Moreover, four participants from two dyads wished to be excluded from the study for unknown reasons and, as such, were removed. Next, outliers were tested using box-plot graphs and two more participants grouped in a dyad were removed. One of them pressed the steal button B (reactive aggression) every six seconds and never pressed the protection button C once, while the other never pressed the aggression button B and pressed the protection button C only once. These participants either did not understand how the game worked or were conspiring throughout this portion of the study. Some borderline outliers were

interpreted as representing natural tendencies of aggression and these participants were kept; they seemed to have understood the game as evidenced by their use of all three button options albeit deciding to be aggressive out of free will. All in all, for the above reasons, 18 participants were removed from the final analyses in Study 2.

6.2. Procedures and Materials

Participants in Study 2 followed the same trajectory as those in Study 1 until the 80-minute mark (Figure 2) at which point they participated, instead, in two tasks each evaluating a different aggressive behaviour. These were chosen instead of standard self-report questionnaires such as Buss and Perry's Aggression Questionnaire (Buss & Perry, 1992) and the Buss-Durkee Hostility Inventory (Buss & Durkee, 1957) because a recent meta-analysis found that, compared to standard questionnaires, observations yield higher correlations with behaviours (Polman, Orobio de Castro, Koops, van Boxtel, & Merk, 2007). These two paradigms are described in detail below.

6.2.1. Proactive aggression

The Hot Sauce Paradigm was used to measure proactive aggression based on the work of Lieberman, Solomon, Greenberg, and McGregor (1999). This paradigm was designed "to provide a quantitative method of capturing intent to harm without provocation" (J.D. Lieberman, personal communication, June 5, 2012). In recent years, experimental research has employed this exercise to measure participants' unprovoked aggression against another person, usually a participant whom they do not know (e.g., Klinesmith et al., 2006). Here, to mask the procedure's true nature, participants were told that they would have to perform a taste sensitivity

test. Each was given a cup filled with 85 grams of water and a single drop of hot sauce. He was told that the sample had been prepared by another participant who was not their previous competitor, was instructed to take a sip, and then rate it on a scale from 1 (*not hot at all*) to 5 (*very hot*). In reality, there was no hot sauce deposited in the cup, only water. The experimenter left the room and then returned with a tray containing two sets of the following items, one set for each participant: another cup of warm water with a lid, a pre-weighed jar of sriracha hot chili sauce from Huy Fong Foods, and two plastic teaspoons. Using one teaspoon to transfer the sauce into the cup and the other to taste the preparation if needed, participants were asked to prepare a sample mixture for another participant with whom they would never come into contact – not their NTT competitor nor the person who had prepared their cup to taste. Participants were told that all quantities of hot sauce were useable and that they could pour as much or as little as they wanted, even though the participant was not very fond of spicy foods. They were also assured that neither the person tasting it nor anyone else would know how much hot sauce they had added to the water because of the fastened lid. They were then left alone for a few minutes until they were done adding the sauce. The two cups containing the hot sauce were finally removed and weighed again to gauge the amount of sauce each had added using a Starfrit™ electronic kitchen scale. It should be noted that, throughout this experiment, the mock hierarchical chart signaling the participant's rank was left casually on the table of both participants (Appendix G), as was also the letter attesting to the winner's NTT performance (but only for the winner; Appendix H). This exercise took approximately 10 minutes.

6.2.2. Reactive aggression

The Point Subtraction Aggression Paradigm (PSAP) is a computer-based behavioural task

used to measure reactive aggression. It was originally designed by Cherek (1981) to measure aggressive behaviour of people provoked in a controlled environment, and numerous findings support the validity of the PSAP as an aggressive behavioural measure (Cherek, Schnapp, Moeller, & Dougherty, 1996; Cherek, Moeller, Schnapp, & Dougherty, 1997; Gerra et al., 2001, 2007; Golomb, Cortez-Perez, Jaworski, Mednick, & Dimsdale, 2007). Although the original PSAP lasts approximately three hours, similar results have been obtained with shorter versions (Golomb et al., 2007). Here, a 32-minute version was programmed using Inquisit© software (see www.millisecond.com). Participants were tested individually, and each was told that he would have the chance to win play money based on his performance on a computer game with another male participant, again a different one from his NTT opponent. This game was played on the computer so that both players never actually saw one another. In reality, this other participant was a computerized program. Seated in front of a computer, each participant had three button options from which to press: option 1, corresponding to letter A on the keyboard, was the 'reward' button (reward response); option 2 was the 'steal' button represented by keyboard letter B (aggressive response); and option 3 was the 'defense' button represented by keyboard letter C (protective response). Participants were told that they could earn money by pressing letter A, steal money from their partner by pressing letter B, or protect their money by pressing letter C.

The game's objective is to gain as many points as possible in exchange for play money. Participants were given extra course credit, and so no money was provided as compensation for participation. To help them keep track of their earnings, their point total would be displayed on the computer screen throughout the game. To earn points, each player would have to hit the letter A 100 consecutive times. By doing so, their point counter would momentarily appear larger on the screen and would flash numerous positive signs around it. When this happened,

their counter would increase by 1, indicating that they had gained 1 point. As well, they were warned that their point counter might turn red at times, with negative signs flashing around it. When this happened, it was their partner, in reality the computer program, who had stolen 1 point from them, thereby causing their counter to decrease by 1 and, conversely, inflating their partner's counter by 1. They were equally free to choose option 2 (letter B). By hitting this letter 10 times (not 100), they were able to steal a point from their partner. However, players were told that they were not able to keep points stolen from their partner. Since they did not benefit financially from stealing, any act of theft was interpreted as a form of punishment to one's partner, and represented the primary measure of reactive aggression. As pointed out by Carré and McCormick (2008), the harm need not be physical. As long as it is considered to be an aversive stimulus by the one on the receiving end, it is qualified as an aggressive act (see also Baron & Richardson, 1994). Finally, participants were also able to select option 3 (letter C), the protective response, and by pressing this letter 10 times they would protect their counter from point subtractions for a period of time, thereby giving them a defensive or nonaggressive option.

The computer program was designed to provoke (or steal from) participants every six to 60 seconds in the absence of option 2 (letter B) or option 3 (letter C) selections. Cherek's (1981) original PSAP provoked participants every six to 120 seconds. However, following Carré and McCormick (2008), a shorter interval of provocations was used here due the PSAP's abbreviated nature. If participants completed 10 presses on letters B or C (i.e., options 2 or 3), this would initiate a provocation-free interval (PFI). Participants were explicitly made aware that pressing button number 3 (protection) initiated a PFI, but were not told that pressing button number 2 (aggression) would also initiate a PFI. When a PFI was initiated, the program held off from provoking participants for a minimum of 60 seconds and a maximum of 120 seconds, after which

the random point subtractions would continue to occur every six to 60 seconds. Another parameter was the fixed ratios according to which participants had to obey: 100 presses for letter A, and 10 presses each for letters B and C. In other words, if participants first selected letter A (reward), they had to complete the 100 presses before being able to select another option. If they selected either letter B (aggression) or C (protection), they had to complete at least 10 presses in either case prior to selecting another option. Finally, the computer program prevented participants from pressing a button more than once within a 170-millisecond interval. To recapitulate, five measures were obtained from the PSAP: 1) point reward responses; 2) aggressive responses; 3) protective responses; and 4) provocations received, all of which determined 5) points earned. For this study, only the aggressive responses were used.

6.3. Measures

6.3.1. Treatment of competition outcome

Competitive outcomes were treated in the same manner as in Study 1, with win being coded "1" and loss being coded "0." In total, there were 36 winners and losers alike.

6.3.2. Testosterone measures

Of the original total of 270 saliva samples collected, analyses included those from 72 participants or 216 samples. All saliva samples were measured in duplicate and on the same day employing the same assaying procedure as in Study 1. The intra-assay coefficient of variation for Study 2's sample was below 10%, at 8.23%. A Kolmogorov-Smirnov test was conducted to assess data normality in testosterone change (T_2–T_1), the mediating variable ("m") in Figure 1, and it proved to be nonsignificant, $D(72) = .68$, $p = .20$. Thus, the null hypothesis of the data

normality of testosterone change cannot be rejected. Both values of skewness (-.524) and kurtosis (2.086) were again computed and fell within acceptable ranges. Finally, a two-dimensional graph was plotted and this confirmed normal distribution of raw values for testosterone change. In addition to testosterone difference scores, the regressor variable method was used (Allison, 1990) and Study 2's findings held up in much the same manner irrespective of the treatment of hormonal change.

6.3.3. Assessment of implicit power motivation

The moderator ("w") personalized power was assessed using the same scoring system as in Study 1 (Winter, 1994) by having the same two coders identify power images in participants' stories from the Picture Story Exercise (or PSE), and controlling for story length by regressing total personalized power on the number of words and using the standardized residuals (Pang & Schultheiss, 2005). In total, 864 picture stories were coded for Study 2 (72 participants × 6 picture stories each × 2 coders), again each taking between five and seven minutes to code.

6.3.4. Treatment of proactive and reactive aggression

Proactive aggression was calculated by the raw difference, in grams, between the hot sauce cup before and after the experiment, which is consistent with what is prescribed in the literature (Lieberman et al., 1999). Tests of normality were also carried out on this variable, termed B_A_ss. Both values of skewness (-.331) and kurtosis (-1.119) were computed and fell within acceptable ranges. Finally, a two-dimensional graph was plotted and this confirmed normal distribution of the B_A_ss measure. Reactive aggression was calculated using the total number of aggressive hits (button B) that a participant accrued at the end of the PSAP, in line with Carré

(2010). Normality tests were also carried out on this variable, termed nmbr_hits, and values of skewness (2.205) and kurtosis (5.747) were computed and fell outside acceptable ranges. A two-dimensional graph was plotted and illustrated a distribution of the nmbr_hits measure that was skewed to the left. However, as will be discussed in more details in the limitations section, the conditional process analysis used here is known to be very robust to non-normality in the dependent variable.

6.3.5. Controls

Anger and psychopathy were two potential confounds which were controlled for here.

Anger. Anger is a negative affective state that has traditionally been conceptualized as a precursor to aggression, with scholars now believing that it plays many causal roles in aggression including reducing inhibition and interfering with moral reasoning and judgment, among others (for a detailed review, see Anderson & Bushman, 2002). Here, anger was measured using a subscale of the shortened version of the Profile of Mood States (SV-POMS; Shacham, 1983), in which participants rated their felt anger following the competition with a five-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Sample items included adjectives such as "angry," "resentful," and "bitter." Cronbach's alpha for the anger subscale of seven items was found to be .91.

Psychopathy. Individuals having psychopathic traits are impervious to distress signals in others and often resort to both instrumental (or proactive) aggression and retaliatory (or reactive) aggression as a means to either benefit materially or exact revenge (Glenn & Raine, 2009). Research has indeed found a strong association between psychopathy and aggression across a wide sample of individuals including adult offenders, antisocial children and adolescents, and

psychiatric patients (Porter & Woodworth, 2006). Like Machiavellianism in Study 1, psychopathy was measured using a subscale of Jonason and Webster's (2010) 12-item 'Dirty Dozen' scale. Using the same five-point scale from 1 (*not at all*) to 5 (*very much*), participants indicated the degree to which they agreed with a series of statements. Sample items for psychopathy included "I tend to be unconcerned with the morality of my actions" and "I tend to be callous or insensitive." Cronbach's alpha for the psychopathy subscale of four items was found to be .61.

6.3.6. Statistical approach for Study 2

Again, Hayes's (2013) Model 5 was employed with the independent variable being competitive outcome, the dependent variables being proactive and reactive aggression, the mediator being testosterone change, and the moderator being personalized power.

6.3.7. Descriptive statistics

Means, standard deviations, and intercorrelations for the study's measures are shown for competitive outcome, testosterone change, proactive aggression (Table 3b), reactive aggression (Table 3c), and standardized residuals for personalized power[2].

[2] Again, readers should note that tables are reproduced as in Study 1 and include the empathic accuracy data as well. This was not intended to confuse readers, but rather to combine all of the data into as few tables as possible.

Table 3

Descriptive Statistics and Intercorrelations

Study		Mean (*SD*)	1	2	3	4	5	6
(a) Empathic Accuracy *N*=84	1. Competitive Outcome (Win/Loss)	0.50 (0.50)						
	2. Testosterone Change	-1.85 (25.13)	-0.25*					
	3. Empathic Accuracy	14.21 (6.31)	0.16	0.35***				
	4. Personalized Power	0.00 (1.00)	0.42***	-0.09	0.17			
	5. Extraversion	3.40 (0.79)	-0.17	0.20	0.14	-0.07		
	6. Machiavellianism	2.67 (0.83)	-0.19	0.01	0.06	0.2	0.29**	
	7. Anxiety	2.50 (0.86)	-0.18	0.1	-0.08	-0.07	0.12	0.24
(b) Proactive Aggression *N*=72	1. Competitive Outcome (Win/Loss)	0.50 (0.50)						
	2. Testosterone Change	-5.77 (34.95)	-0.31**					
	3. Proactive Aggression	27.33 (14.25)	0.05	0.22				
	4. Personalized Power	0.00 (1.00)	-0.07	0.21	0.47***			
	5. Anger	1.90 (0.77)	-0.21	0.02	-0.22	-0.17		
	6. Psychopathy	3.06 (0.82)	0.17	-0.07	-0.15	-0.22	0.02	
(c) Reactive Aggression *N*=72	1. Competitive Outcome (Win/Loss)	0.50 (0.50)						
	2. Testosterone Change	-5.77 (34.95)	-0.31**					
	3. Reactive Aggression	35.97 (41.87)	-0.10	0.09				
	4. Personalized Power	0.00 (1.00)	-0.07	0.21	0.51***			
	5. Anger	1.90 (0.77)	-0.21	0.02	-0.05	-0.17		
	6. Psychopathy	3.06 (0.82)	0.18	-0.07	-0.21	-0.22	0.02	

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

CHAPTER SEVEN

7. RESULTS FOR THE AGGRESSION STUDY (STUDY 2)

7.1. Tests of Hypotheses

All hypotheses in this study were tested controlling for anger and psychopathy. First, addressing the direct effect of win/loss on proactive and reactive aggression, it was predicted that winners would be more inclined to engage in unprovoked or proactive aggression than losers, while losers would be more inclined to engage in provoked or reactive aggression than winners. As illustrated in Table 4a on the next page, respectively, winners did not significantly aggress more proactively than losers (b = 2.51, nonsignificant), nor did losers significantly aggress more reactively than winners (b = -1.64, nonsignificant). However, the hypothesized direction was correct: winners did, on average, manifest more proactive aggression than losers (mean of 28.03g of hot sauce added versus mean of 26.64g), and losers aggressed more reactively than winners (mean of 40.19 steal button presses versus mean of 31.75). Nevertheless, these findings fail to lend full support for hypothesis 3a.

