

An Investigation of Narcissism and Self-Regulation as Predictors of
Aggression

By

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ABSTRACT

AN INVESTIGATION OF NARCISSISM AND SELF-REGULATION AS PREDICTORS OF AGGRESSION

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The current study evaluated individual differences in factors that both facilitate (narcissism) and inhibit (self-regulation) the expression of aggression upon provocation. The overarching goal of the study was to examine the integration of two models of aggression: the threatened egotism model and the self-regulation model. An undergraduate sample of participants ($N=323$) were assigned to receive either positive or negative (provocative) feedback from a fictitious opponent. After receipt of the feedback a competitive reaction time task, in which the participant was allowed to subject the ostensible opponent to sound blasts of white noise, was employed as a behavioural measure of aggression. Consistent with previous research, negative feedback elicited aggression compared to positive feedback, especially among narcissistic males compared to females. Self-regulation was assessed using a battery of executive functioning measures. Results indicated that males with higher perseverance were more aggressive in the negative feedback condition. When the influence of narcissism and self-regulation were assessed simultaneously, a moderating model (i.e., narcissism X self-regulation) was not supported but there was evidence in support of an additive model for males only. Self-regulation predicted a unique portion of variance in aggression (7%) over and above the variance accounted for by narcissism (16%) for males who received negative feedback. These results are discussed in terms of a risk factor model for aggression.

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CHAPTER 1: Review of Aggression, Narcissism, and Executive Functioning

Across Canada in 2009, 19% of all criminal code offences, including traffic violations, were violent offences (Statistics Canada, 2009). Given that there are numerous incidents that do not result in criminal charges (e.g., domestic violence, incidents of school bullying, general aggression between children, etc.), this number certainly underestimates the prevalence of aggressive behaviour. Aggressive behaviour has numerous negative consequences for individuals (e.g., physical, psychological, etc.), as well as for society at large (e.g., financial, political, etc.). In an effort to reduce these deleterious effects, researchers have sought to develop a better understanding of factors that contribute to aggressive behaviour in the hopes that identifying such factors will inform the development and implementation of prevention and intervention strategies.

Aggressive behaviour is the result of a complex combination of interpersonal, contextual, and intrapersonal factors. The broad purpose of the current research was to examine narcissism and executive functioning as intrapersonal predictors using a laboratory aggression measure. Although there are rapidly growing bodies of literature examining both narcissism (Bushman & Baumeister, 1998; Bushman, Baumeister, Thomaes, Ryu, Begeer, & West, 2009.) and executive functioning (Seguin, Boulerice, Harden, Tremblay, & Pihl, 1999; Sprague, Verona, Kalkhoff, & Kilmer, 2011), none have examined the two predictors simultaneously. The goal of the present study is to bridge this gap. In this chapter of the paper, an overview of the conceptualizations, models, and measurement of aggression, narcissism, and executive functioning will be provided. The following chapter focuses on the study conducted for this dissertation and is written as a manuscript to be submitted for publication.

Conceptualizing Aggression

The definition of aggressive behaviour in the literature and in everyday use is quite variable. There is a lack of consistency in the definition and measurement of aggression. A consistent characteristic of behaviour deemed aggressive is that it causes harm. Beyond this, definitions vary according to the salience given to intent, the role of affect, the victim's perspective, and the form of the behaviour. A brief discussion of each of these criteria will follow.

In discussing the aggression-frustration hypothesis, Dollard, Miller, Doob, Mowrer, and Sears (1939) suggested that there must be intent behind a behaviour that causes harm for it to be considered aggressive. In contrast, Buss (1961) argued that intent should not be included as a criterion for aggression, retaining the centrality of the (harmful) consequences of the behaviour. Ignoring intent seems unreasonable because it would mean that accidents resulting in harm, such as bumping into someone in a busy hallway and car accidents would be considered aggressive (Anderson & Bushman, 2002; Berkowitz, 1974, 1981; Feshbach, 1970). Although Buss seemed to put forth a seemingly simplistic definition of aggression, he identified three dichotomies, which have informed the investigation of aggression over the years: physical-verbal, active-passive, and direct-indirect. Various permutations of these three dichotomies characterize different types of aggressive behaviour, such as physical-active-direct (e.g., punching someone), or verbal-passive-indirect (e.g., inviting all but one classmate to a party).

