

Self-Enhancement: The Effect on Escalation of Commitment
and Influence of Digit Ratio (2D:4D)

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Abstract

The main aim of the current study was to examine the effect of self-enhancement on escalation of commitment, and the mediating role of digit ratio (2D:4D) on sex differences in self-enhancement. This study also aimed to analyse the role of self-affirmation, as a moderator of the hypothesised relationship between self-enhancement and escalation of commitment. Results showed that individual differences in self-enhancement predicted escalation of commitment and that self-affirmation emerged as a non-significant moderator of the relationship between self-enhancement and escalation of commitment. Digit ratio partially mediated the effect of sex on self-enhancement. Together, these findings suggest that men are more inclined to display self-enhancement than women because of higher levels of prenatal testosterone exposure, and that the motivation to self-enhance serves to increase escalation of commitment. Potential paths for future research based on the findings and limitations of this study are discussed.

Keywords: self-enhancement, escalation of commitment, digit ratio, overconfidence, over-claiming

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“There are three things extremely hard: steel, a diamond, and to know one's self.”

Benjamin Franklin, Poor Richard's Improved Almanack (1750)

“If most of us remain ignorant of ourselves, it is because self-knowledge is painful and we prefer
the pleasures of illusion.”

Aldous Huxley, The Perennial Philosophy (1894-1963)

For centuries scientists and philosophers have noted the great difficulty of accurately knowing one's self and one's competence. An impressive amount of research has shown that in many domains people tend to have inaccurate self-views, often believing they are better, stronger, and smarter than they actually are (e.g., Alicke, 1985; Dunning, Meyerowitz, & Holzberg, 1989; Klayman, Soll, González-Vallejo, & Barlas, 1999; Kruger & Dunning, 1999; Sedikides & Strube, 1997; Taylor & Brown, 1988). For example, people overestimate their job skills (Baumann, Deber, & Thompson, 1991; Zenger, 1992), students are overly optimistic about their exam results (Clayson, 2005), and drivers overrate their ability to drive (Svenson, 1981).

This pervasive tendency of people to view themselves and their own attitudes, actions, and traits in the most favorable light is known as *self-enhancement* (Alicke & Govorun, 2005; Pfeffer & Fong, 2005). “Self-enhancement denotes the drive to *affirm* the self” (Sedikides & Gregg, 2003, p. 111), namely, to convince ourselves and significant others that we are moral, competent, and virtuous persons with self-integrity (Steele, 1988). This tendency to self-enhance evolves from the desire to possess a positive self-concept (e.g., Allport, 1937; Rogers, 1959;

Sedikides & Strube, 1997). A person's self-concept, or self-identity, refers to the collection of images they possess of themselves, including elements such as personality, attributes, skills, and abilities (Baumeister, 1999; Sedikides & Strube, 1997). Through the process of self-enhancement, people can sustain and bolster this self-concept.

Self-enhancement is regarded as a fundamental human drive that influences information processing on both conscious and unconscious levels (Fiske, 2004; Kunda, 1990). This drive is supported by a variety of cognitive strategies that serve to affirm the self (for reviews, see Baumeister, 1998; Kunda, 1999; Sedikides & Gregg, 2003). For example, people tend to take credit for positive outcomes, but attribute negative outcomes to external causes (for a review, see Campbell & Sedikides, 1999), to describe and evaluate their personality characteristics in overly favorable terms (Colvin, Block, & Funder, 1995; Preuss & Alicke, 2009), and to express too much optimism about future outcomes (Taylor & Brown, 1988; Weinstein, 1980). Across a range of domains, people have been shown to perceive their characteristics and abilities as being above average (for a review, see Alicke & Govorun, 2005; College Board, 1976-1977; Cross, 1977), and to claim the possession of knowledge they don't have (i.e., *over-claiming*; Paulhus, Harms, Bruce, & Lysy, 2003). Moreover, as a means to enhance their self-concept, people generally display *overconfidence* in the accuracy of their decisions, and the correctness of their knowledge and abilities (Christensen-Szalanski & Bushyhead, 1981; Dittrich, Güth, & Maciejovsky, 2001; Landier & Thesmar, 2003; Larwood & Whittaker, 1977; Michailova, 2010).

Bipolar Dimension of Self-Enhancement

There are two ways in which people might enhance their sense of personal worth, namely by *self-advancing* or *self-protecting* (Arkin, 1981; Sedikides & Gregg, 2008). *Self-advancement* involves enhancing the positivity of one's self-concept (Akin, 1981), and is often

seen in social interactions where it can lead to social benefits. Having a more positive and favorable view of oneself and one's abilities directly enhances the self-concept, and importantly might also help individuals convince others that they are more competent and talented than might otherwise be observed (Sedikides & Gregg, 2008). In addition, some studies suggest that having positive and favorable views of oneself and one's abilities may be especially beneficial in leadership contests, because inflated self-images support the very same signalling behaviors that lead to status-enhancement (Anderson, Brion, Moore, & Kennedy, 2012; Johnson & Fowler, 2011; Kennedy, Anderson, & Moore, 2013; von Hippel & Trivers, 2011). These signalling behaviors provide us with information about leadership potential, and are used by others to determine who should be a leader (Van Vugt & Ronay, 2013). In other words, self-enhancement and subsequent behavioral signals of confidence may help individuals gain positions of leadership. Self-confidence is such a signalling behavior, as people recognize confidence as a display for competence, talent, and skills (Anderson & Kilduff, 2009; Reuben, Rey-Bielb, Sapienzac, & Zingalesd, 2011; Van Vugt, Johnson, Kaiser, & O'Gorman, 2008). As a result, self-enhancement tendencies are often found among organizational leaders (e.g., Malmendier & Tate, 2005a, b) and at all other organizational levels, where people benefit from inflating their self-image (e.g., Dunning, Heath, & Suls, 2004; Stoker & van der Heijden, 2001).

The second way in which people enhance their sense of personal worth is by *self-protecting*, a self-defense tactic motivated by a desire to overcome threats to the self (Arkin, 1981). When self-threatened, people often process information in a biased way (Beauregard & Dunning, 1998; Leary & Kowalski, 1990; Munro & Ditto, 1997; Taylor, 1983), using self-enhancement as a mechanism to maintain and protect valued self-images from insecurity and threats to the self-concept (Kunda, 1999; Sedikides & Gregg, 2008). By increasing pro-active

orientation and self-esteem, self-enhancement raises an individual's chances of effectively coping with stressful and ambiguous situations (Taylor & Brown, 1988). Thus, in situations where people feel they need to protect, improve, or maintain their self-concept, self-enhancement becomes especially prominent (Alicke & Govorun, 2005; Pfeffer & Fong, 2005; Sedikides & Gregg, 2008; Taylor & Brown, 1988).

Benefits and Costs

Importantly, there has been an extensive debate in the literature regarding whether self-enhancement is adaptive or mal-adaptive (e.g., McKay & Dennett, 2009; Pfeffer & Fong, 2005). Self-enhancement can be advantageous in many ways, as it leads to benefits such as higher self-esteem (e.g., Taylor & Armor, 1996, Taylor & Brown, 1988), status-enhancement (Anderson et al., 2012; Pfeffer & Fong, 2005), and good physical and mental health (Creswell et al., 2005; Taylor & Brown, 1988). However, having such overly positive and inaccurate appraisals of one's skills and actions can also be disadvantageous. This is especially problematic in the workplace, where "flawed self-assessments arise all the way up the corporate ladder" (Dunning et al., 2004, p. 69). Employees tend to overrate their job performance and working skills (Baumann et al., 1991; Christensen-Szalanski & Bushyhead, 1981; Harris & Schaubroeck, 1988; Haun, Zeringue, Leach & Fole, 2000; Marteau, Johnston, Wynne, & Evans, 1989). Likewise, CEOs, managers, and investors show overconfidence in their judgments, which might lead to suboptimal or risky decision-making (e.g., Ben-David, Graham, & Harvey, 2007; Dunning et al., 2004; Malmendier & Tate, 2005b; Nasic & Weber, 2010; Odean, 1998).