Table 4

Dependent Variable Model, (a) Mediator Variable Model (b), and Mediation (c)

a) Dependent Variable Model
(Dependent Variables = Empathic Accuracy, Proactive and Reactive Aggression)

	Empathic Accuracy		**Proactive Aggression**		**Reactive Aggression**	
Predictor	*b (SE)*	*t*	*b (SE)*	*t*	*b (SE)*	*t*
Competitive Outcomes (Win/Loss)	3.21 (1.47)	2.18*	2.51 (3.14)	.80	-1.64 (8.85)	-.19
Testosterone Change	.08 (.03)	2.80**	.03 (.05)	.63	.09 (.13)	.75
Personalized Power	-1.88 (1.29)	-1.45	2.28 (2.02)	1.13	33.96 (5.70)	5.96***
Interaction (Competitive Outcomes × Personalized Power)	3.66 (1.62)	2.26*	8.25 (3.07)	2.69**	-30.20 (8.65)	-3.43***

b) Mediator Variable Model (Dependent Variable = Testosterone Change)

Competitive Outcomes (Win/Loss)	-11.62 (5.50)	-2.11*	-22.41 (8.30)	-2.70**	-22.41 (8.30)	-2.70**

c) Mediation (Unconditional Indirect Effect)

Bootstrap Indirect Effect	Effect *(SE)*	*CI* (*LL, UL*)	Effect *(SE)*	*CI* (*LL, UL*)	Effect *(SE)*	*CI* (*LL, UL*)
	-.92 (.61)	(-2.5299, -.0642) †	-.66 (1.01)	(-3.1150, 1.1241)	-2.2 (3.27)	(-10.3224, 3.3084)

† Bootstrap 95% confidence interval does not include zero (LL = Lower level, UL = Upper level)
* $p < .05$, ** $p < .01$, *** $p < .001$

The unconditional indirect effect was also tested to determine whether testosterone change acts as a mediator of the relationship between competitive outcomes and proactive and reactive aggression. To do this, a first test of the relationship between competitive outcomes and testosterone change was carried out; this was found to be significant and negative, corroborating the results of Study 1 (b = -22.41, $p < .01$) shown in Table 4b. Again, contrary to predictions, winners' testosterone levels decreased from T_1 to T_2 while those of losers increased (for winners = -16.69; for losers = 5.14) (t = 2.77, $p < .05$). Hypothesis 3b predicted that changes in testosterone would be related to both types of aggression, with men having higher testosterone rises aggressing more than those having lower testosterone rises. Findings showed that the relationships between testosterone change and both proactive aggression (b = .03, p = .5296) and reactive aggression (b = .09, p = .4559) were in the correct direction but were nonsignificant, thus failing to support this prediction (Table 4a). As in Study 1, it was also suggested that testosterone-level change would mediate the relationships between competitive outcomes and each of the two types of aggression (hypothesis 3c). In the case of reactive aggression, the bootstrapped indirect effect had a coefficient of -2.1988 and a confidence interval which included zero (*C.I.* = -10.3224, 3.3084). In proactive aggression, the bootstrapped indirect effect had a coefficient of -.6570 and a confidence interval which also included zero (*C.I.* = -3.1150, 1.1241). Together, these findings suggest that changes in testosterone concentration did not mediate the relationships between the competitive outcomes and both aggression types thereby not offering any support for hypothesis 3c (Table 4c).

Lastly, assessing the conditional direct effect (or moderating effect) of personalized power on the direct relationship between win/loss and each form of aggression, hypothesis 3d posited that personalized power would moderate these relationships in the following manner: as

personalized power rises, winners should experience more proactive aggression compared to losers, while losers should experience more reactive aggression compared to winners. Findings confirmed that, with increasing levels of personalized power, winners showed more proactive aggression than losers ($b = 8.25$, $p < .01$), whereas losers showed more reactive aggression than winners ($b = -30.20$, $p < .001$). Hence, hypothesis 3d was supported as can be seen by the significant effect sizes that were in the predicted direction (Table 4a).

Again, Table 5 clarifies the nature of the moderations. The conditional direct effects of competitive outcome on proactive aggression at both -1 SD and mean value of the power motive show no significant difference between winners' and losers' proactive aggression although losers were relatively more proactively aggressive at low levels of the power motive than winners. At +1 SD, winners show significantly more proactive aggression than losers (10.6965, $p < .05$) (Table 5b). On the other hand, the conditional direct effect of competitive outcome on reactive aggression at the mean value of the power motive shows no significant difference between winners' and losers' reactive aggression. Winners were significantly more reactively aggressive than losers at low power motive levels (28.3403, $p < .05$), while losers were more aggressive than winners at high levels of the power motive (-31.6256, $p < .01$) (Table 5c).

Table 5

Conditional Direct Effect of Competitive Outcomes on Empathic Accuracy, Proactive Aggression, and Reactive Aggression at Different Values of the Moderator Personalized Power

Study	Moderator (Personalized Power)	Conditional Direct Effect *(SE)*	*p* value	Bootstrap 95% Confidence Interval Lower and Upper Level†	
Empathic Accuracy	-1 *SD*	-.4330 (2.127)	.84	-4.6692	3.8031
	At the mean	3.2077 (1.473)	.03	.2734	6.1421
	+1 *SD*	6.8484 (2.099)	.00	2.3891	11.3077
Proactive Aggression	-1 *SD*	-5.6813 (4.563)	.22	-14.7935	3.4309
	At the mean	2.5076 (3.137)	.43	-3.7575	8.7727
	+1 *SD*	10.6965 (4.172)	.01	2.3646	19.0284
Reactive Aggression	-1 *SD*	28.3405 (12.866)	.03	2.6455	54.0355
	At the mean	-1.6425 (8.4860)	.85	-19.3093	16.0242
	+1 *SD*	-31.6256 (11.764)	.01	-55.1203	-8.1308

† Bootstrap 95% confidence interval does not include zero (*LL* = Lower level, *UL* = Upper level)

CHAPTER EIGHT

8. DISCUSSION

8.1. Overview of Studies

The overarching purpose of the two experimental studies presented here was to understand how an important social context, such as a status competition, can impact several facets of a man's empathy and that these relationships are influenced by his psychobiology, namely his thirst for power and his testosterone reactivity. While the first study focused on an empathic construct that was cognitively based, the second focused on two behaviours. To my knowledge, this is the first work to investigate how competitive outcomes interact with personalized power to affect a man's empathic accuracy, as well as his proactive and reactive aggression.

8.2. Major Findings and Theoretical Implications for Empathic Accuracy

8.2.1. Winning, losing, and empathic accuracy

A prediction made here was that competitors would differ in their ability to accurately identify others' emotions following a status contest, with winners scoring lower in accuracy than losers. This was guided by Keltner et al.'s (2003) approach/inhibition theory of power which posits that people with low status, compared to their high-status counterparts, rely to a greater extent on their external environment for resources. As such, these individuals must be vigilant of others' intentions and emotional states because their peers have presumably some say in their wellbeing, affect, and succor. High-status individuals, however, have accrued more resources as a result of their own accomplishments that they could afford being less attentive vis-à-vis others' emotional states. It was further reasoned that a competition having a clear outcome will

artificially create a momentary social stratification based on status, with winners ostensibly having more status than losers and, as such, scoring poorer on empathic accuracy. However, in the very few studies that analyzed the relationship between socioeconomic status (SES) and empathic accuracy, status was either primed (e.g., "Imagine yourself having a high SES") or operationalized objectively (e.g., "Please identify your family's social class") without ever being manipulated directly with actual wins and losses. Asking a participant to either imagine himself having high status or reporting his social status at a finite point in time is a far cry from creating a context in which his status is being determined *in vivo*. Individuals who gain status through competition may also experience the thrill of winning and a boost in positive affect. Since Isen's (2000) work has demonstrated that people having positive affect engage in heuristic processing, it would not be altogether unreasonable to suspect that winners would do the same. Extending this logic, losers suffering a crushing defeat can be expected to experience negative affect and, conversely, engage in systematic processing which is more cognitively taxing than the former.

The opposite was observed, however, namely that winners' empathic accuracy increased while that of losers decreased, and a closer inspection of the studies involving affect in service of cognition can help to explain this unexpected finding. For example, in a similar win/lose scenario involving competitive squash, Cox and Kerr (1990) found that losers demonstrated a heightened level of neuroticism following defeat compared to winners. More recent work has found that those exhibiting more neuroticism tend to engage in more self-diagnosis at the expense of other cognitive tasks (McCrae & Löckenhoff, 2010). Such an elevated and presumably negative self-rumination might explain why losers scored lower in empathic accuracy – itself an important cognitive component of empathy – than winners. To put it another way, losers failed to decipher others' emotions because their cognition was reflected inwards

thereby depleting their reservoir of cognitive ability. This phenomenon can be as explained by ego depletion theory (Baumeister, Bratslavsky, Muraven, & Tice, 1998), which specifies that the self is a limited resource and pursuing one activity, perhaps self-diagnosis in this case, will leave fewer resources for other pursuits. Winners, free from this rumination, thus have more cognitive ability to focus toward accurately identifying others' emotional expressions.

8.2.2. Winning, losing, and testosterone: Explaining mixed findings

Probing into how wins and losses affect testosterone change, it was hypothesized that winning would lead to a rise in men's post-competitive testosterone levels while losing would lead to a drop. The rationale employed here was consistent with Mazur's biosocial model (1985) of testosterone which states that elevations in men's status should be accompanied by elevations in their testosterone levels, and vice versa in the case of status relegations. While several studies have shown this positive effect, the opposite has also been reported, i.e., either winners' testosterone dropped and/or losers' testosterone rose (see meta-analysis by Archer, 2006; for recent studies, see Carré et al., 2009). One shortcoming of the studies used in Archer's (2006) meta-analysis is the employment of small sample sizes, ranging from a mere eight participants (González-Bono et al., 1999) to 66 (Schultheiss & Rohde, 2002), with the latter showing no significant effect in testosterone change between winners and losers. Since these studies showed the difficulty in detecting hormonal effects, one obvious strategy employed here was to increase the number of participants.

Second, extant studies using contrived experiments were more concerned with the competitive outcome itself rather than with subtle contextual features of the research design. Here, particular emphasis was placed on features that would stoke participants' competitive fire

and, by the same token, accentuate any ensuing cognitive, emotional, and physiological differences between rivals. For instance, pairing men who had previously scored similarly on the NTT on Day 1 ensured a more heated competition. As well, employing a female confederate of the same age group who administered the NTT and declared the victor in the loser's presence was intended to trigger a more pronounced testosterone change as shown by studies demonstrating how men's brief interactions with women affect their androgen levels (Roney, Mahler, & Maestripieri, 2003; Saad & Vongas, 2009). Moreover, after stating that the NTT is a valid predictor of future earnings and overall career success, numerous rewards were promised to winners such as the chance to have their biography, photograph, and victory publicized in various media throughout the campus; these extrinsic rewards were openly announced to both players at the competition's outset. Finally, the female confederate gave each winner an "official" JMSB-endorsed letter congratulating them on their performance in the presence of the losers.

Although the finding was significant but in the opposite direction to what was originally predicted, there is nevertheless some degree of confidence in these results because of the large sample sizes employed relative to existing studies, the intricate experimental designs with proper controls, and most importantly, the replication of the win/loss effect on testosterone levels in both studies. Archer's (2006) challenge hypothesis can be used to explain these contrary findings, in particular. This theory was originally formulated to predict the physiology and behaviour of bird species during mating season but has since been applied to humans. According to it, men whose status is threatened by other men in the presence of women should show corresponding rises in their testosterone levels. A study by Cohen, Nisbett, Bowdle, and Schwarz (1996) found that men coming from a "culture of honor" who were insulted believed

their social status was at threat and responded with rises in their testosterone. More recently, researchers (Zilioli, Mehta, & Watson, 2014) studying testosterone responses in competing women introduced the status instability hypothesis which lends further support for why this finding turned out so. This theory predicts that experiencing an unstable low-status position, such a being defeated in a close match, should enhance testosterone in order to motivate behaviours that will help the loser to seek and attain status. In contrast, securing a high-status position in a situation in which status is up for grabs, such a winning a close contest, should prompt winners to avoid further status contests. In their paper, Zilioli et al. (2014) found that losers most likely felt a status threat following competition, whereas winners did not, possibly justifying why the former's testosterone increased while the latter's decreased. While these findings were documented exclusively in female samples, the status instability hypothesis remains to be shown in men.

8.2.3. Testosterone changes and empathic accuracy

It was then hypothesized that men having an increase in testosterone would experience a decrease in empathic accuracy, whereas those having a testosterone decrease would show an increase in accuracy. This prediction was initially guided by Baron-Cohen's (2002) systemizing-empathizing theory developed originally in clinical settings on autistic patients. Affecting primarily boys who had been exposed to high fetal testosterone concentrations, this theory helps to explain how testosterone shaped boys' systemizing ability (e.g., concern with mechanical processes) to the detriment of their empathizing ability (e.g., concern with others' feelings). Along with his colleagues, Baron-Cohen indeed found support that exposure to high concentrations of placental testosterone impaired boys' emotional recognition capabilities across

the life span (Chapman, Baron-Cohen, Auyeung, Knickmeyer, Taylor, & Hackett, 2006; Lutchmaya, Baron-Cohen, & Raggatt, 2002a, 2002b). Finally, more recent research based on adult populations found similar results. For example, in studies where adult participants were injected with exogenous testosterone, researchers found that one's ability to recognize facial emotions from static photographs declined significantly following androgen infusion (Hermans et al., 2006; van Honk & Schutter, 2007; van Honk et al., 2011). In a more recent example in which real social interactions took place between people in dyads, Ronay and Carney (2013) found that those having high naturally occurring testosterone levels were more erroneous in inferring the thoughts and feelings of others.

Together, these studies seem to point to the overall idea of testosterone's debilitating effect on empathic accuracy. Then what explains why the opposite was found? First, it appears that the algorithm 'high testosterone–low empathic accuracy' might not be as straightforward as previously thought. For example, an individual's exposure to androgens in the womb may have an impact on his or her empathic ability later on in life, but this does not mean that another situation in which testosterone levels are increased, especially a social one such as a status competition, could produce the same outcome.