A second characteristic of aggression that is frequently discussed is the role of affect. One widely researched dichotomy of aggression is the reactive (or hostile) and proactive (or instrumental) subtypes (cf. Kempes, Matthys, de Vries, & van Engeland,

2005). Hostile or reactive aggression is typically defined as an impulsive reaction to a perceived threat or provocation that is motivated by anger or frustration. Instrumental or proactive aggression is defined as an intentional, cool-headed act motivated by the expectation of positive outcomes (e.g., obtaining an object or attaining a goal). While not all investigators are in support of the distinction (Bushman & Anderson, 2001) and the two forms of aggression are highly correlated (Dodge & Coie, 1987; Poulin, Cillessen, Hubbard, Coie, & Dodge, 1997; Raine, Dodge, Loeber, Gatzke-Kopp, Lynam, Reynolds, Stouthamer-Loeber, & Liu, 2006), these subtypes of aggression have been found to be differentially associated with two forms of social information processing biases (Crick & Dodge, 1994). Reactive aggression is associated with a hostile attribution bias, which reflects a tendency for an individual to attribute hostile intent to others' actions in ambiguous situations (e.g., someone steps on your toe in a crowded hallway and then you assume this was done on purpose). Proactive aggression is associated with tendencies to overestimate expectancies for positive outcomes resulting from aggressive behaviour (i.e., aggression pays off). Another difference between these subtypes of aggression highlighted by Bushman and Anderson (2001) is the proximal versus ultimate goals of the behaviour, which has implications for the consideration of intent as a criterion for aggression. They argue that hostile or reactive aggression is driven by proximal goals (e.g., revenge, causing harm), whereas instrumental or proactive aggression is driven by ultimate goals (e.g., money, objects, etc.). Thus, both subtypes of aggression require a definition that includes intent to cause harm as a criterion. The authors also note that it is important to the definition to capture incidents of aggression that reflect a blend of the

two subtypes, such as incidents of delayed and planned revenge (e.g., a victim of bullying who plans and follows through on an attack on the bully).

Third, from the perspective of the victim an important criterion for aggressive behaviour is the recipient's motivation to avoid the behaviour. A dentist extracting a patient's tooth causes a certain degree of harm, however patients subject themselves to such "harm-doing" for their long-term benefit. It seems unreasonable to characterize the dentist's behaviour as aggressive. The same argument would apply in cases of masochism (i.e., individuals seeking physical harm).

Finally, aggression can also be manifested in at least three broad forms of behaviour. Physical aggression (e.g., kicking, hitting, punching), which is typically referred to as violence when resulting in extreme injury or harm (Shaver & Mikulincer, 2011). Verbal aggression involves using language to inflict harm on another person (e.g., insulting someone, name calling). Relational aggression refers to behaviours aimed at damaging someone's social relationships or status (e.g., spreading rumours, public humiliation). Historically, most research on aggression has focused on physical aggression, although over the last decade considerable attention has also been paid to relational aggression (e.g., Crick, Osgtrov, & Werner, 2006).

Given the potential for these differing conceptualizations of aggressive behaviour, it is important to specify the definition of aggression that is being used in research studies. The definition of aggression should characterise the behaviour, in general, regardless of the form in which it takes (i.e., physical, verbal, relational). The editors of a recent book, which provides a comprehensive review of the literature on aggression and violence in humans, state that "in social psychology, *aggression* is defined as behaviour

performed by one person (i.e., an aggressor) with the intent of physically or psychologically harming another person who wants to avoid the harm (i.e., a victim)...” (Shaver & Mikulincer, 2011, p.3). This definition seems to capture the important characteristics described above and will therefore be used in the present study.

Measurement of Aggression

Because aggression has been defined in various ways over the years, this has also resulted in various methods of measuring aggression. These methods fall into two broad categories - reports of aggression, and observations of aggression.

Reports of Aggression. Reports of aggressive behaviour can be obtained by examining archival data, such as criminal records, police reports, criminal statistics, etc. This information can be useful at an individual level (i.e., gathering historical reports of aggressive behaviour) as well as at a group or epidemiological level. Information about aggression can also be obtained by directly asking individuals about their own or other’s aggressive behaviour (i.e., self/other reports). Questionnaires have been designed to assess many different aspects of aggression, including severity, frequency, subtype (proactive/reactive), form (verbal, physical, relational), and hostility. Some self-report measures include the Cook-Medley Hostility Scale (Cook & Medley, 1954), the Buss-Durkee Hostility Inventory (BDHI; Buss & Durkee, 1957), the Buss-Perry Aggression Questionnaire (Buss & Perry, 1992), and the State-Trait Anger Scale (Spielberger, Jacobs, Russell & Crane, 1983). Research on aggression in children and adolescents often utilizes the questionnaire-based reports of others such as parents and teachers (e.g., Raine, Dodge, Loeber, Gatzke-Kopp, Lynam, Reynolds, Stouthammer-Loeber, & Liu, 2006).