Taken together, the above findings suggest that self-enhancement matters for corporate decision-making. Making important decisions without an accurate appraisal of one's knowledge and abilities not only affects managerial performance, but also has a serious impact on

organizations and the general public too. It is therefore important to further explore in what ways self-enhancement can be disadvantageous.

Self-Enhancement and Escalation of Commitment

A major theme emerging from such research concerns the influence self-enhancement may have on other cognitive biases (Beshears & Milkman, 2011; Friesen & Weller, 2006). Some research has theorized that self-enhancement is related to a class of self-enhancing decision-making biases (Pfeffer & Fong, 2005; Van Vugt & Ronay, 2013). More specifically, it has been thought that these decision-making biases result from the general goal to self-enhance. These are biases which “favor welcome over unwelcome information in a manner that reflects the individual’s goals” (Von Hippel & Trivers, 2011, p. 2) of bolstering their self-image by maintaining self-serving optimistic beliefs (e.g., overconfidence, escalating of commitment bias, confirmation bias, hindsight bias, anchoring and adjustment bias) (Trope & Neter, 1994; Van Vugt & Ronay, 2013).

One of these self-enhancing biases that has been observed in a wide range of business settings is *escalation of commitment* (e.g., Beshears, & Milkman, 2011; Staw, Barsade, & Koput, 1997). Escalation of commitment refers to the tendency of people to continuously invest in a failing course of action because of the amount of time, money, and effort beforehand invested (Staw, 1981). Kelly and Milkman (2013) pointed out that such escalation of commitment has serious implications for managerial-decision making. For example, bank executives escalate commitment to the problematic loans they select, retaining these loans long after they are revealed to be problematic (Staw et al., 1997). Similarly, NBA sport managers escalate commitment by giving highly drafted players more playing time and retaining them longer, in spite of their injuries, trade status, and on-court performance (Staw & Hoang, 1995). Even stock

analysts, who make forecasts of their company's quarterly earnings, escalate commitment by maintaining out-of-consensus forecasts long after such forecasts are revealed to be incorrect (Beshears & Milkman, 2011). Taken together, these studies demonstrate that escalation of commitment occurs in various types of organizational settings, and can lead to dramatic consequences for both decision makers and organizations (Kelly & Milkman, 2013, p. 62).

Some recent work on escalation of commitment has provided evidence that the motivation to self-enhance might affect the propensity to escalate previous commitments. For instance, in a recent study on consumer behavior (Townsend & Sood, 2012) it was found that the choice of a product of high design affirmed a participant's sense of self, and that consciously choosing these types of products led to a reduced tendency to escalate commitment during a financial decision-making task. The authors proposed that "highly aesthetic" products are self-affirming, because they reflect important self-images and boost self-esteem (Townsend & Sood, 2008, p. 417). This research suggests that the drive to self-affirm affects escalation of commitment.

Furthermore, McCarthy, Schoorman, and Cooper (1993) showed in a field study that overconfident entrepreneurs were substantially more likely to add new capital to their business in the second year than less overconfident entrepreneurs. Moreover, when negative financial feedback followed during the second year, overconfidence seemed to have a bigger influence on entrepreneurs' reinvestment decisions than when positive financial feedback followed. This suggests that overconfidence might increase the risk of escalation of commitment.

Building upon the extant research, the current study proposes that the motive to self-enhance provides one explanation for why people escalate commitment to their past decisions. As stated earlier, individuals who seek to affirm the self, perceive and use information in a

manner that directly enhances their self-concept (Anderson et al., 2012; Pfeffer & Fong, 2005; Zhang & Baumeister, 2006). However, in the case of an escalation situation, self-enhancement motives may also entail the denial of potential failures (Dörner & Schaub, 1994). In most cases, making a mistake is not a self-enhancing thing to do, as it threatens the self-concept. However, admitting to one's failures also does little to promote one's self-concept. According to the self-justification theory (Festinger, 1957), decision-makers who receive negative feedback on a past decision are reluctant to admit failure, since their self-concept hangs in the balance. Admitting failure contradicts the decision-maker's desire to see himself as a competent and coherent person, and thus poses a threat to the self. Instead, the decision-maker may decide to seek an opportunity to enhance and protect the self-concept (Kelly & Milkman, 2013). Thus, in the face of negative feedback, rectifying past decisions in order to justify competence seems a good way to do so. One mechanism, through which previous negative outcomes can be rectified, is by escalating commitment to a previous course of action.

Drawing from the above findings, I propose that decision-makers who are motivated by self-enhancement will be more likely than their low self-enhancement driven counterparts to pursue opportunities for self-justification. In other words, the motive to self-enhance serves to increase the propensity to escalate commitment. Therefore, the current study aims to test whether self-enhancement will be positively related to escalation of commitment. It is hypothesized that (1) self-enhancement will predict escalation of commitment. The current study employs two different measures of self-enhancement: (a) overconfidence and (b) the degree to which individuals over-claim knowledge about non-existing facts (over-claiming).

Role of Self-Affirmation

Another way to test whether escalation of commitment evolves from the desire to self-

enhance is by testing whether *self-affirmation* attenuates the previously reported relationship between self-enhancement and escalation of commitment. Previous research has shown that the tendency to escalate commitment can be reduced by letting people engage in self-affirmation (Sivanathan et al., 2008; Townsend & Sood, 2012). According to Steele's affirmation theory (1988), the main goal of the self is to preserve self-integrity. In other words, people like to see themselves as moral, competent, virtuous, and sensible persons (Sherman & Cohen, 2006; Steele, 1988). Self-affirmation research has shown that when a situation poses a threat to this image of self-integrity (e.g., social threat or health threat), people are strongly motivated to eliminate the threat and restore self-integrity (Sherman & Cohen, 2002, 2006; Steele, Spencer, & Lynch, 1993). In order to do so, people often respond in a defensive manner (Jemmott, Ditto, & Croyle, 1986; Liberman & Chaiken, 1992), rather than recognizing the importance of the threat. An abundance of research has shown that this leads to the biased processing of information that threatens the self (e.g., Munro & Ditto, 1997; Reed & Aspinwall, 1998).

As noted earlier, one way in which this threat can be reduced is by rectifying past decisions in order to justify competence (i.e., escalation of commitment). However, another way is by identifying and affirming one's self-integrity in some other domain, such as by reflecting on a core personal value (Townsend & Sood, 2012). By bolstering another part of the self-integrity (Blanton, Pelham, DeHart, & Carvallo, 2001; Sivanathan et al., 2008), these self-affirmations enable individuals to cope with threats to the self, "without resorting to defensive biases" (Sherman & Cohen, p. 185).

Further research is needed to examine whether the relationship between self-enhancement and escalation of commitment can be reduced by self-affirmation. Townsend and Sood's (2012) study on product choice provided some indirect evidence for this relationship. However, they did

not directly assess the link between self-enhancement and escalation of commitment in relation to a self-affirmation manipulation. In order to fill this gap in the existing literature, the current study examines whether the proposed relationship between self-enhancement and escalation of commitment can be reduced by a self-affirmation intervention. It was hypothesized that (2) the relationship between self-enhancement and escalation of commitment will be attenuated by self-affirmation.