Second, many of the reported studies above that artificially administered testosterone to participants used women exclusively in their sample and, more importantly, increased their testosterone levels between five- and eight-fold to temporarily elevate them to approximate those of men. One could even argue that raising women's testosterone levels to such extraordinary levels in order to generalize about the hormone's effect on a particular ability is pointless because those levels were never meant to reach such heights in the first place. Male participants'

testosterone never rose to this level of change in the studies reported here, but rather fluctuated in ways that appear to be more natural.

Third, and most importantly, previous causal evidence demonstrating testosterone's reduction of facial expression recognition was found solely for threatening expressions, not for non-threatening or 'positive' ones like happiness. For instance, van Honk and Schutter (2007) observed that participants having surges in testosterone had trouble recognizing social threats, in particular anger, whereas they actually did better when identifying non-threatening emotions like happiness. The design herein used an emotional recognition paradigm that featured more non-threatening emotions than threatening ones, possibly skewing the high-testosterone men's accuracy scores. This is an important consideration which could explain why the initial hypothesis failed to materialize. The coefficient of the testosterone-to-empathic accuracy link was significant albeit small, suggesting that participants whose testosterone levels increased may have performed well in identifying non-threatening emotions and poorly in identifying threatening emotions. Such a finding raises questions, therefore, on the specificity of emotions that testosterone might be preferentially "able" to influence decision making. In other words, since testosterone appears to be involved in one's ability to identify another's emotions accurately, could this ability be more pronounced for certain emotions over others?

8.2.4. Winning, losing, and empathic accuracy: Is testosterone a mediating mechanism?

Changes in testosterone were hypothesized to play a mediating role in the effect of winning and losing on empathic accuracy. This mediation was supported. What is interesting, however, is that this indirect effect was negative. This negative relationship had been originally in mind when predicting that, for example, the win → testosterone path would be positive, followed by a

testosterone → empathic accuracy path that would be negative, with the opposite valence for the loss condition. As such, the original reasoning predicted a negative overall effect if one would consider the cross-product of both paths. It turned out, however, that although the reasoning was sound, namely that the indirect effect of competitive outcomes on empathic accuracy was correctly predicted, the *direction* of the individual path components was incorrectly hypothesized. Another important point to consider is that, while this indirect effect through testosterone was negative, the direct non-mediated path was positive (i.e., win → empathic accuracy) even though the opposite was predicted. This makes the inclusion of testosterone of particular importance when considering how the phenomenon of winning and losing relates to empathic accuracy for one simple reason. If one simply calculates the correlation or the regression coefficient between competitive outcomes and empathic accuracy, one will undoubtedly produce distorted values due to the dampening effect of one path on the other. Stated otherwise, we cannot fully understand and appreciate the operating variables at play between winning and losing and empathic accuracy in their entirety if we fail to consider the biological mechanism acting on the hypothalamic-pituitary-gonadal axis (HPG) to stimulate testosterone release. Although finding significant results in the opposite direction can be frustrating, the fact remains that it is through these conflicting findings and ensuing theorizing that a field advances.

8.2.5. Personalized power: How winners differ from losers in empathic accuracy

Finally, in the study featuring empathic accuracy, personalized power was introduced as a moderator of the direct link between competitive outcomes and empathic accuracy. Specifically, it was stipulated that high-personalized power men will score higher in empathic accuracy than

low-personalized power men irrespective of whether they win or lose because power motivation is what inclines them to exercise influence over others, thereby developing their experience in being particularly good at detecting facial expressions that serve as important social cues. However, this prediction turned out to be true only for winners. Thus, as power increased, winners' empathic accuracy increased whereas that of losers declined. One reason explaining why losers' accuracy dropped as personalized power rose may lie in the fact that a defeat will direct a loser's cognitive effort inwards as he ruminates about the causes of his loss, and what this signifies to his status among peers. As his need for power grows fueling his desire to have more control and influence over others, any post-competitive rumination and 'analysis paralysis' resulting from defeat becomes more cognitively taxing. Such a predicament would leave him with fewer cognitive abilities to direct toward deciphering the emotional cues in people's faces. This helps to explain why individuals who experience ostracism from their peer groups, what many consider to be a devastating social loss (Baumeister & Tice, 1990; Baumeister, Twenge, & Nuss, 2002), respond with decreased prosociality (Twenge, Baumeister, DeWall, Ciarocco, & Bartels, 2007) and decreased interpersonal empathy (DeWall & Baumeister, 2006).

A final point to consider is that the moderating effect of personalized power on the relationship between competitive outcomes and empathic accuracy seems to operate at medium-to-high levels of personalized power. This could be due to the fact that men low in personalized power care less about their status such that brooding or negative self-scrutiny is at a minimum compared with high-personalized power men. Thus, no differentiation in empathic accuracy between winners and losers should be seen at low personalized power, but a great deal of differentiation at high levels which is what is observed. Another possibility, this one relying more on statistical methodology, is that the sample of male participants in this study exhibited a

range restriction on personalized power which is discussed in greater detail in the limitations section. Nevertheless, when considering how accurate men are at inferring what others are thinking and feeling following a contest in which status is either won or lost, this finding underscores the importance of personalized power's moderation effect: high personalized power accentuates winners' ability at facial emotion recognition, while it weakens this ability among losers.

To recapitulate, the essence of this study can be summarized in three major points. First, gaining and losing status significantly affect men's empathic accuracy. Second, testosterone plays a mediating role in a negative indirect relationship between competitive outcomes and empathic accuracy and, thus, should be measured whenever possible because it constitutes a separate mechanism through which wins and losses impact accuracy. Lastly, assessing personalized power is critical because we can better understand the predictable levels of empathic accuracy that occur not only between winners and losers, but also among men experiencing the same outcome. By assessing personalized power, we can better estimate the levels of empathic accuracy between any two winners (or losers) who are seemingly equal on other aspects, such as their number of wins or losses, androgen levels, and demographic composition.

8.3. Major Findings and Theoretical Implications for Proactive and Reactive Aggression

8.3.1. Winning, losing, and both aggression types

I initially set out to test whether victorious men who gained status would be more likely than their losing counterparts to engage in proactive aggression, whereas losing men would be more predisposed to engage in reactive aggression. These predictions were guided partially by

biological principles which propound that aggression evolved from a struggle for resource competition (van den Berghe, 1974; Durham, 1976). After competing, winners might wish to perpetuate their streak and, not experiencing anxiety from a loss, would be more willing than losers to aggress against harmless rivals. I also drew from self-determination theory which posits that competence is a fundamental component of a person's psychological health and wellbeing (Deci & Ryan, 2000). After losing, losers' need for competence gets stifled by those who outperform them and, by retaliating against them, they restore balance.

Although this general direction was correctly predicted, namely that winners would be more 'cold-blooded' than losers, and that losers would be more 'hot-blooded' than winners, these differences were not significant. First, and perhaps the most obvious reason, is that the competition and by extension, the promise of rewards received by winners and denied to losers, failed to translate into specific forms of aggression. It could have been the case that the men did not consider the competition to be heated enough, its rewards as being worthy enough, or the resulting temporary status stratification not severe enough to generate any aggression. Second, actual measures of aggression were taken roughly 20-30 minutes and 50-60 minutes following competition for proactive and reactive aggression, respectively. These gaps in time, although necessary for logistic reasons, might have produced the unwanted effect of participants 'cooling off' thereby reducing their aggression. Third, in realistic settings such as the workplace, winners and losers of status not only compete for high-stakes resources (e.g., career mobility), but also know each other intimately and must endure each other's presence for much lengthier periods of time long after rivalry is over (Kilduff, Elfenbein, & Staw, 2010). However, in this study, participants spent between 20-25 minutes competing and another hour or so afterwards in each

other's presence possibly never seeing each other again. Nonetheless, the fact that hypotheses ran parallel to what was originally expected is encouraging, as we will see later.

8.3.2. Testosterone and aggression: Duality, permissive effect, or reverse causality?

Following this, I replicated the first link of the indirect effect which suggested that there would be a difference in men's androgen responses to winning and losing. As in the first study, following competition, winners' testosterone levels dropped while those of losers rose significantly. Moreover, I tested the second link of the indirect effect, namely that rises in testosterone will then lead to rises in both proactive and reactive aggression. Despite common beliefs that testosterone is a necessary precursor to aggression, studies correlating testosterone with aggressive behaviour (e.g., Berman et al., 1993), and those claiming that testosterone changes cause aggression (e.g., only among losers; Carré et al., 2009), I did not find any empirical evidence supporting causality. We need to be cognizant, however, that findings linking testosterone to aggression in humans have yielded mixed results, with other studies showing null effects (for a meta-analysis, see Archer, 2006; see also Archer, Birring, & Wu, 1998). A perusal of the social endocrinological literatures (Archer, 2006; Mehta & Josephs, 2011) revealed why findings did not come out as expected. One explanation is that many different measures of aggression have been used, from self-reports designed to tap more stable aggressive traits to laboratory paradigms developed to capture the more momentary aggressive behaviours. Another is the very small sample sizes employed by studies making the claim that testosterone change causes aggression (e.g., 14 losing men in total in the study by Carré et al., 2009). Yet another reason is that several hormones may interact in order to channel behaviour rather than a single hormone being solely responsible for eliciting behaviour as is typically

believed (e.g., 'duality' between cortisol and testosterone; Carré & Mehta, 2011; Mehta & Josephs, 2010, 2011; see also Vongas & Al Hajj, 2015).

A third reason why testosterone failed to manifest aggression is based on a tenet of neuroendocrinology known as a hormone's 'permissive effect' (Sapolsky, 1997, p. 153). According to this idea, some amount of baseline testosterone is needed for aggressive behaviour, and this amount ranges from 20 percent of normal to twice normal. In other words, a man needs to have his resting testosterone level quadrupled or quintupled – reaching levels akin to bodybuilders abusing anabolic steroids – for him to appreciably aggress. Therefore, a surge is testosterone will not necessarily translate to aggression unless it is substantial and, although men's testosterone changed significantly from pre- to post-competition, the change was not abnormally inflated to trigger aggression.

Changes in testosterone were expected to play a mediating role in the effect of winning and losing on aggression. However, no such mediation was found. One explanation comes again from neuroendocrinology which clarifies the confusion surrounding the relationship between testosterone and aggression by asking the basic question, "does testosterone elevate aggression?" or "does aggression elevate testosterone secretion?" (Sapolsky, 1997). Many researchers, including myself, are biased in favour of answering affirmatively to the first question whereas I should have considered the second and measured testosterone following the aggression tasks. Sapolsky (1997) warns that this bias plagues our understanding of how hormones relate to behaviour because we suffer from 'physics envy' (p. 152), namely the false belief that hormones must be responsible for regulating behaviour because they are much more tangible and fixed in comparison to the transient quality of behaviour. Indeed, this bias is so deeply embedded in us

that we overlooked the possibility of a reverse causality, namely that aggressive behaviour might have in fact been responsible for changes in testosterone levels.

8.3.3. Personalized power: Witnessing how status wins and losses relate to aggression

Finally, personalized power was once more introduced as a moderator of the direct link between competitive outcomes and both proactive and reactive aggression. As personalized power increases, the expectation was that winners would have a greater increase in proactive aggression than losers, while losers would have a greater increase in reactive aggression than winners. Both predictions were supported, with winners showing a steeper increase in proactive aggression than losers, and with losers showing a steeper increase in reactive aggression than winners. Here, several points are worth mentioning.

First, although no relationship was found between competitive outcomes and both types of aggression initially (i.e., direct effect or direct link), introducing personalized power as a moderator permitted a clearer understanding of what the relationship is truly like. Again, this emphasizes the importance of taking personalized power into account when testing the direct effect of competitive outcomes on a given outcome variable, and the danger of being led by faulty or biased findings if this is not done.

A second noteworthy finding relates to the different levels of personalized power at which moderation occurs for each type of aggression. For example, winners and losers differ significantly in proactive aggression at high personalized power but not at low-to-moderate levels, with high-personalized power winners aggressing more proactively than high-personalized power losers. A possible explanation is that proactive aggression involves aggressing against an "innocent" individual and trying to extract resources from the interaction

(e.g., money, points in a game, or reputation among peers). This type of aggression might come easier to a person high in the power motive which is what was observed with increases in proactive aggression for both winners and losers.

But what explains the difference between the two groups? High-personalized power winners might feel as though they have free reign in exploiting others because they are unencumbered by rivals, further solidifying their ascension in the social hierarchy. High-personalized power losers, however, might feel that a status loss curbs their sense of being in control. In addition, since the decision to proactively aggress relies on less consequential information (e.g., unknown punishment that a competitor can inflict), losers become apprehensive in committing to this decision out of fear of losing additional resources and status.

A more interesting moderation takes place with reactive aggression. At high personalized power, both winners and losers aggress more reactively than their low-personalized power conspecifics. This time, high-personalized power losers displayed more of this form of aggression possibly to re-establish their status by retaliating against a less ambiguous opponent, whereas high-power winners retaliated less because their status was improved by the win, and hence was more secure. In other words, one can easily imagine that winners were basking in glory from a status elevation and this acted as a buffer for episodic bouts of provoked aggression, which explains why winners often maintain their calm temperament following a victory in spite of the malevolent actions of jealous and frustrated rivals. At the low end of the personalized power spectrum, winners are in fact more reactively aggressive than losers. This seems odd at first but, when one considers the gains that come from winning, one quickly realizes that victorious low-personalized power individuals experience a boost in their self-esteem and their belief in a potential status improvement thereby fueling more aggression. Low-personalized

power losers, on the other hand, have neither the internal drive nor this short-term burst of energy that winners enjoy and might be less likely to aggress.

The core of this study can be embodied in two key points. First, unlike in the study on empathic accuracy, testosterone changes emerging from gaining and losing status have no significant effect on men's aggression types. Perhaps this may be because testosterone and androgens in general have a more obvious effect on the cognitive abilities that operate 'beneath the surface' than they do on the more self-aware behaviours. This may also suggest that the causal mechanism works in the reverse direction, namely that it is aggressive behaviour that brings about testosterone rises. Second, and more critically, it is by ushering in personalized power that the true effect of a status victory or loss on both types of aggression can be seen. Without understanding power's influence, we would have never been able to tell that winners and losers aggress differently and in important ways. These and other theoretical implications are framed in a broader discussion of my thesis's practical implications for managers, a section to which I turn to next.