The advantages of gathering data from archival sources is that it provides confirmed evidence of historical aggression and perhaps even sufficient details about the incidents to examine some of the specific aspects of aggression mentioned above. The disadvantage is that the records may provide only a snapshot of one's aggressive behaviour and may not reflect a person's or group's general aggressive tendencies. Using questionnaire measures of aggression addresses this issue by tapping broader evaluations of aggressiveness. The disadvantage with any questionnaire measure is that the results may be subject to responder biases. To address this issue one must turn to observational measurement methods.

Observing Aggression. Measuring aggression by observing it can occur in the natural environment or in the laboratory environment. Naturalistic methods involve observing behaviour as it occurs in the environment. Some research relies on methods in which the researcher is simply a passive observer, for example, an investigation of childhood deviance (Patterson, 1977), or associations between alcohol consumption and aggression (Murdoch, Pihl, & Ross, 1988). Other research involves methods in which the researcher takes a more active role (e.g., a confederate may contrive some form of provocation to elicit a response from a person). An example of this would be the horn-honking scenario, in which a confederate refrains from proceeding through an intersection (driving) after the light turns green for a set amount of time (Baron, 1976). The amount of frequency, duration, and latency of horn-honking by individuals behind the confederate is recorded. The advantage of naturalistic measures is the measurement of observable behaviour in real life situations, which increases the ecological validity of the results. The problems with these methods include difficulties operationalizing

observations, limited inter-rater reliability, the inability to obtain informed consent, and the risk of harm to participants and/or confederates.

Observations of aggression in the laboratory setting address some of the issues raised above with naturalistic observations. Buss (1961) developed the first technique for directly investigating physical aggression. In the Buss Teacher-Learner paradigm the participant thinks they are randomly assigned to the role of the “teacher” and that another person (actually a confederate) is assigned the role of the “student”. The teacher is asked to present some material to the student, who has to try to demonstrate mastery of it. If the student makes a correct response, the teacher provides a reward. If the student makes an error, the teacher issues a punishment in the form of electric shocks. The intensity and duration of the shocks, which provided a measure of aggression, are left for the teacher to decide. The artificiality and demand characteristics of this paradigm, and confounds with helping behaviour have been identified as criticisms of this method (Tedeschi & Quigley, 1996, 2000). As a result, this approach is now rarely used. Currently, the two most commonly used laboratory paradigms are the Point Subtraction Aggression Paradigm (PSAP: Cherek, 1981) and the Competitive Reaction Time Task (Taylor, 1967).

In the PSAP, participants try to earn as many points as possible by pressing a button. The points are converted into monetary reward at the end of the study to foster motivation. The participant can earn a point by pressing one button approximately one hundred times. Pressing another button will deduct ten points from an ostensible opponent. In order to create a provocation, the “opponent” (actually a confederate) deducts points from the participant at a predetermined time. Thus, the number of times the participant deducts points from the “opponent” provides a measure of aggressive

behaviour. An advantage of this method is the availability of a non-aggressive response, as well as the fact that it can be used in repeated measures designs. Validity of this measure has been demonstrated with violent vs. non-violent parolees (Cherek, Moeller, Schnapp & Dougherty, 1997; Cherek, Schnapp, Moeller, & Dougherty, 1996). Several criticisms of this measure have also been identified. Because it involves a non-physical form of aggression, this may limit the generalizability of the results to real life situations involving physical aggression. Testing sessions are long, therefore variables such as fatigue, concentration, and boredom may have confounding effects. A major criticism is that there is a reward for aggressive behaviour which may increase the likelihood of the behaviour in this particular context, but may not reflect an individual's actual level of aggressive behaviour outside of the experimental situation. Because of these drawbacks with the PSAP, many researchers prefer to employ the Taylor aggression paradigm (Taylor 1967).