Sex, Self-Enhancement, and Digit Ratio

Given that self-enhancement is such a pervasive and enduring motive, it is not surprising that social and behavioral scientist have devoted much attention to the determinants of self-enhancement (for a review, see Hepper, Gramzow, & Sedikides, 2010). Prior research suggests that some differences in self-enhancement can be explained by sex (Johnson, 2004; Reuben, Rey-Bell, Sapienza, & Zingales, 2011), with men tending to hold more positive illusions than women (e.g., Barber & Odean, 2001; Boyd-Wilson, Walkey, McClure, & Green, 2000; Johnson et al., 2006; Lin & Raghurir, 2005). Positive illusions are a form of self-enhancement that involve systematically inflated self-perceptions of competence, illusion of control over events, and invulnerability to risk (Taylor & Brown, 1988). Similarly, there is a sizable literature documenting that overall, men exhibit higher degrees of overconfidence than women (e.g., Barber & Odean, 2001; Beyer, 1999; Lundeberg, Fox, & Puncchohar, 1994; Zindel, Menezes, Matsushita, & Da Silva, 2010). Taken together, these studies suggest that there are consistent sex differences in self-enhancement, with men displaying more self-enhancement tendencies than women.

Only recently have scientist begun studying the role of biological systems in the onset, maintenance, and recurrence of self-enhancement. One mechanism, which may be a fundamental

contributor, is testosterone. Testosterone is a sex hormone, which influences many of the behaviors, as well as the development of sex related features specific to adult males. Although both men and women produce this testosterone, levels in men are substantially higher than in women (Southren et al., 1967). There is a large literature showing that circulating testosterone is associated with dominance-seeking and risk-taking behaviors (e.g., Apicella et al., 2008; Cashdan, 1995; Coates & Herbert, 2008; Mazur & Booth, 1998; Ronay & von Hippel, 2010; Schultheiss, Dargel, & Rohde, 2003; Vermeersch, T'Sjoen, Kaufman, & Vincke, 2008). Ronay et al. (2012) pointed out that one of the major findings within the testosterone literature is that “higher levels of circulating testosterone motivate the pursuit and possession of power and dominance” (Ronay, Greenaway, Anicich, & Galinsky, 2012, p. 672; Schultheiss et al., 2003). This need for dominance refers to the desire of individuals to occupy roles or positions of prestige, power, and influence (Anderson et al., 2012, pp. 35). Grant (1998), however, argued that there is a “less attractive side of dominance: the tendency to overconfidence and high self-regard” (Grant, 2012, “measuring testosterone”). For instance, in a recent study by Anderson et al. (2012), it was demonstrated that individuals who more strongly desired roles or positions of prestige and status displayed higher levels of overconfidence in their task abilities.

Given the myriad of studies highlighting the relationships between testosterone and dominance-seeking and risk-taking behaviors, it has been argued that testosterone might be a proximate mediator of positive illusions (Johnson et al., 2006). One study found that in college-aged women, higher levels of testosterone were associated with high positive self-regard (as measured by the extent to which college-aged women overestimated their rank in leadership, status, and popularity with other college-aged women) (Cashdan, 1995). In other research, however, no such relation was found (Johnson et al., 2006). Given its role in promoting

dominance-seeking and risk-taking behaviors, it seems plausible that individual differences in testosterone might play a role in the previously reported relationship between sex and self-enhancement.

Ronay et al. (2012) noted that the results of research investigating the relationship between dominance-seeking behaviors and prenatal testosterone exposure are conceptually similar to the findings from research measuring circulating testosterone (for a review, see Millet, 2011; Ronay et al., 2012, p. 672). This also seems to be the case for risk-taking behaviors and prenatal testosterone exposure (Stenstrom, Saad, Nepomuceno, & Mendenhall, 2011).

One way to measure prenatal testosterone exposure is by assessing individuals' ratio between the length of the index finger and the ring finger (2D:4D), as some evidence has suggested that digit ratio is a valid proxy of prenatal and adult testosterone concentration (Hönekopp, Bartholdt, Beier, & Liebert, 2007; Manning, Scutt, Wilson, & Lewis-Jones, 1998). A lower digit ratio is hypothesized to be influenced by higher prenatal testosterone levels (Manning et al., 1998), with males, on average, having lower digit ratios than females. Evidence, supporting this claim, found that 2D:4D ratios are lower in males than females (Manning et al., 1998; van Anders, Vernon & Wilbur, 2006).

Therefore, another goal of this study is to examine the biological antecedent of sex differences in self-enhancement, using digit ratio (2D:4D) as a proxy measure of individual differences in prenatal testosterone exposure (Manning, 2002). Specifically, this study tests the possible indirect relationship between sex and self-enhancement through the mediating variable of digit ratio. Because testosterone is associated with dominance-seeking and risk-taking behaviors, it is hypothesized that (3) males will display more tendencies towards self-enhancement than females, and (4) that digit ratio will explain in part the previously reported

relationship between sex and self-enhancement.

Method

Participants

Participants ($n = 115$, 36 male, mean age = 21.99, $SD = 4.41$) were undergraduate and graduate university students at VU University who participated in exchange for either money or course credits. Eighty-one percent were Dutch and 19% were native to other countries.

Furthermore, nearly half (46.1%) of the participants were psychology students, and 53.9% were students with other study backgrounds.

Design and General Procedure

The current study used a 1 x 2 (affirmation versus no-affirmation) between-subject experimental design, and consisted of two parts: (1) a computer-based questionnaire and (2) scan of the right hand. After providing their informed consent, participants were told the experiment would involve testing general knowledge skills, in which they had to complete a series of computer-based questionnaires and provide a scan of their right hand (see Appendix B for the questionnaires). They were assured that the data would remain confidential and anonymous. Participants then completed the demographic questionnaire, the General Knowledge Questionnaire and the short version of the Over-Claiming Questionnaire. The General Knowledge Questionnaire and the short version of the Over-Claiming Questionnaire were counterbalanced in order to avoid any carry-over effects. After completing the self-enhancement and demographic questionnaires, participants were randomly assigned to the affirmation or control condition. In the affirmation condition, participants were instructed to write a short description of their most important value. In the control condition, participants were instructed to write a short description about their last shopping trip to the super market. All participants were

given 5 minutes to complete the writing task, followed by the escalation of commitment task which assessed participants' willingness to escalate commitment to a failing investment. The key dependent variable was the degree to which participants escalated their commitment. The key independent variables were individual differences in self-enhancement, and random assignment to an affirmation versus control condition. It was predicted that self-enhancement would be positively related to escalation of commitment and that this relationship would be attenuated by the self-affirmation manipulation.

Once they completed the escalation of commitment task, participants were asked to inform the research administrator, by knocking on the cubicle's door. Participants were then taken to a separate room where the lengths of their second (2D) and fourth (4D) fingers were measured, using a flatbed scanner. The key dependent variable was self-enhancement. The predictor variable was sex, and the mediating variable was digit ratio (2D:4D). It was predicted that males would display more tendencies towards self-enhancement than females, and that digit ratio would mediate the previously reported relationship between sex and self-enhancement. At the conclusion of the experiment participants were paid for their participation and debriefed.

Measures

Demographic questions. Some personal data were collected in order to measure other variables that may interact with the dependent and independent variables of interest: sex, age, ethnicity, educational background, and duration of studies.