8.4. Managerial Implications

While scholars have made a fervent and widely publicized case against competition in favour of cooperation (Kohn, 1992), and while this well-intended prescription is meant for us to create a better society, the fact remains that competition is a daily reality for many working people. More importantly, competition forms the basis for how rewards and status are often bestowed on employees, from entry-level workers to members of executive teams. At present, we know little about what happens to our empathy and aggression when we win and lose and, moreover, which individual differences are involved in making these responses differ from one

person to another. In the workplace, understanding these issues is important because this is where we value fierce competitiveness on one hand yet, paradoxically, it is also where we stress empathy and cooperation on the other. I begin by outlining practical implications of my research involving empathic accuracy before exploring what we have learned from findings related to power motivation, aggression, and testosterone. Given that we know more about aggression in the workplace than what we do about empathic accuracy, my emphasis in this section will be targeted on the latter.

Empathic accuracy is one facet of the broader concept of empathy, and identifying the intentions, thoughts, and feelings of another person is something we do every day without much self-awareness. As a result, we fail to appreciate its importance especially at work. This neglect is also partly due to the fact that the study of emotions in the workplace has traditionally focused on the *expression* of emotions, such as emotional labor and display rules. Management scholars are now beginning to shift their attention toward the *perception* of emotions, an essential skill for managers wishing to be responsive in fast-paced and diverse environments. As a result, a growing body of work is emerging which points to the importance of emotion recognition for practitioners (Ashkanasy & Humphrey, 2011; see also DePaulo, 1992; Elfenbein & Ambady, 2002; Hooijberg, Hunt, & Dodge, 1997; Jordan, Ashkanasy, & Härtel, 2002; Snodgrass, 1992). So why is the skill of empathic accuracy important at work?

First, recognizing emotions accurately has been shown to be related to goal-oriented performance (Elfenbein et al., 2007). In a recent meta-analysis combining 18 studies with 1,232 participants in total, Elfenbein and her colleagues found a positive correlation between empathic accuracy and performance consistently across many jobs requiring high levels of face-to-face

interaction, including physicians, medical interns, foreign service workers, public service interns, business executives, managers, therapists, elementary school principals, and school teachers.

Second, empirical evidence has also shown that male managers' accuracy in perceiving others' emotions was positively associated with subordinate ratings on transformational leadership behaviour (Rubin et al., 2005). Transformational leaders are those who decisively change their followers' attitudes and beliefs toward a new vision, one that invigorates them to attain unprecedented performance (Bass, 1985). Among the behaviours characterizing such leaders is individualized consideration, which involves attending to followers' needs and personal development. This focused attention as mentors and coaches signals the respect that leaders have for their followers' feelings which enhances the latter's sense of self-worth and confidence leading to the potential development of new and creative ideas. Leaders who fail to pick up on their followers' emotional cues will miss out on the opportunity to motivate them to surpass performance expectations. This may be even more critical in organizational cultures having low power distances where the relationship between followers and leaders is interdependent (Hofstede, Hofstede, & Minkov, 2010) and where leaders are increasingly being typified as "managers of group emotions" (Pescosolido, 2002, p. 583; see also George, 2000).

Another related domain within leadership in which empathic accuracy is believed to play a fundamental role is emotional intelligence, a concept that resonates well with practicing managers but has generated heated debates among academics (for a brief summary, see Antonakis, Ashkanasy, & Dasborough, 2009; Walter, Cole, & Humphrey, 2011). Emotional intelligence was originally defined as "the ability to monitor one's own and others' feelings and emotions, to discriminate among them, and to use this information to guide one's thinking and actions" (Salovey & Mayer, 1990, p. 18). Therefore, any person aspiring to have it must manage

not only one's own emotions but also others' emotions in order to achieve specific goals. Several organizational behaviour scholars have found positive correlations between emotional intelligence and job performance (e.g., Sedamar, Robins, & Ferris, 2006; Wong & Law, 2002). According to the most recent conceptualization of emotional intelligence, there are four distinct skills that one needs to master successfully, each one representing a unique and sequential step in a hierarchy (Mayer, Salovey, & Caruso, 2004). These are, in order: 1) perceiving emotions, 2) using emotions to facilitate thought, 3) understanding emotions, and 4) managing emotions. In other words, the ability to perceive emotions accurately in oneself and in others is the *most* fundamental level of emotional intelligence and, without this important step, none of the remaining three can be fulfilled. Therefore, if status losses cause a significant decrease in one's empathic accuracy as demonstrated here, then this change could adversely affect one's job performance and leadership in two related respects, namely transformational leadership and emotional intelligence.

Finally, two other areas in which empathic accuracy is important for organizational behaviour involve nonverbal communication and negotiation. Nonverbal communication occurs whenever senders and receivers transmit messages between themselves using media other than speech or writing, such as facial expressions, gestures, and bodily movements and positions. At work, there are two types of important messages. One is the sender's assessment of his or her status relative to the receiver's and the other is the degree to which a sender likes the receiver or is interested in what he or she is saying (Goman, 2008). Consider the case in which an employee misinterprets his supervisor's contemptuous grimace and oversteps his boundary during a meeting or one where a seller fails to pick up on his potential client's surprised look during a contract agreement. Without empathic accuracy, these messages will go undetected and lead to

unwanted outcomes for both parties. In his classic work, Mehrabian (1972) noted that, when there are incongruent verbal and nonverbal messages, most people rely disproportionately on the nonverbal ones for the source of meaning.

Wrongfully interpreting a target's expressions, however, can also damage the perceiver's reputation and negotiating ability. For instance, Byron (2007) found that male managers who were poor at deciphering facial expressions were deemed to be less persuasive by their subordinates than managers who were more accurate. In a related study, Byron, Terranova, and Nowicki (2007) found that salespersons from distinct industries who were deficient at emotion recognition sold fewer products per month and earned lower annual salary increases than their more accurate cohort. The authors, therefore, provided some evidence indicating that empathic accuracy is critical in negotiation, and concluded that people who correctly interpret others' emotions are able to be more persuasive because they can incrementally gauge receivers' feedback. Should receivers' feedback indicate irritation, anger, or any other negative emotion, they might be prompted to change tactics, otherwise they will carry on if feedback is positive. Senders are also more persuasive when their messages match the moods and emotions of receivers (DeSteno, Petty, Rucker, Wegener, & Braverman, 2004; Rucker & Petty, 2004). Hence, a persuasive message could be "tailored to resonate with the emotions of those being persuaded" (Rucker & Petty, 2004, p. 17), and tailoring such a message requires that senders accurately evaluate their receivers' present emotional states (see also Byron, 2007).

In sum, managers are advised to take empathic accuracy seriously because, as some have pointed out (e.g., Hooijberg et al., 1997), most activities within organizational life are emotionally loaded. For example, leadership, managerial decision-making, employee motivation, conflict resolution, and negotiation all occur in the context of social relationships.

From what this thesis's research suggests, we become more accurate at identifying others' emotional facial expressions when we gain status than when we lose it. Moreover, we also know that changes in status need not be as drastic as one might imagine for empathic accuracy to differ considerably between winners and losers. While these changes can be very significant in some situations (e.g., going from law student to corporate tax lawyer), the workplace is nonetheless replete with examples of "mini battles" taking place daily between competitors. Examples include professors vying for the same government research grant, partners in an accounting firm striving to outcompete one another in new accounts, and entry-level bank tellers each determined to earn the "Teller-of-the-Year" award. In every case, loss of perceived status to a rival will be likely met with a decrease in empathic accuracy. The professor having been outshined by his faculty colleague may become unresponsive to his doctoral students' distressful signals, whereas the 'winning' professor might do the opposite and become vigilant to the same pleas. Similarly, the junior bank teller who lost the annual coveted recognition award to his fellow coworker might fail to respond appropriately to a client in need, while the winner may show even more focus in this regard. While these claims need to be proven with empirical data collected in their respective field settings, the message is clear: winning status enables one to perform better at interpreting facial expressions of emotion, while losing it detracts from this ability, with the end result being that one's social astuteness at work may become affected.

The research conducted here also shows that people's empathic accuracy following a status contest will vary according to the extent to which they are motivated by personalized power. Individuals who gain status will do better at emotion recognition with increasing levels of personalized power, whereas those who lose status do poorer. Managers and leaders are widely known to be power-motivated individuals who enjoy having impact on others and their

surroundings (McClelland & Burnham, 1976). Managers with high personalized power who sustain a social defeat must beware that their perception of others' emotions will suffer in the aftermath of the loss. Knowing what fate lies ahead can help them plan ahead because the consequences of a loss could be worse than the antecedents that have led to it – at least for those whose lives are affected by the losers.

Human resource departments may find it worthwhile to administer the Picture Story Exercise (PSE), provided they have the training, as a means of assessing the personalized power motive of their employees. Contrary to other dispositional measures used frequently in recruitment and selection, the PSE offers several advantages. First, because it measures implicit motives which are based on affect rather than cognition, it is less prone to self-report biases that often limit the validity of explicit motive measurement. Second, implicit motives interact with motive-specific incentives from a given situation whereas explicit motives are criticized for failing to do so. In the current studies, men's personalized power interacted with winning and losing to give rise to different degrees of empathic accuracy and aggression. This finding might have gone entirely unnoticed had I used an explicit measure for power motivation (e.g., a self-report questionnaire) because participants might have been weary to express their predilection for power given our society's normative stance on or perception of power-seeking people. Given that power has long been thought to corrupt those who possess it (Kipnis, 1972), it is reasonable to expect that asking participants to provide self-assessments themselves on power would yield questionable outcomes. Third, unlike self-report questionnaires that predict short-term behaviour and deliberate cognitive choices, the PSE predicts long-term behaviour and behavioural trends (Schultheiss, 2007). By considering the implicit power motive of job candidates as a practical piece of information, recruiters may find it useful to understand whether a given employee might

be suited for a managerial, leadership, or any other role in which decision making will impact other people. It is nonetheless recommended that recruiters also measure the power motive through self-report questionnaires because a mismatch between implicit and explicit motives can produce disastrous outcomes for an individual. For example, consider the case when someone explicitly indicates in a survey that he enjoys having influence over other teammates presumably because his environment values leadership, but then fails to show this desire for social dominance when given the opportunity to express himself in a more subtle way through the PSE. Such a mismatch could be catastrophic because it means that what this individual *says* may not be what he truly *prefers*. Indeed, studies have shown that motive incongruence leads to a number of negative outcomes including less flow (Schüler, 2010), goal attainment (Brunstein, Schultheiss, & Grässmann, 1998; Vongas et al., 2014), and reduced wellbeing and positive affect (Schattke, Koestner, & Kehr, 2011). Lastly, the PSE enables one to capture not only the motive power, but also the achievement and affiliation motives that are powerful motivators in their own right to the extent that the workplace permits employees to satisfy each of them. In fact, the PSE is currently used by management consulting firms, an example being the Hay Group which is a prestigious Philadelphia-based firm that operates in 49 countries and uses the PSE as a "benchmark tool for assessing, coaching, and developing successful, high-performing leaders" (www.haygroup.com, accessed October 12, 2014).

This research also provides insight regarding when competitive outcomes trigger two distinct types of aggressive behaviour, namely proactive (unprovoked) and reactive (provoked). To my knowledge, these are among the first studies to distinguish the type of aggression that winners and losers are prone to following a competition. Aggression comes in different degrees as well and, unlike empathic accuracy, it is a behaviour that we are fully conscious of even when

we allow emotions to get in the way of our restraint. In the workplace, aggression involves "any act in which one individual intentionally attempts to harm another" (Neuman & Baron, 1998, p. 395) and, as such, often disguises itself in the most subtle ways: hostile expressions like 'dirty looks,' belittlement and condescension, rumor spreading, interrupting others while they speak, and giving someone the silent treatment.

Although neither winning nor losing was strong enough alone to spur aggression of either type, personalized power predicted who would be the most aggressive individual for each type of aggression. Since overt aggression measured here may be less prevalent in organizations than the softer and more elusive forms mentioned above, one needs to observe implicit power motivation to better understand winners' and losers' behavioural tendencies. Given that managers and leaders are high-power people, this work becomes especially relevant for management practice. In particular, it advises that high-power individuals who lose status will be more prone to aggress reactively following a provocation, whereas those who win status will be more likely to aggress proactively. The bottom line is that high-power people desire social recognition which drives them to aggress in different ways depending on whether they win or lose status. High-power winners might feel more entitled than losers to exploit others when unprovoked, and this is important because proactive aggression can promote a cascade of reactive aggression manifestations. Thus, knowing what situational and individual variables affect proactive aggression can help practitioners potentially reduce the occurrence of both aggression types. High-power losers, on the other hand, might be worried about suffering more losses in the future should they proactively aggress against someone whom they have not sized up properly. Therefore, they will resort to aggressing reactively against someone whom they have a history with and, as such, could evaluate more easily the risk in doing so. In light of these

findings, managers need to be careful when placing certain individuals in competitive situations and, more so, must monitor the environments in which winners and losers function to ensure that no foul play surfaces. A winner who belittles an innocent and unsuspecting underperformer at a meeting could be just as damaging to a firm as a loser who causes others to delay action on critical matters.

This leaves us to a final implication for managers. Are practitioners better off knowing that a status-induced testosterone change affects a person's empathic response? I believe the answer to be yes. First, it was demonstrated how a social interaction among complete strangers competing with one another could have immediate effects on a man's neuroendocrine system, and maybe even longer since testosterone changes that ensue from competition persist from several hours to weeks (Mehta et al., 2008). If different levels of empathic accuracy can be detected from testosterone reactivity following a status contest in which rewards are extremely trivial compared to those in real life, then it is wholly plausible that the findings here will replicate in naturalistic settings. Knowing that competitive environments affect human physiology and empathic ability equips us with knowledge to rethink how we structure work. Simply put, once we realize the extent to which our social interactions strongly affect our body chemistry, only then shall we begin looking at these interactions in a more appreciative way and think through implications we had never imagined before. For example, some managers may wish to frame competitions as challenges – not as threats of status losses – while others might articulate goals using a win-win lens instead of the more traditional win-lose approach where someone must lose in order for another to get ahead. Second, physiological measures, like those of implicit motives, have the benefit of being immune from self-report biases (Akinola, 2010). The social context explored in this thesis altered men's testosterone and, subsequently, affected

their empathic accuracy but not their aggression suggesting that androgens might be more important in acting directly on perceptual abilities than on cognitively controlled behaviours. This is important because our perceptions influence our decision making far beyond recruitment and selection, employment interviews, and performance appraisals. Finally, with the exception of health and wellness issues, how the human body and its physiology affect the workplace rarely evokes any serious thought in management. As Heaphy and Dutton (2008) noted in a recent theoretical piece in the *Academy of Management Review*, economies are increasingly based in service as opposed to manufacturing industries which implies that social interactions account for the largest proportion of individuals' work time (see also Waldron, 2000). Let us not forget that humans are just as much social beings as they are biological beings. It is therefore my hope that this thesis will raise a number of questions and pave the way for future interdisciplinary research with studies incorporating biology and, therefore, putting an end to viewing workers as being bodiless.