In the Taylor paradigm (1967), participants are told they are competing with another person on a reaction time task, although in reality there is a fictitious opponent. At the start of each trial the participant selects a level of shock to be delivered to the opponent if he wins that trial. A signal of some sort (auditory or visual) appears to warn the participant to prepare for the task, then a light appears for a moment indicating that the participant should press a button when it turns off. The participant is instructed to do so as quickly as possible, with the goal of having a quicker reaction time than the opponent. Next, the participant is informed of the shock level selected by the "opponent". Finally, if the participant lost the trial, he receives the shock. Wins and losses of each trial are predetermined, as are the shock levels selected by the ostensible opponent. The

intensity of shock levels selected by the participant is typically reported as a measure of aggression. The shock level selected on the first trial is considered a measure of unprovoked aggression, whereas later trials reflect retaliatory aggression (Hammock & Richardson, 1992). The Taylor paradigm allows for the systematic investigation of changes in provocation levels (e.g., Hoaken, Shaughnessy, & Pihl, 2003). This method also allows for the manipulation of other factors such as the physical environment, presence of an audience (Richardson, Bernstein, & Taylor, 1979), drugs (Taylor & Chermack, 1993), and alcohol (Giancola, 2004). Variations of the Taylor paradigm have been used in which electric shocks have been replaced with hearing blasts of white noise (Bushman and Baumeister, 1998).

There is an ongoing debate about the validity of laboratory measures of aggression. Tedeschi & Quigley (1996) argue that these measures do not provide realistic and generalizable results. Although, Giancola and Chermack (1998) noted that these criticisms apply to many laboratory measures of aggression, they argued that there is considerable support for the construct validity, convergent validity, and discriminant validity of the Taylor paradigm (Bernstein, Richardson, & Hammock, 1987; Gaebelein & Taylor, 1971; Giancola & Zeichner, 1995).

There are obvious ethical considerations to using the Taylor paradigm. First, the use of deception is required, which may pose an ethical issue. Second, the participant may experience emotional discomfort as a result of supposed delivery of shocks to another person. Third, the receipt of shocks to the participant is a potential concern. These are important issues that could potentially outweigh the benefits of using this method. However, one study in which participants were interviewed about the paradigm

suggested that the paradigm does not seem to result in much emotional discomfort related to the concerns above (Pihl, Zacchia, & Zeichner, 1981). Only 14 of 78 participants interviewed reported that something about the study bothered them. Seven of the participants were bothered by boredom or parts of the study unrelated to the aggression paradigm (e.g., beverages consumed). Only four participants were bothered by the electric shocks, and three by the use of deception. These results suggest that the negative consequences experienced by the participant in using this paradigm are minimal.

In addition to having clarity around definitions and measures of aggression, it is important to have a theoretical model to guide our understanding of how a multiplicity of factors lead to the development of aggressive behaviour. One such model will now be discussed.

Model of Aggression

Many theories and models of aggression have been developed over the years. Recently Anderson and Bushman (2002) proposed a comprehensive model that integrates less broadly focused theories, which is aptly referred to as the General Aggression Model. In developing the General Aggression Model, the authors drew on five theories that have historically guided research on aggression: frustration-aggression theory (Dollard, Doob, Miller, Mowrer, & Sears, 1939), cognitive neoassociation theory (Berkowitz, 1989), script theory (Huesmann, 1986), excitation transfer theory (Zillmann, 1983), and social interaction theory (Tedeschi & Felson, 1994). A brief description of the General Aggression Model is provided below.

Acknowledging the roles that distal factors (i.e., biological, environmental, and personality) play in aggressive behaviour, the General Aggression Model focuses more

on proximal factors of the person and the situation that affect the likelihood of aggression. The model emphasizes the influence of *knowledge structures* on aggressive behaviour. Knowledge structures include perceptual schemata (i.e., identification of objects, events), person schemata (i.e., perceptions or beliefs about a person or group of people), and behavioural scripts. Knowledge structures develop over time, are influenced by experiences, can become automatized with increased activation, and may be associated with affective states. In the model, person factors and situation factors are referred to as inputs. Person factors include sex, beliefs, attitudes, values and traits (e.g., narcissism and executive functioning), and so forth. Situation factors include provocation, aggressive cues, frustration, drugs/alcohol, and incentives. The inputs are believed to influence situational outcomes via the present internal state, which include cognition (e.g., attributions, scripts), affect (e.g., mood and emotion, expressive motor responses), and arousal (i.e., physiological arousal). These three internal states have reciprocal relationships, which yield information that is processed in the portion of the model called outputs. The authors identify automatic processing (i.e., immediate appraisals) and controlled processing (i.e., reappraisals) as precipitating impulsive or thoughtful actions, respectively. Finally, the model includes a feedback loop from the social encounter (e.g., aggressive incident) to the distal factors. Overall, the General Aggression Model provides a parsimonious model for understanding the development and use of aggressive behaviour by integrating previously validated domain specific theories.