Self-enhancement. Individual differences in self-enhancement were measured by two different approaches.

Overconfidence. The first approach involved assessing individual differences in overconfidence. Following the Moore and Healy (2008) classification, the overconfidence facet

of miscalibration was considered. Miscalibration is a stable cognitive bias in which people tend to overestimate the precision of their knowledge and beliefs (Ben-David, Graham, & Harvey, 2010; Johnsson & Allwood, 2003; Michailova, 2010), in essence enhancing their self-image.

To assess this miscalibration of one's knowledge and beliefs, Michailova's (2010) General Knowledge Questionnaire was used. The General Knowledge Questionnaire was chosen for three reasons. First, the measure controls for the hard-easy effect, balancing easy, medium, and hard questions. This effect occurs when the degree of overconfidence increases with task difficulty (Lichtenstein, Fischhoff, & Phillips, 1982). Second, it uses three-choice forced response format, instead of two-choice forced response format present in other instruments (e.g., West & Stanovich, 1997). According to Michailova (2010), three-choice response formats are less abstract to participants and less inherently prone to produce extreme levels of overconfidence, as compared to two-choice response formats. Third, the measure controls for sex biases, excluding items that were previously found to be easier for either sex (e.g., Deaux & Farris, 1977; Kurman, 2004).

The General Knowledge Questionnaire consisted of 18 items, of which some items were assumed to be easy to answer. It has been debated that the use of items that are too easy undermines overconfidence (Lichtenstein & Fischhoff, 1977). To control for the hard-easy effect, seven additional items were added to the questionnaire that were assumed to be more difficult to answer.

The task presented participants with 25 general-knowledge questions (e.g., "How does one call the vocal organ of birds?"), each with three possible answers (e.g., bellows, syrinx, or sonorant). Participants were asked to identify the correct answer and state their confidence level that their chosen answer was correct. Similar to prior research, scores on the GKQ were obtained

by regressing participants' average confidence onto their average accuracy and retaining the residuals as our measure of self-enhancement (Anderson et al., 2012). Higher scores corresponded to greater self-enhancement.

The overconfidence test had good internal consistency, with a reported Cronbach alpha coefficient of .83, a strong, negative correlation between accuracy and bias rate, $r(115) = -.70$, $p < 0.01$, and no relationship between scores on overconfidence and experience or background (age, student, ethnicity, and years of study) (Michailova, 2010).

Over-claiming. The second measure of self-enhancement, employed in the current study, was the OCSF-25 (Bing, Kluemper, Davison, Taylor, & Novicevic, 2011). The OCSF-25 is a short version of the Over-Claiming Questionnaire (OCQ-150; Paulhus et al., 2003) that measures the degree to which individuals over-claim knowledge about non-existing facts (Paulhus et al., 2003). Participants were asked to rate their familiarity with each of the 25 listed items on a 7-point scale (0 = *never heard of it* and 6 = *very familiar*). Eight of the 25 items were non-existing (i.e., meta-toxins, Gail Brennan, consumer apparatus, Queen Shattuck, Murphy's Last Ride, sentence stigma, shunt-word), while the remaining items represented existing items from different categories, such as books and art (Bing et al., 2011).

Following Paulhus et al. (2003), scores on the OCSF-25 were obtained by using the signal detection analyses described by Macmillan and Creelman (1991). First, the proportion of hits (number of existing items that are given a higher rating than the cutoff point) and false alarms (number of non-existing items that are given a higher rating than the cutoff point) were calculated. The cutoff point was the highest score on the 7-point scale that was labelled as non-familiar. The scores above the cutoff point were labelled as familiar. These calculations were repeated for each cutoff point (i.e., 0, 1, 2, 3, 4, 5), and scores were averaged in order to obtain

the final score of proportion of hits and false alarms. Next, a knowledge accuracy index was calculated using the following formula: accuracy index = $p(\text{hits}) - p(\text{false alarm})$. The accuracy index was reliable ($\alpha = .83$). The over-claiming index was calculated using the following formula: bias index = $p(\text{hits}) + p(\text{false alarm})$. Higher scores corresponded to more over-claiming. The over-claiming index was reliable ($\alpha = .75$). Evidence of internal consistency and construct validity for the OCQ have also been previously demonstrated (Bing et al., 2011). Paulhus et al. (2003) showed that there was a strong, positive correlation between the accuracy index and cognitive ability ($r = .52$), and a positive correlation between the over-claiming index and self-deceptive enhancement ($r = .30$) and personality enhancement ($r = .22$).

Self-affirmation manipulation. Following Cohen, Aronson, and Steele (2000), participants rank-ordered a list of 11 values and personal characteristics (e.g., artistic skills, sense of humor, social skills) in order of importance. In the affirmation condition, participants recalled and wrote about a personal experience in their lives where their first ranked value was salient, and resulted in a positive sense of self-worth. In the no-affirmation condition, participants were told to recall and write about their last shopping trip to the super market. All participants were given 5 minutes to complete the writing task.

Escalation of commitment. To measure escalation of commitment, participants were presented with a decision-making game that consisted of three questions on capital investment (Staw, 1981). Participants were first given information on business investment opportunities of Company X (50% chance of 1700 euro and 50% chance of 900 euro). They were told that their initial investment had to be 1000 euro and asked to indicate, on a scale from 0% (absolutely no) to 100% (absolutely yes), their willingness to continue to invest in company X, keeping in mind that their goal was to gain as much money as possible. They were also asked to provide an

explanation for their course of action. Following this first decision, participants were then given new information on business investment opportunities of Company X (30% chance of 1800 euro and 70% chance of 700 euro). They were faced with two scenarios (invest or don't invest and keep the 900 euro), asked to indicate their willingness to continue to invest in company X, and again, provided an explanation for their course of action. For the third and last time, participants were given new information on business investment opportunities of Company X (20% chance of 1900 euro and 80% chance of 600 euro). Again, they were faced with two scenarios (invest or don't invest and keep the 800 euro), asked to indicate their willingness to continue to invest in company X, and then provided a written explanation for their course of action. Scores were obtained by first weighting the confidence scores for each questions based on the statistics provided in the questions. The following formula was used: $(\text{item 1} \times 0.5) + (\text{item 2} \times 0.7) + (\text{item 3} \times 0.8)$. Participants' responses were then averaged across the three items. The measure assessed the degree to which individuals escalated their commitment to invest in company X. A higher score corresponded to more escalation of commitment ($\alpha = .50$).

Digit ratio. To measure individual differences in prenatal testosterone exposure, lengths of the second (2D = index finger) and fourth (4D = ring finger) fingers were measured, as described by Manning et al. (1998). Participants were asked to remove rings and bracelets, and place their right hand on the flatbed scanner. Scanned images of the right hand were then taken. Resolution was adjusted to ensure that the three main creases in each finger were well visualized on the scanned images. Using the acquired images, measurements were made from the midline of the basal crease of the finger to the middle of the tip, using the Adobe Photoshop measurement tool (Allaway, Bloski, Pierson, & Lujan, 2009). The 2D:4D ratio was calculated by dividing the length of the second finger (2D) by the length of the fourth finger (4D). Lower digit

ratios indicated exposure to higher levels of prenatal testosterone.

Results

One of the 115 participants was eliminated from the sample due to being more than 3 standard deviations from the mean on over-claiming. One participant was also eliminated from the sample because of insufficient knowledge of the English language, and eight data points were excluded from the further analyses because of missing hand scans (corrupted files). Preliminary analyses were conducted to ensure no serious violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity were further detected. See Table 1, for demographics and test scores.