8.5. Research Limitations

As with any research, there are limitations to this work. First, a manipulation check immediately after the competition could have been employed to be certain that both rivals 'bought in' to the rigged outcome. This was not a realistic possibility for reasons mentioned below and, more importantly, behavioural researchers who use deception in experimental studies assert that withholding full disclosure is warranted in some cases as long as participants agree to be debriefed later in the study (Kimmel, 2012). Had a manipulation check been included at such an early moment would have risked jeopardizing the experiments' internal validity by making participants suspect of the hypotheses and, consequently, they might have acted differently

thereby affecting results (i.e., subject effect). This would have also raised suspicion about the competition being rigged and, therefore, the true effect of competitive outcomes on ensuing measures (e.g., hormonal, aggressive, and empathic responses) would have been compromised further exacerbating the research's validity. Related to this idea, all participants were enrolled in the same class making it difficult to control information dispersion regarding the experiment after debrief, thus potentially contaminating results. While it is known that some participants will act altruistically and try to help the researcher by responding in a manner they believe will be favourable to the research, there are others who wish to do the opposite by harming the research. In fact, some participants were removed because they revealed that they had developed some knowledge of the experiment in which they participated. Others that remained silent might have successfully gone through this screening without detection to eventually affect results. However, to reduce this bias, a single-item interpersonal closeness or intimacy measure (Aron et al., 1992) was used just before debriefing to assess how "close" each individual felt toward his rival. Using this information in a qualitative manner, participants who rated their opponent as being particularly close received some added scrutiny in order to identify possible outliers on any of the measures. Moreover, upon debriefing, participants who demonstrated non-engagement or a lack of understanding of what they were expected to do were removed unless the outlying data reflected measures bearing no direct relation to the study.

On a positive note, participants in each of the two studies here matched, in terms of demographics, those of several published sources that used student samples from much smaller class sizes compared to the COMM 222 class at Concordia University that has over 1500 enrolled students. This gives some assurance that the above threats to validity, if they occurred, were not in some way critical to the experiments. Lastly, as they departed the laboratory

premises, an unduly number of winners proudly clung to their hierarchical charts and signed letters, with many asking about when they would be contacted to set up the photo shoot for the lobby exhibition (with short biographical sketch and NTT performance). Equally excessive was the number of losers who left behind the mock chart. Together, these two independent observations point to the fact that the competition manipulation, however mundane it appeared at first glance, was sufficiently convincing and had the effect for which it was designed. Nevertheless, a proper statistical computation must be carried out to demonstrate whether there is a significant difference between winners hoarding the charts and losers leaving them behind.

Another possible limitation involved time constraints. Due to the fact that there was an allocated time constraint in which to carry out the experiments, the second day of experimentation (or Day 2) ran at roughly two hours which might raise the issue of participant fatigue. However, many studies involving saliva collection in between which participants are exposed to various treatments assured us that such time durations are de rigueur and that fatigue is usually not found to be a major issue (e.g., Carré, 2010; Saad & Vongas, 2009).

A third limitation related in part to the number of candidates who were willing and able to participate in these studies, i.e., males who volunteered to have their saliva sampled, including those reporting no endocrine abnormalities and oral cavity problems, as well as those who were not taking hormone-altering medication (e.g., antidepressants). Given that these restrictions limited the sample's potential size, there was little choice but to measure both proactive and reactive aggression in the same experimental séance. To minimize carry-over effects, however, proactive aggression was measured first followed by reactive aggression. Recall that the former is unprovoked aggression, whereas the latter is provoked or reactionary. Since proactive aggression involves presumably less affect and frustration than the more heated reactive

aggression, all participants were first exposed to the proactive aggression paradigm before engaging in the reactive aggression one. Hence, this singular order was adhered to as a means of getting around the likelihood that provocation-induced aggression would be carried over to contaminate the unprovoked measures.

A fourth limitation which some might find problematic is the use of single-item measures to quantify some of the variables. Proactive aggression was measured by the amount of spicy hot sauce added to a glass of water, for example. Such a measure precludes the calculation and reporting of a reliability index and thus affects the judgment of a given score's quality. Two main reasons explain these choices. First, as mentioned, the fear that participants would be fatigued prevented the inclusion of other measures. For instance, the empathic accuracy task involving the Montreal Set of Facial Displays of Emotion alone took about 30 minutes to complete. Second, these same measures have received rigorous validity testing and, as a result, have been used in isolation in many top-tier publications within psychology.

A fifth limitation involves the question of language barriers that may have impeded some participants' comprehension of the activities they were asked to accomplish. For some, English is neither their maternal nor second language. This issue would have been especially problematic during the emotional identification test where the names of a number of emotions might have been unknown to some participants or, worse, have had a different meaning in their culture (e.g., serenity, shame, contempt). Care was taken, however, to reduce the level of instructional complexity when designing the studies. For example, all participants were given a glossary of the 10 emotions they were asked to recognize in the photographs. This glossary contained enough information to explain the word but not too much so as to guide the

participant's response by having him focus on the facial features that characterize a particular emotion.

Another limitation hinged on the decision to retain a dyad if one of the participants either decided to opt out of a study or was determined to be an outlier. In cases like these, both individuals in the dyad were removed even if other sources kept lone participants. The reason behind this decision is that useful qualitative data was also collected (not used per se in this thesis) that proved to be instrumental in providing a clearer picture of the variety of responses that both winners and losers experienced from the competition outcome, ranging from being elated and beaming with joy to seeming detached and sulking. This rich mix of reactions made the measures of one dyadic partner (e.g., testosterone boost or blow) relatively dependent on the behaviours and attitudes of the other, even if for brief period of time. Because of this dynamic process taking place between the two competing participants, it was best left to exclude the dyad altogether when one participant's data suggested that it be removed. In any case, additional analyses with the removed individuals included yielded the same results.

A seventh limitation surrounded the application of what some might consider to be a 'passive' competitive task (i.e., the NTT). From a sympathetic nervous system perspective, passive versus active stress tasks have very different effects which might account for the testosterone findings in this thesis (S. Bacon, personal communication, May 16, 2015). Had the competition task included a component of direct confrontation or conflict, might there have been a different testosterone response? I believe so. According to Archer's meta-analysis (2006), changes in testosterone following sport competitions (i.e., active task) are significantly greater than those for contrived competitive situations involving a monetary reward (i.e., passive task). This is not hard to imagine since direct and intense confrontations are expected to kick in more

adrenaline and cortisol that, in turn, will modulate testosterone production (Schultheiss, 2007). Therefore, having participants engage in a more head-to-head confrontation would have elicited bigger changes in post-competitive hormonal fluctuations. That being said, there is little reason to suspect that the observed measures of empathic accuracy and aggression would be any different.

An eight limitation concerns the use of a female moderator throughout the studies. This may prompt some critics to claim that my results were due partly to arousal emanating from the brief social interaction between the male participants and the female moderator. Employing a female moderator was indeed used to maximize the effect of the experimental manipulation (O.C. Schultheiss, personal communication, June 11, 2012). To understand the extent to which this impacted my findings, one would have to carry out a parallel study using a male moderator and then compare the results between the two groups. This opens up yet another question that remains to be tackled, namely whether male intrasexual competitions differ substantially in the presence of females versus when they take place with an all-male cast. In other words, does having a female audience witnessing a male-male competition affect in some particular way how victories and losses translate into rivals' downstream behaviours and cognitions? Researchers have shown that men experience testosterone changes during brief interactions with women (Roney et al., 2003; Saad & Vongas, 2009), with these hormonal reactions being stronger for aggressively dominant men (van der Meij, Buunk, van de Sande, & Salvador, 2008). In each of the above studies, the women never competed with the men but were instead bystanders in various social interactions – some of which involved only men competing with their same-sex partner. Proponents of evolutionary biological theory have found that the ratio of males to females in a given population is an important determinant of animal behaviour because it

increases the intensity of same-sex competition for mates (Kvarnemo & Ahnesjö, 1996). This idea appears to apply to humans as well. For example, some scholars have found that when the sex ratio represents a scarcity of women, the men become more economically impulsive: they have a greater number of credit cards, higher debt, fewer intentions to save money, and a preference for quick and smaller financial gains rather than potentially larger future gains (Griskevicius et al., 2012). In my thesis, both the ratio of men-to-women (2:1) and the same female moderator remained constant throughout each of the two studies. However, neither the males' physical attraction toward the female moderator nor the extent to which the moderator believed the participants were trying to impress her was controlled for as in other studies (e.g., Roney et al., 2003). In today's workplace, women work alongside men in increasing proportions and some scholars, notably in sociology, have raised the issue of how the sex ratio of a team's composition may influence the onset of sexual harassment, clearly an aggressive behaviour (McLaughlin, Uggen, & Blackstone, 2012). Therefore, future research ought to appreciate both the subtle and blatant nuances of the effects of mixing men and women together in competitive settings.

A ninth and final potential limitation involved the way in which data normality was handled on the basis of values obtained from skewness and kurtosis tests. Although raw testosterone measures were skewed, this was not the case for the difference in raw testosterone levels (i.e., pre- and post-competition). Skewness and kurtosis were also within the limits for proactive aggression and empathic accuracy. Reactive aggression, however, was negatively skewed with the majority of participants aggressing few times compared with a majority which aggressed much more. A decision had to be made about whether or not to transform this measure. It appears that scholars have done both, with some transforming this measure while

others not. Rex Kline (personal communication, May 14, 2014) advised that values having a concrete meaning such as blood sugar levels or testosterone concentrations should not be transformed if statistical methods used are robust enough to handle non-normality. Another personal communication with Andrew Hayes (October 16, 2014), the author of conditional process analysis used here, assured us that the procedure is very robust to non-normality in the dependent variable and that he is, in general, against transformations unless they are absolutely necessary. For the above reasons, and consistent with many mentioned published studies on hormonal changes, raw measures were used.

8.6. Future Research

Future scholars should first attend to the conflicting results surrounding the relationship between competitive outcomes and testosterone-level change. In two studies employing an identical experimental design with above average sample sizes, winners' testosterone dropped while that of losers rose. While these findings are not novel, the opposite has been documented (Archer, 2006). To make sense of my findings, therefore, several critical issues need to be addressed. First, the independent variable needs some clarification: a competition is not synonymous with a decisive competitive outcome. Testosterone measures taken in the midst of competition should be expected to differ from measures taken *after* winners and losers are announced. While competing, winners bear the responsibility of maintaining their status and losers have the chance to reverse the tide. One could assume that, in the case where rivals are still competing, the mechanisms controlling hormonal concentrations and the resulting cognitive and behavioural responses are in flux compared to those when the proverbial chequered flag is displayed and there is an uncontested winner. During competition, one's testosterone might rise

in an effort to defend a temporary status gain and following a victory, when status is established and no longer appears to be threatened, having lower testosterone might serve winners better by making them abandon further challenges as a way to protect their status. On the contrary, after a status loss, losers' higher testosterone acts as a catalyst for them to compete again and possibly regain the status. The take-home message here is that comparing testosterone changes during competition to those following competition fails to appreciate context complexity (Johns, 2006). What happens to testosterone levels during competitive events is different from what happens to them following the competition, and this should be made clear.

Future researchers therefore must take this into account and craft their studies in such a way that data collection truly reflects the organizational phenomenon they are studying. For example, if one wishes to investigate how hormones interact with predispositions to affect performance among sales representatives who are competing daily for sales, then tracking testosterone fluctuations throughout the working day would be the best option. However, if one wants to understand how a promotion (i.e., an elevation in employee status) that cannot be easily reversed once announced affects downstream behaviours and attitudes, then measuring testosterone concentrations after the promotee's 'crowning' would be the right strategy.

Researchers may also look into livelier competitive paradigms that reflect team competitions as a way of mimicking what often occurs in the workplace: teams competing with one another on competitions that involve some level of corporal activity rather than being based solely on highly cognitive tasks such as the one used here (e.g., persuasive pitches to prospective clients). In the studies reported here, a number tracking exercise was used in which participants competed one-on-one in what was a first and only encounter and whose physical involvement was minimal. Compare this, for example, to a team negotiation activity where the goal is to try

to obtain more for your team at the expense of the rival team (e.g., a distributive or win-lose negotiation). In such a scenario, there is more vigorous activity among team members which is something that would likely interfere with hormonal mechanisms like testosterone because pre-competitive baseline or resting states can be expected to be very different from post-competitive ones given the influence of mood and other hormones acting on team members (e.g., adrenaline). Such a group context can either escalate negative feelings associated with a status loss because few people like to be seen as losers by fellow teammates or, on the contrary, dilute the effects of winning and losing because teammates share this glory and burden, respectively.

Another thing to consider is that, when competition occurs in an activity one is already familiar with, the effect of winning and losing might be different from that which occurs when competition takes place on a novel activity. Losing on a competitive task or game we know very well could induce shame because our sense of self is heavily involved due to our prior knowledge and identification with the activity such as an experienced salesperson failing to close a major sale or a professional tennis player losing an important championship match. Losing in a contest we are completely unfamiliar with might instead induce guilt because responsibility is removed from the self and we could easily justify the loss by saying, "It's my first time." These are merely examples of two distinct affective experiences that might differentially affect hormonal mechanisms and resultant participant responses when other types of paradigms are used. This then opens the floor to an array of questions for future research. For example, how does self-efficacy influence post-competitive testosterone levels? Or, are hormonal changes different during individual versus group competitions? This latter question might be even more critical now that we are moving toward a more team-based approach to management.

Third comes the prospect of using a more diverse set of participants. While most experimental work that studies basic phenomena uses undergraduate samples, some have used older participants having managerial work experience (e.g., MBAs in works by Ronay & Carney, 2013 and White, Thornhill, & Hampson, 2006). Unless replication takes place, there is no reason to assume that results would or should match. For example, as males age, their baseline testosterone progressively declines. As baseline testosterone levels differ, so might testosterone changes not taking into account covariates like experience with the competition. One could also assume that the same testosterone change (*x* in pictograms per milliliter of saliva) between males having different baseline testosterone levels will have a different effect on outcomes (e.g., empathic accuracy). Researchers should engage in field experiments involving older participants than rely on convenience sampling with students given that the mean age of workers in the developed world is increasing and is expected to be over 40 in the near future (United Nations Development Programme, 2010).