In summary, there are many theories used to understand and investigate factors related to aggression. The reality is that aggressive behaviour is result of a complex

interplay of variables that is difficult to understand. Systematic theory driven research is necessary to improve our understanding of this interplay of factors which should lead to the development of more effective prevention and intervention techniques that target the most appropriate factors. To this end, the present study examines two factors that have been demonstrated to predict aggression in the past: narcissism and executive function. From the perspective of the General Aggression Model, these factors would be considered personal traits within the input portion of the model. The following sections discuss what narcissism and executive functioning are and how they are measured.

Conceptualizing Narcissism

There exists some ongoing debate about how to conceptualize and operationalize narcissism and the potential differences between adaptive and pathological narcissism. In their review of conceptualizations of narcissism, Cain, Pincus, & Ansell (2008), highlight the distinctions between clinical theories, criteria used to determine the presence of pathological narcissism (i.e., narcissistic personality disorder or NPD), and social/personality psychology.

In regards to clinical theories, Miller and Campbell (2008) attribute some of this confusion to narcissism's deep roots in psychodynamic theory (Freud, 1931), which lacked an emphasis on operational definitions. More recent clinical theories, which followed in the psychodynamic tradition have been put forth by Kernberg (1975), Kohut (1977), and Millon (1981). The literature on narcissism has highlighted two broad aspects of narcissism, grandiosity and vulnerability, which have at least implicitly been included in various conceptualizations over the years (Miller & Cain, Pincus, & Ansell, 2008; Campbell, 2008; Rosenthal & Hooley, 2010). Freud (1931) described a relatively well-

adjusted individual presenting with a dominant interpersonal style. Kernberg (1975) suggested that narcissists have a defensive organization, tend to rely on defence mechanisms, such as “splitting, denial, projective identification, omnipotence, and primitive idealization” (pp. 229-230), and are prone to respond with verbal aggression. Fundamentally, Freud’s description reflects primarily the grandiose aspects of narcissism, while Kernberg’s description reflects primarily the vulnerable aspects. These characteristics of narcissism have driven the development of diagnostic criteria in the DSM. Miller and Campbell note that although the DSM-IV acknowledges the vulnerability and fragility of narcissists in the diagnostic and associated features, these features are not emphasized in the actual diagnostic criteria, which focus on grandiose aspects of narcissism. Among other suggestions, some have recommended that the emphasis on vulnerability be increased in the development of diagnostic criteria for NPD in the next edition of the DSM.

The social/personality literature on narcissism stems from the previously mentioned theories and diagnostic criteria. Narcissism is considered a dimensional personality trait, potentially ranging from adaptive narcissism to pathological narcissism. Most of the research on narcissism from a social-personality perspective has relied on the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979, 1981). In fact, it has been reported that approximately three quarters of all social-personality research on narcissism between 1985 and 2006 utilized the NPI (Cain et al., 2008; del Rosario & White, 2005). A brief description of this measure, its validity, and implications for the conceptualization of narcissism are discussed.

Measurement of Narcissism

The NPI is a 40 item self-report questionnaire, developed by taking into consideration the diagnostic criteria in the DSM-III. The range of the narcissism dimension being assessed by the NPI (i.e., adaptive, subclinical, and/or clinical narcissism) is debated. Some argue that the NPI assesses only adaptive narcissism (i.e., qualities that assist people in maintaining their realistic self-perceptions (Pincus & Lukowitsky, 2010), while others have demonstrated the construct and criterion validity of the NPI in non clinical and clinical samples (Miller, Gaughan, Pryor, Kamen & Campbell, 2009), suggesting it provides an adequate assessment of narcissism at both ends of the spectrum. Miller et al. demonstrated that the NPI seems to include an assessment of interpersonal dominance (agency), which was not captured by clinical assessments of narcissism. Furthermore, they found that clinical experts considered interpersonal dominance to be an important aspect of pathological narcissism even though it is not currently a formal criterion. This debate will continue to inform the development of criteria for NPD in the DSM-V.