Table 1

Participants' Descriptive Statistics and Test Scores

Variables	<i>n</i>	<i>M</i>	Range	<i>SD</i>
Age in years*		21.84	17 – 53	4.21
Digit ratio*		0.96	0.84 – 1.03	0.03
Males	32	0.95	0.84 – 1.00	0.03
Females	73	0.96	0.90 – 1.03	0.03
OCFS-25*		0.54	0.10 – 1.21	0.24
GKQ*		0	-1.94 – 2.34	1.00
Self-enhancement*		0	-1.89 – 2.45	0.84
Self-affirmation	54			
Males	22			
Females	32			
No-affirmation	51			
Males	10			
Females	41			
Escalation of commitment*		28.21	0 – 66.67	14.33

Note. **N* = 105.

Self-Enhancement and Escalation of Commitment

As expected, preliminary analyses revealed a strong correlation between the measures of overconfidence (GKQ) and over-claiming (OCFS-25), $r(105) = .43, p < 0.01$, indicating that both measures were assessing the same underlying construct of self-enhancement. Thus, both scores on the GKQ and OCFS-25 were combined as one robust and valid measure of self-enhancement (see Appendix A for the separate analyses of GKQ and OCFS-25).

A single regression analysis was used to assess the ability of the self-enhancement measure, to predict levels of escalation of commitment. In this model, self-enhancement emerged as a significant predictor of escalation of commitment, $B = .27, t(103) = 2.79, p = .01, \eta^2 = .07$. Table 2 depicts the correlations.

Table 2

Correlation Matrix

Variables	1	2	3	4	5
1. Digit ratio	–				
2. OCFS-25	-.22*	–			
3. GKQ	-.18	.43**	–		
4. Self-enhancement	-.24*	.84**	.84**	–	
5. Escalation of commitment	-.26**	.24*	.21*	.27**	–

Note. $N = 105$. * $p < .05$. ** $p < .01$.

Moderation by Self-Affirmation

Next, a multiple regression analysis was used to test the proposed moderation model that self-affirmation would attenuate the relationship between self-enhancement and escalation of commitment. Self-enhancement was mean-centered and affirmation was dummy coded (1 = affirmation and -1 = no-affirmation), prior to the creation of the self-enhancement-by-affirmation

interaction term (Jaccard & Turrisi, 2003). The results revealed a significant main effect of self-enhancement on escalation of commitment, $B = .28$, $t(103) = 2.89$, $p = .01$. Neither the main effect of self-affirmation, $B = -.10$, $t(103) = -1.05$, $p = .30$, nor the interaction between self-affirmation and self-enhancement were significant, $B = -.02$, $t(102) = -0.20$, $p = .84$. Thus, self-affirmation did not emerge as a significant moderator of the relationship between self-enhancement and escalation of commitment.

The results described above suggested that there was no influence of self-affirmation on the relationship between self-enhancement and escalation of commitment. To further test the validity of these results, both conditions (affirmation and no-affirmation) were analyzed separately. The analyses revealed that, when splitting the data file by affirmation, self-enhancement emerged as a significant predictor of escalation of commitment in the no-affirmation condition, $B(1, 49) = .29$, $n = 51$, $p = .04$, $\eta^2 = .08$, but after self-affirmation it did not, $B(1, 52) = .26$, $n = 54$, $p = .06$, $\eta^2 = .07$. This indicates that self-affirmation had some influence on the relationship between self-enhancement and escalation of commitment.

During the manipulation check it became apparent that some participants had not followed the instruction correctly. When looking at the content of the participants' essays in the affirmation condition, some participants wrote generally about their identified value instead of a personal event involving that value. Additional analyses, testing the self-affirmation effect with these participants present and absent in the data file, showed no significant change in the pattern of results.

Sex, Self-enhancement and Digit Ratio

A one-way between subjects ANOVA was performed to investigate sex differences in (a) self-enhancement and (b) digit ratio. Sex was dummy coded as 1 = male and -1 = female. The

analyses revealed a statistically significant difference between males ($M = 0.28$, $SD = 0.90$) and females ($M = -0.12$, $SD = 0.79$) on self-enhancement, $F(1,103) = 5.18$, $p = .03$, $\eta^2 = .05$.

Furthermore, the difference between males ($M = 0.95$, $SD = 0.03$) and females ($M = 0.96$, $SD = 0.03$) on digit ratio was significant, $F(1,103) = 9.41$, $p < .01$, $\eta^2 = .08$. This result indicated that male participants had higher prenatal testosterone exposure than female participants.

Mediation by Digit Ratio

Next, the hypothesis was tested that digit ratio would mediate the effect of sex on self-enhancement. Following Hayes (2009), a bootstrapping procedure with 10,000 resamples was used, entering sex as the independent variable, mean-centered digit ratio as the mediating variable, and self-enhancement as the dependent variable. As Figure 1 illustrates, digit ratio significantly mediated the relationship between sex and self-enhancement (indirect effect = .0506, $SE = .0356$; the 95% bias-corrected confidence interval did not include zero: .0036, .1466). These analyses suggest that a substantial effect of sex on self-enhancement was mediated by digit ratio.

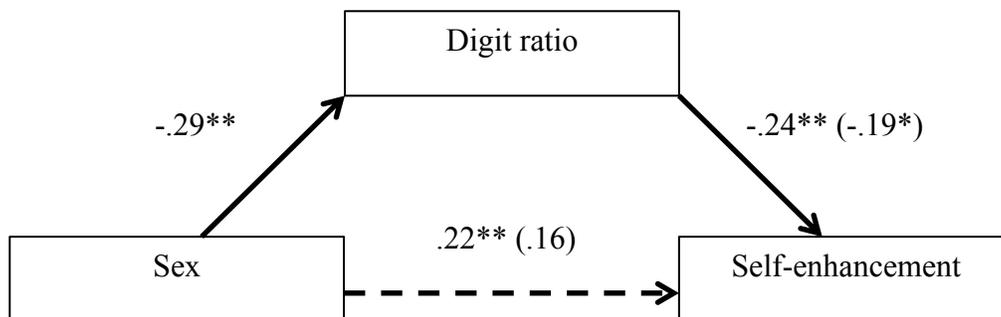


Figure 1. Mediation of the effect of sex on self-enhancement via digit ratio. The numbers along the paths are standardized regression coefficients; the numbers in parentheses are simultaneous regression coefficients. * $p = .06$, ** $p < .05$, *** $p < .001$.

Discussion

As outlined previously, the goals of this study were to analyze the effect of self-enhancement on biased decision-making (i.e., escalation of commitment), and to provide insight into the biological antecedents of sex differences in self-enhancement. With the use of an experimental research design, this study tested four hypotheses: (1) Self-enhancement will predict escalation of commitment, (2) the relationship between self-enhancement and escalation of commitment will be attenuated by self-affirmation, (3) males will display more tendencies towards self-enhancement than females, and (4) digit ratio will explain in part the previously reported relationship between sex and self-enhancement. The results provided support for all but hypothesis 2. The results for these four hypotheses are discussed below in the order mentioned.