Fourth, many of the published articles that relate to the work here are frustratingly void when it comes to important information regarding experimental design. As such, it becomes difficult to determine why some researchers found one effect while others found the opposite (e.g., the difference in findings from studies on testosterone changes following competition). Thus, critical information remains elusive for valid experimental replications and many researchers must resort to personally contacting those having executed the studies to better understand what took place in the laboratory. Some of these questions have been mentioned earlier in this thesis but are nonetheless lacking in the current literature, and they often involve very subtle information that could potentially make a significant difference in findings. For example, what were the age and sex of confederates or research assistants that participants were

exposed to and interacted with? How were rivals positioned during the competition, head to head or apart with their backs facing each other? Were competitors given some time to interact informally and establish a brief and possibly cordial connection before the competition took place? Most, if not all, of the current studies involving hormonal assessments are grossly lacking in qualitative data. In fact, not a single published source was found that delves into this level of detail, and this is surprising because most studies have a low sample size thereby rendering the analysis of such data ever more important. Rich qualitative information was collected in both studies reported here with the intention of reporting it in future research.

Other avenues for future research involve extending the present studies to include, for example, some empathy-related constructs that fall under the purview of cognitions (e.g., perspective taking), behaviours (e.g., altruism and helping), and emotions (e.g., personal distress). Another avenue is to address the lack of consensus on what constitutes a validated measure of trait empathy. Compared to aggression, much less research has gone into developing measures of dispositional empathy. Since differences in trait empathy can play an important role in understanding the effect of a situational context (e.g., competitive environment) on any one of these dimensions of empathy, this takes on a special significance. How could one validly explain the effect of any independent variable on a person's empathic response if he or she cannot measure where that person stands on that response and control for it? As the importance of empathy in the workplace is made a little more obvious with this research, I invite future researchers to develop a validated measure of trait empathy and for researchers interested in the construct to include it in their research.

Finally, the two studies presented here have shown that personalized power plays a critical role in the relationship between competitive outcomes and empathy, and disregarding its

influence can bias findings. As such, future researchers are advised to consider two points. First, since the role of implicit motives in influencing human behaviour has proven to be instrumental, researchers need to keep these motives in mind when investigating constructs that involve any aspect of social interaction. The work here focused on implicit power and, in particular, only one dimension namely personalized power. Other implicit motives such as affiliation and achievement play an important role in countless other human endeavors and ignoring them would be unwise. For example, a man's need for achievement might very well positively affect his ability in recognizing others' emotional cues by pushing him to focus on the task and see it through to successful completion. Similarly, his need for affiliation might ward off aggressive outbreaks because having such a need would instead endear him to others. In addition, distinguishing between personalized and socialized power would add to the small but important literature showing how people who vary in these two respects will pursue different courses of action (e.g., Chusmir, 1986; Chusmir & Parker, 1984; Magee & Langner, 2008; Schultheiss et al., 1999). For instance, women are similar to men in personalized power but superior in socialized power (Chusmir, 1986). Across cultures, women are seen as the more altruistic and empathic sex, demonstrating communal behaviours (e.g., affection) over the more masculine agentic ones (e.g., dominance) (Eagly, 1987). When it comes to testosterone, although it is higher in men, its bearing on the psychology and behaviour of both sexes is equivalent (Udry, 2000; Zyphur, Narayanan, Koh, & Koh, 2009). Therefore, gender influences how these motives impact empathic accuracy and aggression (for details, see Vongas & Al Hajj, 2015).

The second is to look for other moderators and mediators when pondering the effect of winning and losing on social outcomes. We have seen that a hormonal mediational mechanism

exists in empathic accuracy but not in aggression. This finding was surprising given the widely held belief that testosterone is intimately associated with aggression. Another reason explaining why the hypothesized mediation failed to emerge is the likelihood of the existence of competing mediators. Other than testosterone, there are countless other mechanisms through which competitive outcomes may produce aggression. For instance, scholars interested in psychophysiological biomarkers of workplace stressors have shown that interactional unfairness triggers the release of cortisol, the principal stress hormone, into the bloodstream which then stimulates deviant behaviour (Yang, Bauer, Johnson, Groer, & Salomon, 2014). It is entirely conceivable to suspect that people whose thwarted efforts to gain rewards like status might feel some form of injustice which then translates to stress and a subsequent decrease in empathy and a rise in retaliatory aggression.

On the moderation side, a possible candidate could be core self-evaluations, which is a broad personality concept consisting of specific traits that reflect evaluations people hold about their self-worth and competence (Judge & Bono, 2001). As a person's core self-evaluation increases, the temporary status stratification which the experimental manipulation attempts to enhance might not be as effective in causing a change in testosterone. The fundamental issue here is that conflicting results, null findings, and findings that run opposite to predicted directions should be seen as opportunities for future work rather than problematic areas to shy away from.

Finally, a more obvious future research area that seems ripe for investigation involves the psychophysiological systems that are at play during competitive interactions between women. At the moment, how these mechanisms operate in women remains a mystery although a recent theoretical paper sheds light on the matter (Vongas & Al Hajj, 2015). Before answering this

question, we need to understand not only whether men and women compete in the same way, but also whether they interpret victory and defeat similarly. Although the two sexes compete routinely in the workplace today, this does not mean that they compete indistinguishably. For example, Bronson and Merryman (2013) showed that men are more eager to embark into competitions quickly, have exaggerated beliefs in their ability to win against overwhelming odds, and are more likely to abort future competitions when faced with an obstacle. Women, however, are more strategic in selecting to compete when their odds of winning are greater, have more sensible expectations about outcomes, and persist more after suffering a defeat. Despite these differences, men and women compete instinctively with same-sex members in competitions that are equally intense (Barash, 2006; Cashdan, 1998). In fact, Schultheiss, Wirth, Torges, Pang, Villacorta, and Welsh (2005) affirmed that the power incentive arising from victory over a same-sex opponent is as attractive for women as it is for men, and the loss of power after a defeat is just as aversive to both sexes.

In a nutshell, although men and women approach competition differently, victory tastes just as sweet, and loss just as bitter. Other recent reviews on gender differences in motive distribution have found that women express higher levels of implicit power motivation than men (Pang & Schultheiss, 2005), suggesting that the notion of power being attributed overwhelmingly to men may be an arcane one. This poses an interesting intellectual puzzle given that women are believed to possess more empathy, in general, than men (Vongas, 2009). They also have such low baseline testosterone levels that even a modicum of hormonal change can show a greater effect on empathic outcomes compared with their male counterparts. While some empirical work has been carried out in this area, these efforts have been dwarfed by research focusing on men. Researchers are thus invited to abandon this misconceived notion that testosterone is

primarily a male hormone, and become open to the idea that testosterone changes in women warrant just as much attention especially in the context of winning and losing. It is also hoped that this research will lead us to study testosterone beyond the restrictions of intrasexual competition and into that of intersexual competition (i.e., competition between members of the opposite sex). With increasing numbers of women in the global workplace and at all levels of the organizational hierarchy, intersexual competition will become inevitable and a topic that we cannot afford to neglect.

TABLES

Table 1

The 10 Most Cited Definitions of Empathy in the Biological and Social Sciences (1949-2011)

Author(s)	Definition	Focus
Dymond (1949)	"…transposing of oneself into the thinking, feeling and acting of another and so structuring the world as he does." (p. 127)	Cognitive
Hogan (1969)	"…constructing for oneself another person's mental state" (p. 308)	Cognitive
Stotland (1969)	"…reacting emotionally because he perceives that another is experiencing or is about to experience an emotion." (p. 272)	Affective
Mehrabian & Epstein (1972)	"…responsiveness to another's emotional experience." (p. 526)	Affective
Hoffman (1981)	"…affective response appropriate to someone else's situation rather than one's own." (p. 44)	Affective
Eisenberg & Miller (1987)	"…emotional matching and the vicarious experiencing of a range of emotions consistent with those of others." (p. 91)	Affective
Batson et al. (1995)	"…other-oriented feelings congruent with the perceived welfare of another individual." (p. 621)	Affective
Davis (1994)	"…include the processes taking place within the observer and the affective and nonaffective outcomes which result from those processes." (p. 12)	Both
Baron-Cohen (2011)	"…ability to identify what someone else is thinking or feeling and to respond to their thoughts and feelings with an appropriate emotion." (p. 16)	Both
de Waal (2008)	"…the capacity to be affected by and share the emotional state of another, assess the reasons for the other's state, and identify with the other, adopting his or her perspective." (p. 281)	Both

Table 2

Summary of Hypotheses

Hypothesis 1a	Compared to losers, winners will score lower in empathic accuracy.
Hypothesis 1b	Changes in testosterone negatively relate to empathic accuracy, with testosterone increases (decreases) being associated with less (more) accuracy.
Hypothesis 1c	Testosterone change mediates the relationship between competition outcome and empathic accuracy.
Hypothesis 1d	Personalized power moderates the direct effect of the relationship between competition outcome and men's empathic accuracy; as personalized power increases, winners will show a steeper increase in empathic accuracy than losers.
Hypothesis 2	Competition outcome elicits changes in testosterone, such that winners (losers) show testosterone increases (decreases) after a win (loss).
Hypothesis 3a	Winners (losers) will be more inclined to engage in proactive (reactive) aggression against a third party than losers (winners).
Hypothesis 3b	Changes in testosterone are positively related to aggression, with men having higher testosterone increases (decreases) being associated with more (less) aggression than those with lower testosterone increases (decreases).
Hypothesis 3c	Testosterone-level change mediates the relationship between competition outcome and aggression.
Hypothesis 3d	Personalized power moderates the direct relationship between competition outcome and men's aggression; as personalized power increases, winners (losers) show more proactive (reactive) aggression than losers (winners).

Table 3

Descriptive Statistics and Intercorrelations

Study		Mean (*SD*)	1	2	3	4	5	6
(a) Empathic Accuracy *N*=84	1. Competitive Outcome (Win/Loss)	0.50 (0.50)						
	2. Testosterone Change	-1.85 (25.13)	-0.25*					
	3. Empathic Accuracy	14.21 (6.31)	0.16	0.35***				
	4. Personalized Power	0.00 (1.00)	0.42***	-0.09	0.17			
	5. Extraversion	3.40 (0.79)	-0.17	0.20	0.14	-0.07		
	6. Machiavellianism	2.67 (0.83)	-0.19	0.01	0.06	0.2	0.29**	
	7. Anxiety	2.50 (0.86)	-0.18	0.1	-0.08	-0.07	0.12	0.24
(b) Proactive Aggression *N*=72	1. Competitive Outcome (Win/Loss)	0.50 (0.50)						
	2. Testosterone Change	-5.77 (34.95)	-0.31**					
	3. Proactive Aggression	27.33 (14.25)	0.05	0.22				
	4. Personalized Power	0.00 (1.00)	-0.07	0.21	0.47***			
	5. Anger	1.90 (0.77)	-0.21	0.02	-0.22	-0.17		
	6. Psychopathy	3.06 (0.82)	0.17	-0.07	-0.15	-0.22	0.02	
(c) Reactive Aggression *N*=72	1. Competitive Outcome (Win/Loss)	0.50 (0.50)						
	2. Testosterone Change	-5.77 (34.95)	-0.31**					
	3. Reactive Aggression	35.97 (41.87)	-0.10	0.09				
	4. Personalized Power	0.00 (1.00)	-0.07	0.21	0.51***			
	5. Anger	1.90 (0.77)	-0.21	0.02	-0.05	-0.17		
	6. Psychopathy	3.06 (0.82)	0.18	-0.07	-0.21	-0.22	0.02	

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

Table 4

Dependent Variable Model, (a) Mediator Variable Model (b), and Mediation (c)

a) Dependent Variable Model
(Dependent Variables = Empathic Accuracy, Proactive and Reactive Aggression)

	Empathic Accuracy		**Proactive Aggression**		**Reactive Aggression**	
Predictor	*b (SE)*	*t*	*b (SE)*	*t*	*b (SE)*	*t*
Competitive Outcomes (Win/Loss)	3.21 (1.47)	2.18*	2.51 (3.14)	.80	-1.64 (8.85)	-.19
Testosterone Change	.08 (.03)	2.80**	.03 (.05)	.63	.09 (.13)	.75
Personalized Power	-1.88 (1.29)	-1.45	2.28 (2.02)	1.13	33.96 (5.70)	5.96***
Interaction (Competitive Outcomes X Personalized Power)	3.66 (1.62)	2.26*	8.25 (3.07)	2.69**	-30.20 (8.65)	-3.43***

b) Mediator Variable Model (Dependent Variable = Testosterone Change)

Competitive Outcomes (Win/Loss)	-11.62 (5.50)	-2.11*	-22.41 (8.30)	-2.70**	-22.41 (8.30)	-2.70**

c) Mediation (Unconditional Indirect Effect)

Bootstrap Indirect Effect	Effect *(SE)*	*CI* (*LL, UL*)	Effect *(SE)*	*CI* (*LL, UL*)	Effect *(SE)*	*CI* (*LL, UL*)
	-.92 (.61)	(-2.5299, -.0642) †	-.66 (1.01)	(-3.1150, 1.1241)	-2.2 (3.27)	(-10.3224, 3.3084)

† Bootstrap 95% confidence interval does not include zero (*LL* = Lower level, *UL* = Upper level)
* $p < .05$, ** $p < .01$, *** $p < .001$

Table 5

Conditional Direct Effect of Competitive Outcomes on Empathic Accuracy, Proactive Aggression, and Reactive Aggression at Different Values of the Moderator Personalized Power