The factor structure of the NPI has been demonstrated to be unstable, ranging from one to seven factors. Raskin and Terry (1988) identified seven components of narcissism assessed by the NPI: self-sufficiency, exhibitionism, authority, superiority, vanity, exploitativeness, and entitlement. It is noteworthy that these characteristics seem to align more closely with the grandiose aspects of narcissism than the vulnerable aspects. As a result of the unstable factor structure, most researchers tend to use the overall score in their analyses. It has been suggested that the widespread use of the NPI is problematic in that narcissism has become conceptualized as whatever it is that the NPI

measures (Ackerman, Witt, Donnellan, Trzesniewski, Robins, & Kashy, 2011). Thus, it is important to consider what the NPI is actually measuring.

Narcissism assessed by the NPI has been positively correlated with Machiavellianism and psychopathy (Palhaus & Williams, 2002), hostility and interpersonal rejection (Paulhaus, 1998), aggression (Bushman & Baumeister, 1998), limited romantic commitment (Campbell & Foster, 2002), pathological gambling (Lakey, Rose, Campbell, & Goodie, 2008), and high self-esteem (Campbell, Rudich, & Sedikides, 2002). The positive relation between NPI narcissism and self esteem deserves particular attention because high self esteem is typically associated with positive psychological well-being. Some have suggested that the NPI is related to the combination of high explicit self-esteem and low implicit self-esteem, reflecting fragile or vulnerable self conceptions (Campbell, Bosson, Goheen, Lakey, & Kernis, 2007; Zeigler-Hill, 2006), linking narcissistic grandiosity and vulnerability. Results of a recent study suggest that the NPI confounds the assessment of self-esteem with the assessment of narcissism (Rosenthal & Hooley, 2010). In particular, these authors found a subset of NPI items that seem to correlate strongly with measures of self-esteem. These findings indicate a need to partial out the effects of self-esteem when examining the relations of variables with narcissism as assessed by the NPI full scale score.

Models of Narcissism

Using the NPI full scale score and taking the perspective of an individual's self conceptions and interpersonal orientations, Rhodewalt and Morf (1995) developed a comprehensive profile of the NPI narcissist:

...one who reports highly positive self-evaluations of which he or she is very confident. At the same time, their self-conceptions are characterized by low self-complexity and little actual/ideal discrepancy. The NPI-defined narcissist makes self-attributions in such a way as to take greater credit for positive outcomes than do less narcissistic people. Yet, despite these confidently held positive self-views, such an individual is more cynically mistrustful of, and antagonistic toward others. Although narcissists do not perceive more or less available social support than others, they appear to benefit more from the belief that support is available during times of high demand. This last finding, perhaps suggests that narcissists are more reliant than others on external social feedback and support for psychological well-being (Rhodewalt & Morf, 1995, pp. 17-18).

This profile highlights the narcissist's paradoxical sense of grandiosity combined with their intense need for admiration and attention. They seem to over rely on external confirmation of their overly inflated sense of self. The authors suggest that the fact that the narcissists' self-perceptions are over inflated and not grounded in objective reality necessitates a need for frequent reinforcement from external sources. Morf & Rhodewalt (2001) have developed a model for understanding the behaviour of narcissists using this paradox. They suggest that the underlying motivation for narcissistic individuals is their maintenance or regulation of their self perceptions. To this end, they engage in interpersonal (e.g., manipulative and aggressive behaviours) and intrapersonal (e.g., biased interpretations, selective attention to information) strategies to maintain their grandiose self perceptions. These strategies have inadvertent negative impacts on their social relationships, which end up challenging their self perceptions further (e.g., social

rejection, negative feedback from others, etc.). As result, these individuals are caught in a vicious cycle of trying to elicit the external feedback that confirms their grandiosity using strategies that are ultimately likely to elicit negative feedback.

As previously mentioned, in addition to narcissism the present paper focuses on executive functioning as another personal characteristic that predicts aggressive behaviour. In the sections that follow, the conceptualizations and measurement of executive functioning will be discussed.

Conceptualizing Executive Functioning

Executive functioning broadly refers to higher-order cognitive processes that allow people to effectively engage in goal-directed and purposeful decision making behaviours and is involved in regulating one's thoughts, feelings, and actions. Executive functioning emerged from the neuropsychological literature. The most famous case of executive dysfunction is that of Phineus Gage (Harlow, 1993), a railway worker who sustained damage to his frontal lobes in an accident, which he survived. It was observed that after the accident, his ability to regulate his emotions, behaviour, and to plan and organize his behaviour (e.g., tasks) effectively was severely hindered, although his general knowledge was not affected by injury. This helped set the stage for the frontal lobe metaphor, which suggested that these types of deficits were attributed to damage of the frontal lobes. Eventually, these cognitive processes came to be referred to as executive functions, and from a neurological perspective the prefrontal cortex is strongly linked to executive functions, although there is now more of an understanding that the neuronal pathways throughout the brain play an important role in executive functions. It was also accepted that executive functioning abilities vary with development and