The observed relationship between self-enhancement and escalation of commitment is in line with those observed by McCarthy, Schoorman, and Cooper (1993), and suggests that individual differences in self-enhancement influence the degree to which participants escalate commitment to a failing course of action. The higher one's tendencies towards self-enhancement, the higher one's willingness to continue investing in company X, despite evidence of this being a failing strategy. It seems that, when confronted with negative information over a capital investment, participants who were motivated by self-enhancement were more likely than their low self-enhancement driven counterparts to pursue opportunities of self-justification. This is because the motivation to self-enhance often exists alongside the motivation to preserve a coherent and competent self-view (Oreg & Bayazit, 2009). Taken together, these findings raise the possibility that escalation of commitment may indeed be an expression of the need to self-enhance.

Second, although it was hypothesized that self-affirmation would attenuate the

relationship between self-enhancement and escalation of commitment, this was not observed in this study.

Also, this study did not replicate the effect found by other researchers that self-affirmation reduces escalation of commitment (Townsend & Sood, 2012; Sivanathan et al., 2008). This goes against the expectation that participants in the affirmation condition would show less escalation of commitment when faced with negative information on capital investment, because they had the opportunity to bolster their self-integrity (Sherman & Cohen, 2006), and indicates that self-affirmation was unsuccessful in reducing escalation of commitment. However, although the interaction term was not significant, it is important to note that in the no-affirmation condition self-enhancement predicted escalation of commitment, but after a self-affirmation intervention it did not. Also, participants who self-affirmed were somewhat less likely to escalate commitment compared to those who did not self-affirm.

Third, this study tested for the first time whether individual levels in prenatal testosterone exposure, as measured by digit ratio (Manning, 2002), would partly explain sex differences in self-enhancement. The observed sex difference in self-enhancement was as predicted: men reported higher levels of self-enhancement than women. Although the pattern of results for sex differences in self-enhancement have been mostly similar across studies—in the present study and in many other researches, men have shown to exhibit greater overconfidence than women, and hold more positive illusions (e.g. Barber & Odean, 2001). What is important to note, is that the present study controlled for sex biases (gender neutral task) and applied two different measures of self-enhancement (i.e., overconfidence and over-claiming). This detection of equivalent results using different measures of self-enhancement and controlling for sex biases, provides evidence that sex differences with respect to the level of self-enhancement seem to be even more

stable than previously thought (Kurman, 2004; Deaux & Farris, 1977).

Furthermore, it was demonstrated that digit ratio mediated the effect of sex on self-enhancement. These results confirm the hypothesis, and provide evidence suggesting that men are more inclined to display self-enhancement than women because of higher levels of prenatal testosterone exposure. The considerable link between sex and self-enhancement could be outlined in both biological and behavioral terms. Men seem to exhibit more self-enhancement (e.g., Barber & Odeon, 2001), and have higher levels of testosterone than women (e.g., Southren et al., 1967). Subsequently, higher levels of testosterone co-exist with a number of dominance-seeking behaviors, such as positive self-regard (Cashdan, 1995). A possibility, following Johnson et al. (2006), is that this sex differences in self-enhancement may be due to an increased need for dominance caused by testosterone. Given these results, it seems plausible that sex differences in self-enhancement are in part biological in origin.

Limitations and Implications

Despite the contributions of this study, a few shortcomings should also be noted. First, the applicability of the results to the real world is somewhat restricted by a number of factors. The current study used a laboratory setting, and observed behavior that occurred in an artificial context. This setting differed greatly from a real world decision-making setting, because bad decisions were of little consequence for the participants. Therefore, participants may have taken greater risks than they would have normally done in real life (Beck & Wade, 2004). In addition, the sample consisted mostly of students, of which nearly half of them studied Psychology. This might have affected the generalizability of the results. It should, however, be noted that a considerable proportion of the participants were non-Dutch, which adds to the generalizability of the results. Thus, future research might seek to further investigate the link between self-

enhancement and escalation of commitment in an organizational setting, where the stakes of making a faulty decision are much higher.

Second, although this study showed that self-enhancement predicted escalation of commitment, evidence for self-affirmation as a significant moderator was not found. Perhaps this non-significant effect of self-affirmation could be attributed to the randomization of participants. There were a considerable higher proportion of male participants in the affirmation group compared to the control group. Since male participants showed more self-enhancement than female participants, this might have affected the results. Future research can seek to explore this possibility by using a more randomized sample of male and female participants.

Moreover, when looking at the content of the participants' essays in the affirmation condition, some of the participants wrote generally about their identified value instead of a personal event involving that value. Future research could examine whether self-affirmation has a stronger influence on the relationship between self-enhancement and escalation of commitment when instructions are followed more correctly.

Another variable that might have influenced the effect of self-affirmation on self-enhancement is the "moderating role of free choice" (Silverman, Logel, & Cohen, 2013, pp. 1). In the present study, participants were required to write about their most important value. In a recent study by Silverman et al. (2013) it was, however, demonstrated that there are restrictions to this self-affirmation intervention. They showed that when participants were told of the effects of self-affirmation and then instructed to self-affirm (externally imposed), self-affirmation's effects were negated. However, when participants were given the choice to self-affirm or not, awareness of self-affirmation effects did not attenuate them. These results suggest that people benefit more from self-affirming when freely chosen, instead of externally imposed. One

possible explanation, provided by the authors is, that when people are asked to do something that is good for them, this could result in a more defensive reaction, because the message indirectly says that something is wrong. Since half of the participants in this study were Psychology students, chances are that they were aware of the effects of the self-affirmation manipulation. This might explain why the self-affirmation intervention was less successful than expected.

Research on the effects of self-enhancement could move forward in several directions. One future direction that arises from the limitation mentioned above would be to continue to explore whether the effect of self-enhancement on escalation of commitment can be attenuated through an affirmation process, using the approach suggested by Silverman et al. (2013). A future study could decide to give participants the free choice of self-affirming or not before imposing a threatening task.

In terms of the relationship between self-enhancement and escalation of commitment, another future direction lies within other self-enhancing biases. As mentioned earlier, research has suggested that self-enhancement is related to a class of decision-making biases that result from the general goal of bolstering one's personal sense of self (Van Vugt & Ronay, 2013). Until now, the effects of self-enhancement on these decision-making biases have barely been explored. This study provides some support for this claim, but the effect of self-enhancement on other self-enhancing decision-making biases should also be considered (e.g., confirmation bias, hindsight bias). As Van Vugt and Ronay (2013) pointed out, this could lead to a better understanding of an underlying mechanism that may underpin biased decision-making and leadership selection in organizations.

Finally, another critical direction for future research involves a further investigation of the mediating role of testosterone on sex differences in self-enhancement. While there is a

considerable amount of evidence reporting sex differences in self-enhancement, to my knowledge there has been no direct evidence for a biological antecedent of sex differences in self-enhancement. This study is a first step in that direction. The next step for future research would be to assess whether the same effect holds for circulating testosterone.

Although future research is necessary to further explore whether self-affirmation can attenuate the effect of self-enhancement on escalation of commitment, this study also makes several important contributions to the existing literature. First, the aim of this study was to better understand in what ways self-enhancement can be harmful. Research has shown that self-enhancement tendencies are found in all organization levels, and often lead to faulty decision-making. This study supports these findings and adds to the literature that people who exhibit greater self-enhancement are more likely to escalate commitment. This result helps explain how the escalation of commitment bias emerges, and why some people are more likely than others to show this bias. Moreover, this result provides organizations insight in how self-enhancement can affect their organizational practices, and gives them the change to anticipate future problems caused by self-enhancement. Second, this study extends the self-enhancement literature by examining the biological antecedents of sex differences in self-enhancement, and provides evidence suggesting that men exhibit greater self-enhancement than women because of higher levels of prenatal testosterone exposure.