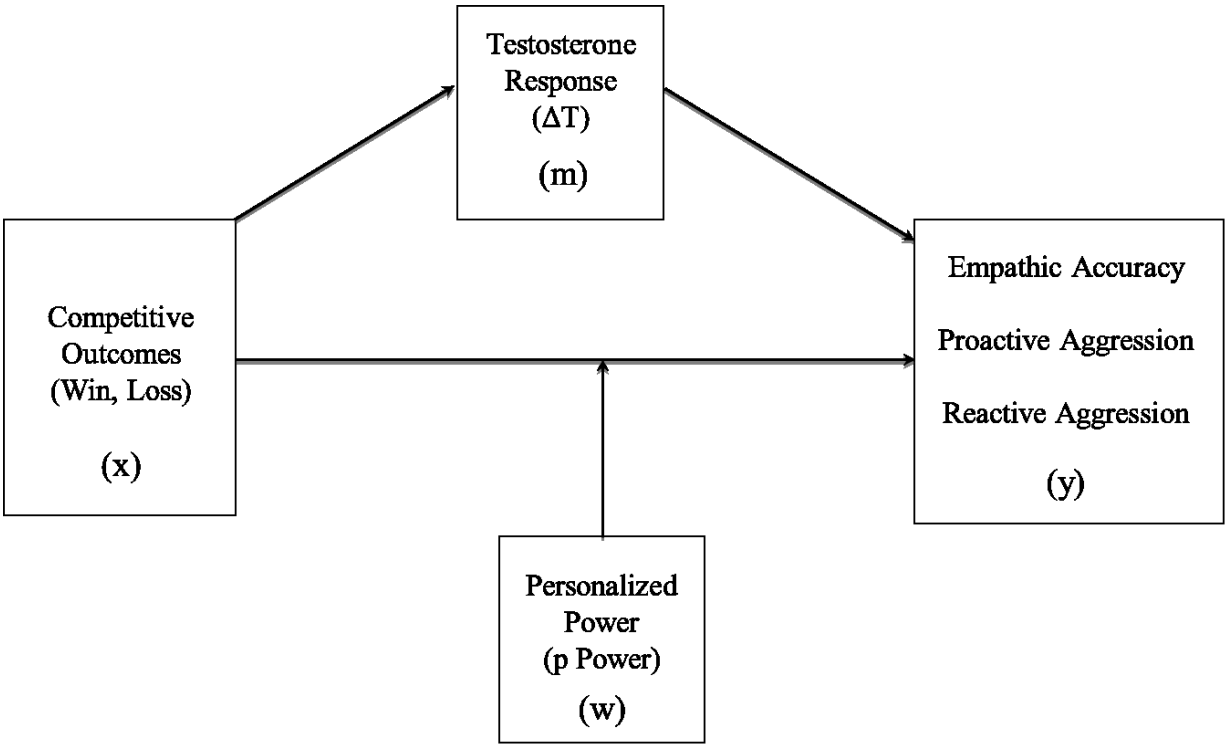
Study	Moderator (Personalized Power)	Conditional Direct Effect *(SE)*	*p* value	Bootstrap 95% Confidence Interval Lower and Upper Level†	
Empathic Accuracy	-1 *SD*	-.4330 (2.127)	.84	-4.6692	3.8031
	At the mean	3.2077 (1.473)	.03	.2734	6.1421
	+1 *SD*	6.8484 (2.099)	.00	2.3891	11.3077
Proactive Aggression	-1 *SD*	-5.681 (4.563)	.22	-14.7935	3.4309
	At the mean	2.508 (3.137)	.43	-3.7575	8.7727
	+1 *SD*	10.697 (4.172)	.01	2.3646	19.0284
Reactive Aggression	-1 *SD*	28.341 (12.866)	.03	2.6455	54.0355
	At the mean	-1.6425 (8.4860)	.85	-19.3093	16.0242
	+1 *SD*	-31.625 (11.764)	.01	-55.1203	-8.1308

† Bootstrap 95% confidence interval does not include zero (*LL* = Lower level, *UL* = Upper level)

FIGURES

Figure 1

A Conditional Process Model of the Effect of Male-Male Competition on Empathic Accuracy and Aggression

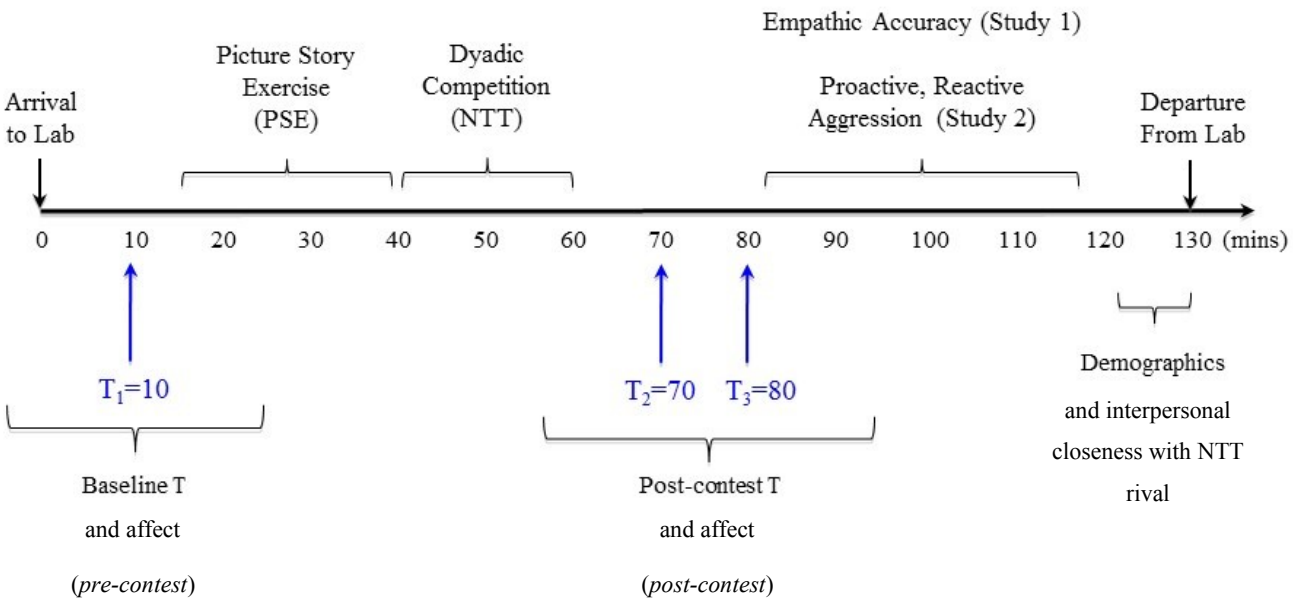


Variables: x = independent, y = dependent, m = mediator, w = moderator

Direct effect: x → y
Indirect effect: x → m → y
Conditional direct effect: w * xw

Figure 2

Timeline of Experimental Procedures



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APPENDIX A

Recruitment Speech

"Hello everyone. My name is John Vongas and I am a PhD candidate at Concordia's John Molson School of Business under the supervision of Dr. Marylène Gagné. For my thesis, I am exploring men's physiological changes and behaviours across various games played both alone and in pairs. These games include brief competitive and cooperative interactions, viewing still pictures and videos on a computer screen, and even taking part in a taste test.

Therefore, I am running several experiments and I am looking for male participants only because men's psychological and biological responses differ from those of women in certain contexts. Participation is voluntary, and whoever participates will be asked to visit my lab, located at the John Molson (MB) building, on two separate occasions and lasting approximately 2 hours. You will be asked to fill out some basic personality questionnaires, and provide us with three saliva samples after engaging in the various games just described from which we will then do a biochemical analysis.

All of the data that we collect will be confidential, with no names or other identifying markers appearing on test tubes and forms. For the taste sensitivity exercise, this requires that participants taste some spicy foods containing the ingredient capsaicin – the active component in chili peppers. So, anyone who might be allergic to or not tolerate capsaicin well should not participate in this one particular experiment; please note, however, that this is not the case for the other experiments.

Finally, for participating, you will receive two course credits toward your final grade in COMM 222. Please note that you must complete the full study which involves coming to the lab on two occasions, as stated above, and fulfilling the study's task requirements. All in all, this is a unique opportunity to see how your body chemistry changes under different conditions. I would be more than happy to share with you your individual results as well as the general findings from all of the experiments at a later time.

Thank you for your time."

APPENDIX B

Consent Form to Participate in a Testosterone Study

I, _____, understand that I have been asked to participate in a program of research being conducted by John Vongas and Dr. Marylène Gagné from the Department of Management of Concordia University's John Molson School of Business (John's telephone: 514-880-7012; and email: j_vongas@jmsb.concordia.ca).

A. PURPOSE

I have been informed that the purpose of the research is to explore men's hormone changes across various exercises played either alone or in groups of other people, and to understand how these social interactions affect their behaviours in the short term.

B. PROCEDURES

I will meet the researcher at Concordia University's John Molson School of Business (MB building, room MB 13-266). I will write short stories after being shown six (6) pictures, and will complete some basic questionnaires. I will also provide 3 saliva samples over the course of 2 hours during which time I will participate in exercises both on my own and with others in pairs. These exercises may involve a competition against another person, a taste sensitivity test, and various exercises done on the computer.

Confidentiality. All information that I provide (saliva, questionnaires) is confidential. I have been told that my name will not be associated in any way with the data collected in the study, and that I will not be identified individually in any way in written reports of this research. I also have been told that data collected during this study will be stored in a locked file cabinet at the John Molson School of Business (MB) building, and that it will be kept for six (6) years after which time all data will be shredded and disposed. Access to this data will be restricted to John Vongas, the doctoral student conducting the study.

C. RISKS AND BENEFITS

I understand that I may be able to earn course credit for participating in this research. On a broader note, my participation will benefit the scientific community by helping to grow our knowledge of the relationship between hormone changes in men and social behaviour.

(Cont.) Consent Form

D. CONDITIONS OF PARTICIPATION

- I understand that I am free to withdraw my consent and discontinue my participation at any time during the experiment without negative consequences.
- Should I complete an experiment and *then* decide that I wish to withdraw my data and information, I will have up to one (1) week of the date of the experiment to do so.
- I understand that my participation in this study is:

CONFIDENTIAL (i.e., the researcher will know, but will not disclose my identity)

- I understand that the data from this study may be published.

I HAVE CAREFULLY STUDIED THE ABOVE AND UNDERSTAND THIS AGREEMENT.
I FREELY CONSENT AND VOLUNTARILY AGREE TO PARTICIPATE IN THIS STUDY.

NAME (please print) _____

SIGNATURE _____

If at any time you have questions about the proposed research, please contact the study's Principal Investigator, Dr. Marylène Gagné, Department of Management, (514) 848-2424 ext. 2775, email: mgagne@jmsb.concordia.ca

If at any time you have questions about your rights as a research participant, please contact the Research Ethics and Compliance Advisor, Concordia University, 514.848.2424 ex. 7481, email: ethics@alcor.concordia.ca

APPENDIX C

1. The Dirty Dozen (Jonason & Webster, 2010)

The following statements describe ways that people sometimes use to meet their needs. You are asked to judge how these statements apply to you. You might feel that some of these traits are not socially desirable. Do not worry about how you are presenting yourself to others. Remember, this is an anonymous survey. What is important here is to be honest. There are no right or wrong answers.

	Not at all	**A little**	**Moderately**	**Quite a bit**	**Very much**
I tend to manipulate others to get my way.	1	2	3	4	5
I have used deceit or lied to get my way.	1	2	3	4	5
I have used flattery to get my way.	1	2	3	4	5
I tend to exploit others towards my own ends.	1	2	3	4	5
I tend to lack remorse.	1	2	3	4	5
I tend to be unconcerned with the morality of my actions.	1	2	3	4	5
I tend to be callous or insensitive.	1	2	3	4	5
I tend to be cynical.	1	2	3	4	5
I tend to want others to admire me.	1	2	3	4	5
I tend to want others to pay attention to me.	1	2	3	4	5
I tend to seek prestige or status.	1	2	3	4	5
I tend to expect special favours from others.	1	2	3	4	5

2. Mini-International Personality Item Pool (Donnellan, Oswald, Baird, & Lucas, 2006)

For each of the following statements, please indicate whether you agree or disagree using a five-point scale (1= *strongly disagree*, 5=*strongly agree*).

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
I am the life of the party.	1	2	3	4	5
I sympathize with others' feelings.	1	2	3	4	5
I get chores done right away.	1	2	3	4	5
I have frequent mood swings.	1	2	3	4	5
I have a vivid imagination.	1	2	3	4	5
I don't talk a lot.	1	2	3	4	5
I am not interested in other people's problems.	1	2	3	4	5
I often forget to put things back in their proper place.	1	2	3	4	5
I am relaxed most of the time.	1	2	3	4	5
I am not interested in abstract ideas.	1	2	3	4	5
I talk to a lot of different people at parties.	1	2	3	4	5
I feel others' emotions.	1	2	3	4	5
I like order.	1	2	3	4	5
I get upset easily.	1	2	3	4	5
I have difficulty understanding abstract ideas.	1	2	3	4	5
I keep in the background.	1	2	3	4	5
I am not really interested in others.	1	2	3	4	5
I make a mess of things.	1	2	3	4	5
I seldom feel blue.	1	2	3	4	5
I do not have a good imagination.	1	2	3	4	5

3. Shortened Version of the Profile of Mood States (SV-POMS; Shacham, 1983)

For each of the following adjectives, please indicate the extent to which you feel like this right now (1=*strongly disagree*, 5=*strongly agree*).