throughout the general population, even in the absence of brain injury (c.f. Anderson, 1998). Viewing executive functioning more as a trait has resulted in an explosion of psychological research investigation its potential relationships with other traits, such as intelligence (Davis, Pierson, & Finch, 2011) and personality (e.g., Williams, Suchy, & Kraybill, 2010), as well as a variety of behaviours (Hughes & Ensor, 2011; Hummer, Kronenberger, Dunn, Mosier, Kalnin, & Mathew, 2011).

Although, there is general agreement across researchers about the broad definition provided above, the construct of executive functioning is often referred to as elusive. Executive functioning is considered to be an umbrella term for various cognitive processes but there is currently no universally agreed upon definition (Suchy, 2009). Several different definitions and conceptualizations of executive functioning have been proposed, leading to the development of a variety of measures. Recent reviews provide details of various theories and measures of executive functioning (Chan, Shum, Touloupoulou, & Chen, 2008; Suchy, 2009). An overview of some conceptualizations of executive functioning will now be provided.

The primary need for a theory of executive functioning is to provide a definition that identifies underlying component processes that feed into the umbrella, which is executive functioning. The number, names, and nature of component processes proposed in different theories of executive functioning varies greatly. One of the earliest theories of executive functioning was developed by Luria (1966, 1973), who proposed a model whereby executive functions are responsible for programming, monitoring and regulating behaviour. The supervisory attentional system (SAS; Burgess, 2000; Burgess et al., 2000; Norman & Shallice, 1986) is an extension of Luria's theory, which emphasized a

distinction between routine behaviours/tasks and novel behaviours/tasks. Neuroimaging studies support the claim that the frontal lobes are activated during novel but not practiced tasks. For example, one study found that the frontal lobes were active during a novel task and became less active as the task was practiced (Raichle, Fiez, Videen, Macleod, Pardo, Fox, & Petersen, 1994). The results also indicated that when a somewhat different task (i.e., somewhat novel) was being attempted, the frontal lobes were partially activated.

On a conceptual level, Rabbit (2001) attempted to delineate executive functions from *non-executive functions*, identifying several important distinctions. The most critical distinctions appear to be: 1) executive functions operate at a conscious level (on-line processing) whereas non-executive functions operate at an unconscious level (off-line processing); 2) executive functions are necessary for novel tasks, which require on-line information processing, whereas non-executive functions are involved in habitual tasks, which are basically automatized responses to environmental stimuli. For example, when one is first learning to drive a car, one tends to consciously attend to and process an abundance of information from several different cues (e.g., position of the mirrors, his hands, and feet, recalling what gear the car is in; attending to other cars, pedestrians, the lines on the road, the passenger, the radio, etc.). It seems overwhelming at first, but eventually it becomes a fairly automatized behaviour. In fact, driving is sometimes done at such an unconscious level that while a person is driving, he may suddenly realize that he does not recall having been aware of driving the last few kilometres at all. From this perspective, executive functions appear to be particularly involved in conscious information-processing, which is required for completing novel tasks.

Another theory (Mesulam, 2002) suggests that the brain has a *default mode* of information processing, which involves direct and obligatory stimulus-response linkages (i.e., reflexive, automatic processing). He also argues that this mode is overridden by the executive functions, which reside in the frontal lobes; therefore, damage to the frontal lobes results in a return to the default mode. Furthermore, he identifies five core component processes of executive functioning that assist in overriding the default mode. These processes are: 1) disinhibition; 2) novelty seeking; 3) working memory; 4) linking emotional significance to action and experience; and 5) the encoding of context, perspective and mental relativism. Mesulam provides a review of several neuropsychological studies with monkeys and humans indicating that these five processes are impaired after frontal lobe lesions occur.

In a similar vein, Knight and Stuss (2002) review neuropsychological research investigating executive functioning deficits in frontal lobe patients and organize it into eight components. These are: 1) inhibitory control; 2) excitatory control (i.e., initiation of tasks); 3) novelty processing; 4) working memory and attention; 5) emotion regulation; 6) temporal processing; 7) memory (i.e., explicit memory, source memory and metamemory); and 8) behavioural monitoring. Although there appears to be some overlap with Mesulam's conceptualization there are also considerable differences. Most notably, Knight and Stuss include excitatory control, memory, and behavioural monitoring as component processes, whereas Mesulam does not.