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Appendix A

A single regression analysis was used to assess the ability of the overconfidence measure (GKQ) and the over-claiming measure (OCFS-25), to predict levels of escalation of commitment. In this model, both overconfidence, $B = .21$, $t(103) = 2.19$, $p = .03$, $\eta^2 = .05$, and over-claiming, $B = .24$, $t(103) = 2.46$, $p = .02$, $\eta^2 = .06$, were significant in predicting escalation of commitment.

Moderation by Self-Affirmation

A multiple regression analysis was used to test the proposed moderation model that self-affirmation would attenuate the relationship between overconfidence and escalation of commitment. The results revealed a significant main effect of overconfidence on escalation of commitment, $B = .22$, $t(103) = 2.25$, $p = .03$. The main effect of affirmation, $B = -.09$, $t(103) = -0.91$, $p = .37$, nor the interaction between affirmation and overconfidence were significant, $B = -.03$, $t(102) = -0.27$, $p = .79$.

A second multiple regression analysis was used to test the proposed moderation model that self-affirmation would attenuate the relationship between over-claiming and escalation of commitment. The results revealed a significant main effect of over-claiming on escalation of commitment, $B = .25$, $t(103) = 2.55$, $p = .01$. The main effect of affirmation, $B = -.10$, $t(103) = -1.01$, $p = .32$, nor the interaction between affirmation and over-claiming were significant, $B = -.08$, $t(102) = -0.80$, $p = .43$.

Sex, Overconfidence, Over-claiming and Digit Ratio

A one-way between subjects ANOVA was performed to investigate sex differences in (a) overconfidence, (b) over-claiming, and (c) digit ratio. The analyses revealed a statistically significant difference between males ($M = 0.34$, $SD = 0.94$) and females ($M = -0.15$, $SD = 0.99$)

on overconfidence, $F(1,103) = 5.72, p = .02, \eta^2 = .05$. There was no significant differences between males ($M = 0.52, SD = 0.28$) and females ($M = 0.59, SD = 0.23$) on over-claiming, $F(1,103) = 2.06, p = .15, \eta^2 = .02$.

Furthermore, the difference between males ($M = 0.95, SD = 0.03$) and females ($M = 0.96, SD = 0.03$) on digit ratio was significant, $F(1,103) = 9.41, p < .01, \eta^2 = .08$.

Mediation by Digit Ratio

Next, the hypothesis was tested that digit ratio would mediate the effect of sex on overconfidence. Following Hayes (2009), a bootstrapping procedure with 10,000 resamples was used, entering sex as the independent variable, mean-centered digit ratio as the mediating variable, and overconfidence as the dependent variable. As can be seen in Figure 2, the analysis revealed a non-significant mediation effect of digit ratio on the relationship between sex and overconfidence (indirect effect = .0400, $SE = .0390$; the 95% bias-corrected confidence interval included zero: -.0118, .1467).

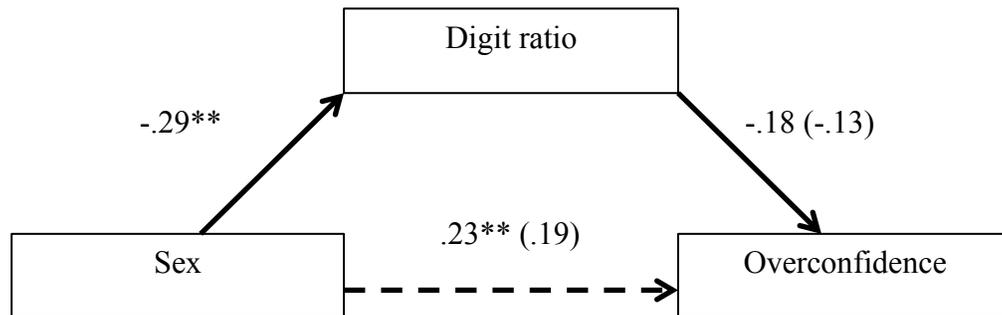


Figure 2. Mediation of the effect of sex on overconfidence via digit ratio. The numbers along the paths are standardized regression coefficients; the numbers in parentheses are simultaneous regression coefficients. * $p < .05$, ** $p < .01$, *** $p < .001$.

A second analyse was used to test the mediating effect of sex on over-claiming (see Figure 3). Based on the bootstrapping procedure, the results indicated that digit ratio significantly mediated the relationship between sex and over-claiming¹ (indirect effect = .0148, $SE = .0102$; the 95% bias-correct confidence interval did not include zero: .0011, .0419).

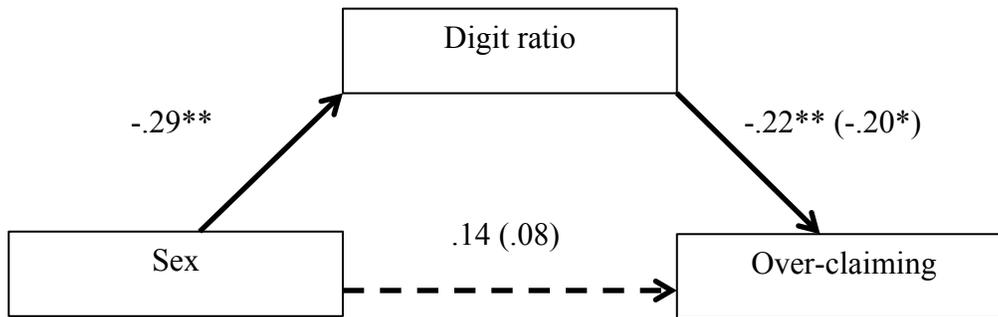


Figure 3. Mediation of the effect of sex on over-claiming via digit ratio. The numbers along the paths are standardized regression coefficients; the numbers in parentheses are simultaneous regression coefficients. * $p = .05$, ** $p = < .05$, *** $p < .001$.

¹The regression analyses revealed a non-significant direct effect of sex on over-claiming. Rucker, Preacher, Tormala, and Petty (2011), however, illustrated that significant indirect effects can appear when total or direct effects are not statistically significant, and suggest that in the absence of a significant total effect it is appropriate to proceed with testing indirect effects.

Appendix B

Introduction to the Experiment and Questionnaires

During this experiment you are going to fill in some questionnaires, including some general demographic questions, general knowledge questions, and some questions related to decision-making. Afterwards, we will make a scan of your hand. Please turn off your mobile telephone during the experiment, as this may distract you. Also, consumption of food or drinks (except water from a bottle) is not allowed. At the end of the experiment you will receive an individual code, which you will need to tell the research administrator in order to receive your money. Before we start with the experiment we would like you to fill in some personal questions. Your personal data will remain confidential and anonymous at all times. Good luck with the experiment!

General Knowledge Questionnaire (GKQ)

Below you will be presented with 25 general knowledge questions.

1. Please choose only one of three given answers. Only one of them is correct.
2. When you have made your choice and have chosen your answer, we would like to know how sure/confident you are that your answer is correct.

Since there are three alternative answers and only one of them is correct you have a 33% chance of giving a correct answer. Therefore 33% means that you are guessing and do not know the correct answer, and 100% corresponds to absolute certainty. You can use any number between 33% and 100% to indicate your confidence that your answer is correct. Please answer all questions. Even if you have to guess everything, you could answer 33% correct by chance. We are interested in your first answer.