***Right now*, I am:**	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Unhappy	1	2	3	4	5
Sad	1	2	3	4	5
Blue	1	2	3	4	5
Hopeless	1	2	3	4	5
Discouraged	1	2	3	4	5
Miserable	1	2	3	4	5
Helpless	1	2	3	4	5
Worthless	1	2	3	4	5
Lively	1	2	3	4	5
Active	1	2	3	4	5
Energetic	1	2	3	4	5
Cheerful	1	2	3	4	5
Full of pep	1	2	3	4	5
Vigorous	1	2	3	4	5
Confused	1	2	3	4	5
Unable to concentrate	1	2	3	4	5
Bewildered	1	2	3	4	5
Forgetful	1	2	3	4	5

(Cont.) Shortened Version of the Profile of Mood States (SV-POMS; Shacham, 1983)

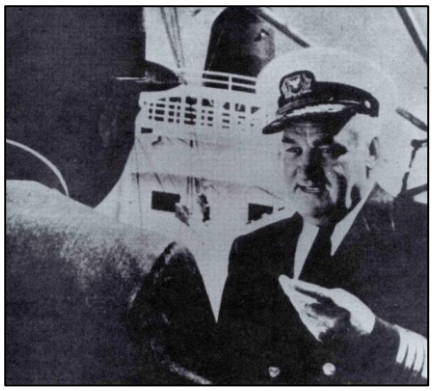
***Right now*, I am:**	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Uncertain about things	1	2	3	4	5
Tense	1	2	3	4	5
On edge	1	2	3	4	5
Uneasy	1	2	3	4	5
Restless	1	2	3	4	5
Nervous	1	2	3	4	5
Anxious	1	2	3	4	5
Angry	1	2	3	4	5
Peeved	1	2	3	4	5
Grovely	1	2	3	4	5
Annoyed	1	2	3	4	5
Resentful	1	2	3	4	5
Bitter	1	2	3	4	5
Furious	1	2	3	4	5
Worn-out	1	2	3	4	5
Fatigued	1	2	3	4	5
Exhausted	1	2	3	4	5
Weary	1	2	3	4	5
Bushed	1	2	3	4	5

APPENDIX D

Salivary Collection Method through Passive Drool

APPENDIX E

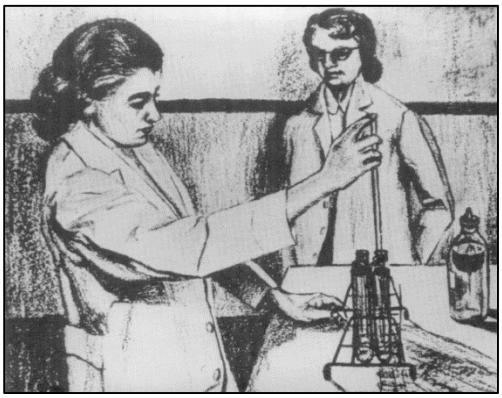
Cues to Elicit Stories for the Picture Story Exercise (Smith, 1992)



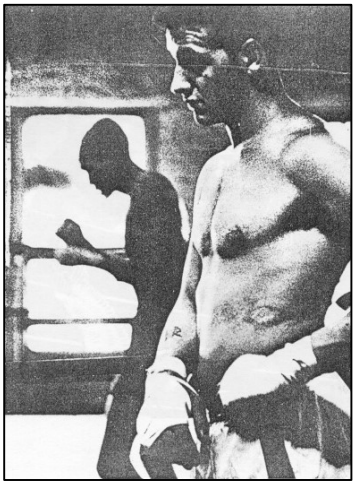
Ship captain

Bicycle race

Hooligan attack



Women in laboratory



Boxer

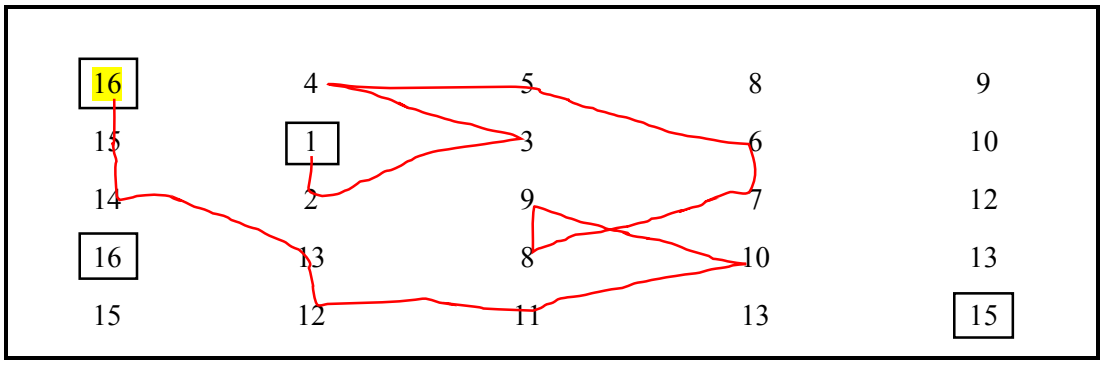
Woman and man arguing

APPENDIX F

Abridged Version of the Number Tracking Test

(Taken with permission from Oliver Schultheiss)

This test requires you to connect consecutive numbers with lines as fast as possible. The next consecutive number is **ALWAYS ADJACENT** to the number you have currently arrived at. It may be located above, below, to the right of, to the left of, or diagonally to the current number. Sometimes you may have to cross a line to connect two consecutive numbers. Here is an example:

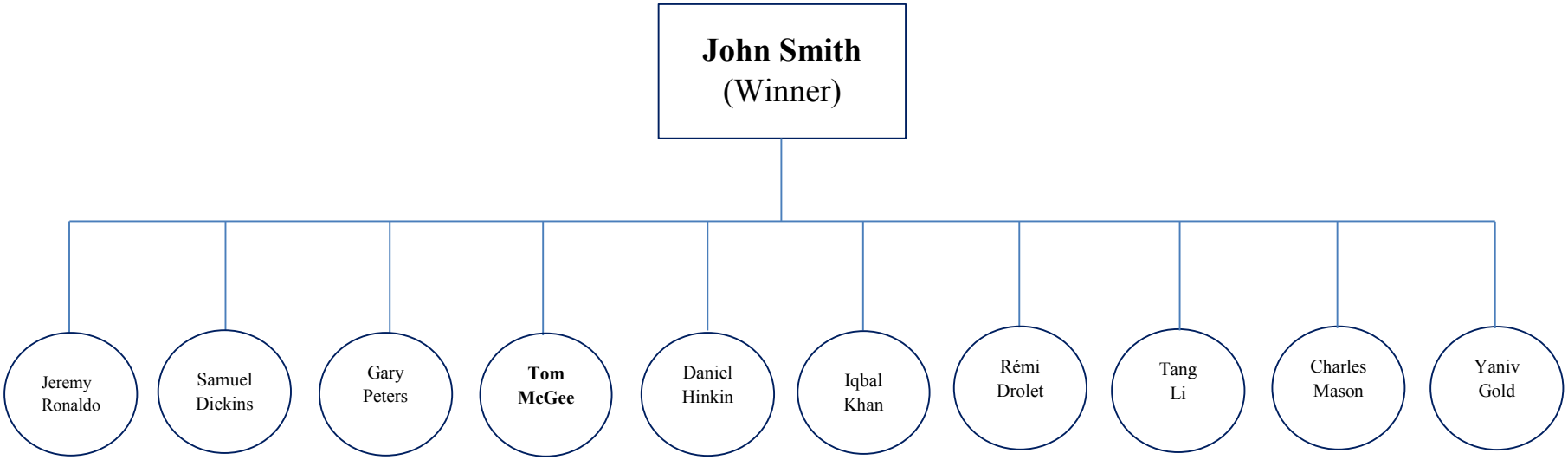


Locate the start number (number 1, boxed) and the final number (number 16, boxed and highlighted). You always start at the boxed number 1 and work your way through the numbers with one uninterrupted line. If you have taken a wrong turn somewhere, trace the line back to the last correct number and continue from there. The task is made more difficult (a) by distractor numbers surrounding consecutive numbers and (b) by boxed distractor numbers that look like final numbers. However, there is only one possible path from the starting number to the final number and only one valid final number.

Try to track the numbers with your pen in the above exercise. Hold the pen closer to its rear end so your hand doesn't block your sight on the neighboring numbers. Make sure that you cross each number while drawing the line.

APPENDIX G

Mock Organizational Chart featuring NTT Winner and Loser in Bold*



* All names herein are fictitious. The winner is clearly shown to occupy the dominant position. Below him are the names of 10 male participants who also completed the NTT and who performed worse. Note in bold the names of the winner and loser who competed in the same dyad.

APPENDIX H

Sample Letter Attesting to the Winner's Performance

Concordia University
John Molson
School of Business

Monday, April 1, 2013.

Dear Mr. John Smith,

Congratulations on completing the Number Tracking Test while recording the fastest average time by a man in all 8 groups (*N*=300)! Here is your performance, in time lapsed, compared to the groups' average time:

Your average time:	*Groups' average time:*
0.92 min	1.07 min

Please allow us to acknowledge your performance by having your name and short biography published in our school's (JMSB) lobby. We will be in touch with you shortly.

Sincerely,

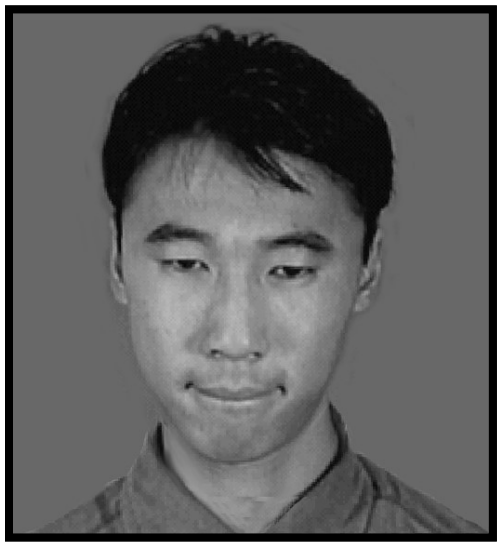
John G. Vongas
PhD Candidate & Faculty Lecturer
John Molson School of Business
Department of Management

APPENDIX I

Examples of Facial Expression Cues

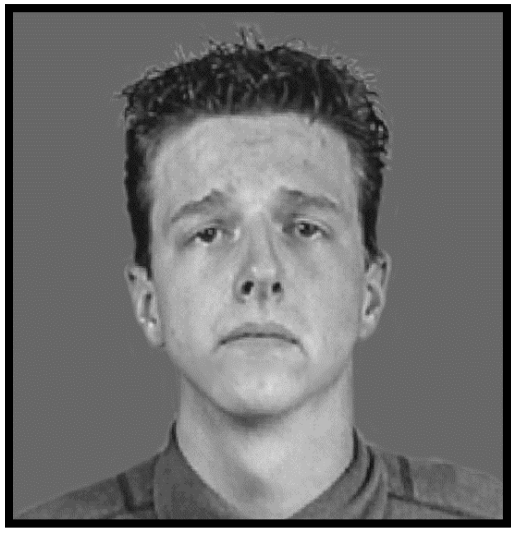
Samples from the Montreal Set of Facial Displays of Emotion (Beaupré & Hess, 2005)

(Taken with permission from Ursula Hess)

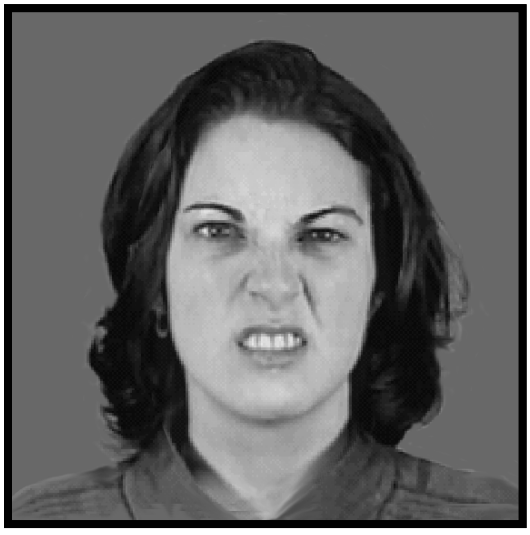


Shame

Fear



Sadness



Disgust

Glossary of Emotions*

Emotion	Meaning
Happiness	A state of wellbeing and contentment; a pleasurable or satisfying experience
Contempt	A feeling that someone or something is not worthy of any respect or approval
Shame	A feeling of regret or sadness that one has because the self has been humiliated or disgraced
Embarrassment	The state of feeling foolish in front of others; something or someone that causes a person or group to look or feel foolish
Serenity	The quality or state of being calm and peaceful
Anger	A strong feeling of being upset or annoyed because of something wrong or bad; the feeling that makes someone want to hurt other people, to shout, etc.
Sadness	Feelings associated with grief or unhappiness
Fear	An unpleasant emotion caused by being aware of danger; a feeling of being afraid
Surprise	The feeling caused by something that is unexpected or unusual
Disgust	A strong feeling of dislike for something that has a very unpleasant appearance, taste, smell, etc.; annoyance that you feel toward something because it is not good, fair, appropriate

***** Taken from the Merriam-Webster Dictionary. Although six emotions were portrayed by actors in the Montreal Set of Facial Displays of Emotion, the glossary included four additional emotions and their definitions, namely *contempt*, *embarrassment*, *serenity*, and *surprise*.

APPENDIX J

Participant Demographic Information

1) What is your age? _____

2) What is the highest education level that you have *completed*? (Circle one)

a. Some College (CEGEP)
b. College (CEGEP) degree completed
c. Some Bachelor's
d. Bachelor's degree completed
e. Some Master's
f. Master degree completed
g. Some PhD
h. PhD degree completed

3) Choose the social class label below that you identify yourself with the most? (Circle one):

a. Lower class
b. Lower-middle class
c. Middle class
d. Upper-middle class
e. Upper class

4) What is your family's approximate annual income (Circle one)?

a. Below $15,000
b. $15,001–$25,000
c. $25,001–$35,000
d. $35,001–$50,000
e. $50,001–$75,000
f. $75,001–$100,000
g. above $100,000

5) What is your parents' highest education level *completed*? (Circle one for each parent)

Father	Mother
a. Some College (or CEGEP)	a. Some College (CEGEP)
b. College degree completed	b. College degree completed
c. Some Bachelor's	c. Some Bachelor's
d. Bachelor's degree completed	d. Bachelor's degree completed
e. Some Master's	e. Some Master's
f. Master degree completed	f. Master degree completed
g. Some PhD	g. Some PhD
h. PhD degree completed	h. PhD degree completed

(Cont.) Demographic Information

6) If you have one or more brothers and sisters, how many of them are:

Older than you: ____ Younger than you: ____

* If you are the only child, place an "X" here: ____

7) 2D: 4D:

8) Height:

9) People in Canada come from many racial or cultural groups. You may belong to more than 1 group on the following list, taken from Statistics Canada. Place an check "X" on the group you identify with the *most*:

a. ___ Aboriginal (e.g., North American Indian, Métis or Inuit)

b. ___ East Asian (e.g., Chinese, Korean, Japanese, etc.)

c. ___ South Asian (e.g., East Indian, Sri Lankan, etc.)

d. ___ Black (e.g., Caribbean, African, etc.)

e. ___ White (e.g., European, North American, etc.)

f. ___ Latin American (e.g., Central American, South American, etc.)

g. ___ Southeast Asian (e.g., Vietnamese, Cambodian, etc.)

h. ___ Arab (e.g., North African, Middle Eastern, etc.)

i. ___ West Asian (e.g., Iranian, Afghan, etc.)

j. Other group (please specify): _____

k. Mixed (specify and circle the one you identify with the *most*):

_____

APPENDIX K

Inclusion of the Other in the Self scale (Aron, Aron, & Smollan, 1992)

Please circle the picture below that best describes your relationship with your competitor on the number tracking test. The more the circles overlap, the "closer" you feel to him.