1.	Which of the following is known for being an instant camera?		
	Canon camera	Polaroid camera	Minolta camera
	How confident are you that your answer is correct? %		

2.	Where do flounders mostly live?		
	in coral reef	dug on the ground	in the reed
	How confident are you that your answer is correct? %		

3.	What do roll mops consist of?		
	herring filet	pork	salmon filet
	How confident are you that your answer is correct? %		

4.	Which country does the Nobel Prize winner in Literature Gabriel García Márquez come from?		
	Colombia	Spain	Venezuela
	How confident are you that your answer is correct? %		

5.	Which style movement does Anacreontics belong to?		
	Rococo	Romanticism	Realism
	How confident are you that your answer is correct? %		

6.	What is meant by horripilation?		
	itch	goose bumps	muscle pain
	How confident are you that your answer is correct? %		

7.	How many letters does the Russian alphabet consist of?		
	40	33	26
	How confident are you that your answer is correct? %		

8.	"Tosca" is an opera from?		
	G. Puccini	G. Verdi	A. Vivaldi
	How confident are you that your answer is correct? %		

9.	What is the name of the Greek Goddess of wisdom?		
	Pallas Athena	Nike	Penelope
	How confident are you that your answer is correct? %		

10.	What is the most abundant metal on the Earth?		
	iron	aluminum	copper
	How confident are you that your answer is correct? %		

11.	What is the word for a person who lacks knowledge?		
	Ignatius	ignorant	ideologue
	How confident are you that your answer is correct? %		

12.	Who flew for the first time with an airship around the Eiffel Tower?		
	Santos-Dumont	Count Zeppelin	Saint-Exupéry
	How confident are you that your answer is correct? %		

13.	What is the snow shelter of Eskimos called?		
	wigwam	igloo	tipi
	How confident are you that your answer is correct? %		

14.	Someone with brontophobia is scared of ...?		
	lightning	needles	vomiting
	How confident are you that your answer is correct? %		

15.	Which animal digs with its teeth?		
	maned wolf	mole	bilby
	How confident are you that your answer is correct? %		

16.	How many days does a hen need to incubate an egg?		
	21 days	28 days	14 days
	How confident are you that your answer is correct? %		

17.	What is ascorbic acid?		
	apple vinegar	vitamin C	vitamin B
	How confident are you that your answer is correct? %		

18.	What is the middle color of the rainbow?		
	blue	yellow	green
	How confident are you that your answer is correct? %		

19.	How is the whitish coating that you sometimes see on chocolate called?		
	bloom	glycerol	mold
	How confident are you that your answer is correct? %		

20.	Which language does the concept "Fata Morgana" come from?		
	Italian	Arabic	Swahili
	How confident are you that your answer is correct? %		

21.	What is inflamed when one has gingivitis?		
	toe tissue	eye tissue	gum tissue
	How confident are you that your answer is correct? %		

22.	How does one call the vocal organ of birds?		
	bellows	syrinx	sonorant
	How confident are you that your answer is correct? %		

23.	Which of the following is a hot chili sauce?		
	Tabasco	Curacao	Macao
	How confident are you that your answer is correct? %		

24.	What is the fasting month in Islam called?		
	sharia	ramadan	imam
	How confident are you that your answer is correct? %		

25.	Which enterprise does Bill Gates belong to?		
	Intel	Microsoft	Dell Computers
	How confident are you that your answer is correct? %		

Over-Claiming Short Format (OCSF-25)

Next, we will present you with a list of items. We would like you to indicate how familiar you are with each item from a scale of 0 to 6 (0 = never heard of it, 6 = very familiar).

We are interested in your first answer.

_____ Houdini	_____ Lewis Carroll	_____ double entendre
_____ Charlotte Bronte	_____ free will	_____ consumer apparatus
_____ meta-toxins	_____ Dale Carnegie	_____ blank verse
_____ myth	_____ Murphy's Last Ride	_____ shunt-word
_____ Antigone	_____ sentence stigma	_____ art deco
_____ chlorarine	_____ Bay of Pigs	_____ Artemis
_____ alliteration	_____ hyperbole	_____ a capella
_____ Gail Brennan	_____ The Aeneid	_____ euphamism
_____ Queen Shattuck		

Ranking Values

This part of the questionnaire involves ranking values and characteristics. Below is a list of characteristics and values, some of which may be important to you, some of which may be unimportant. Please rank these values and qualities in order of their importance to you, from 1 to 11 (1 = most important item, 11 = least important item) and remember your first ranked value.

Use each number only once.

_____ Artistic skills/aesthetic appreciation	_____ Athletics
_____ Sense of humor	_____ Music ability/appreciation
_____ Relations with friends/family	_____ Physical attractiveness
_____ Spontaneity/living life in the moment	_____ Creativity

_____ Social skills

_____ Business/managerial skills

_____ Romantic values

Self-Affirmation Manipulation

After ranking 11 values and characteristic, we would like you to remember 3 personal experiences in which your first ranked value was important to you and made you feel good about yourself. When you have done this, pick one of these experiences and write a short story describing the event and your feelings at the time. You will have 5 minutes to write the short story in the space below. After 5 minutes you will be automatically send to the next question.

No-Affirmation Manipulation

This part of the questionnaire involves writing a short story. We would like you to remember your last trip to the supermarket. When you have done this, you will have to write a short story describing the event and your feelings at the time. You will have 5 minutes to write the short story in the space below. After 5 minutes you will be automatically send to the next question.

Escalation of Commitment

You are now going to play a decision-making game. Please try to keep in mind that you want to end up with gaining as much money as possible. At the end of this experiment the participant who ends up with the most money will receive some sweets.

Please read the following questions carefully, and indicate which options you would choose. You are playing a decision-making game where you have the opportunity to increase your money. You start off with 1000 euro's. This is your own money. In order to increase your money we give you the opportunity to invest in a start-up company named 'company X' during a

good state of economy. Your initial investment has to be 1000 euro. There is a 50% chance that you will end up with a 1700 euro, and a 50% chance that you will end up with 900 euro.

There are 2 possible scenarios during this decision-making game when investing in company X:

1. Invest 1000 euro
2. Don't invest and keep the 1000 euro

Question 1: Please give a probability rating indicating your willingness to continue to invest in company X during this decision-making game, with 0% (absolutely no) to 100% (absolutely yes): _____ %

Please explain in the space given below why you have chosen this option:

Ok, let's say you have made the investment.

This is great! However, you discovered that the competition in the segment in which company X is active is fiercer than expected. This is a major setback for you and you lost 100 euro. Now, there is a 30% chance that you will end up with 1800 euro, and a 70% chance that you will end up with 700 euro. This will have serious implications for your 1000-euro investment during this decision-making game. Again, you are faced with 2 possible scenarios:

1. Invest
2. Don't invest and keep the 900 euro

Question 2: Please give a probability rating indicating your willingness to continue to invest in company X during this decision-making game, with 0% (absolutely no) to 100% (absolutely yes): _____ %

Please explain in the space given below why you have chosen this option:

Again, let's say you have made the investment. This time the decision-making game becomes even harder: unfortunately the economy has fallen into a recession because of a global crisis. This has serious implications for your 1000-euro investment in company X, because you lost another 100 euro above the previous 100 euro you already lost. In order to gain as much money and win the decision-making game, you have to carefully consider what to do with your money. There is a 20% chance that you will end up with a 1900 euro, and an 80% chance that you will end up with 600 euro. Again, you are faced with 2 different scenarios:

1. Invest
2. Don't invest and keep the 800 euro

Question 3: Please give a probability rating indicating your willingness to continue to invest in company X during this decision-making game, with 0% (absolutely no) to 100% (absolutely yes): _____ %