Another important distinction that has been made in the executive functioning literature involves the role of affective processes. Traditionally, most of the attention in executive functioning research was devoted to "cool" executive functions (Zelazo &

Muller, 2002; Miller & Cohen, 2001), which are involved in tasks that do not evoke any, or very minimal, affective responses (e.g., sorting cards, planning a task, organizing information, completing mazes, etc.). More recently, there has been a shift in the conceptualization of executive functioning that takes into consideration the affective components of executive functioning (cf. Bechara, 2004). Hot executive functions do not necessarily involve novel experiences or conscious information-processing. An important theory that drives this shift is the somatic marker hypothesis (Damasio, 1995; Damasio, Tranel & Damasio, 1991), which suggests that we consciously or unconsciously associate emotional valences (i.e., somatic markers) with any information that is processed. These somatic markers are activated when we are considering certain options in a decision-making process, which enables us to make more rapid decisions because we do not have to reconsider all other relevant information. For example, if you had an unpleasant experience at a particular restaurant during which you felt frustrated and disappointed, when the neural representation of that restaurant or experience are activated so too will negative affect associated with that event be reactivated. This strengthened neural-connection will likely lead to your decision not to eat at that restaurant the next time someone suggests it. One major implication of this conceptualization is that hot executive functions can operate at a more unconscious level because we may not always be aware of the affect associated with a particular event.

The models described above include a broad range of potential executive functioning processes, which may in fact overlap in some instances. Based on this observation, Anderson, Levin, & Jacobs (2002) suggest that such definitions can be made more parsimonious by integrating the multitude of components into three interconnected

components. *Attentional control* includes selective attention, sustained attention, and response inhibition; *goal setting* includes initiating, planning, problem solving, and strategic behaviour; and *cognitive flexibility* includes working memory, attentional shift, self-monitoring, and self-regulation. The advantages of conceptualizing executive functioning as having only three broad components are that it is indeed more parsimonious, and may lend itself better to operationalized definitions, which is important for future research. The disadvantages of this kind of simplified model are that it may be too narrow and other researchers may not agree upon the way in which these three components are conceptualized.

Another three-component model of executive functioning is based on factor analyses of the results from neuropsychological tests, as well as the examination of the performance of brain-injured individuals on these tests. Pennington (1997) proposed a conceptualization of executive functioning that included only *verbal working memory*, *cognitive flexibility*, and *behaviour inhibition*. It is noteworthy, that the neuropsychological tests that were administered assessed primarily cool executive functions and *not* hot executive functions. Denckla (1996) also focused primarily on cool executive functions, defining executive functioning as “inhibition, delayed responding, maintenance of anticipatory set/preparedness to act, and planning of sequences of selected actions” (p.266). It could be argued that Denckla’s second component requires inhibition and it is therefore a redundant component, that the third component is equivalent to cognitive flexibility and that the last component is dependant on working memory. Therefore, it seems that Denckla would concur with Pennington’s three-component model. It is also noteworthy, that the term *cognitive flexibility* as used by

Anderson et al. (2002) encompasses working memory, whereas both Denckla and Pennington view them as being distinct constructs. This is reflection of the definitional issues plaguing the executive functioning literature.

A final model to be reviewed here was developed by Barkely (1997; 2001). His conceptualization of executive functioning is unique in that he proposes that although executive functioning depends on behavioural inhibition, it is not technically a component of executive functioning. Behavioural inhibition, which he defines as the ability to inhibit an automatic response that is controlled by the behavioural inhibition system, is necessary, but not sufficient for the employment of the four executive functions. The executive functioning components in this model are nonverbal working memory, verbal working memory, self-regulation of affect/motivation/arousal, and reconstitution (his term for cognitive flexibility). Notice that unlike the other conceptualizations, Barkley suggests that a distinction should be made between verbal and non-verbal working memory.

There are at least as many measures of executive functioning as there are theories. In the following section, a brief overview of various executive functioning measures is provided.

Measurement of Executive Functioning

Executive functioning measures can be considered to fall into one of two broad categories described by McGuire (2001) in his discussion about measures of problem solving abilities. *Process measures* assess one's ability to effectively use executive cognitive abilities and behavioural activities to problem solve in everyday life. These measures generally rely on self-report questionnaires. *Outcome measures* assess an

individual's executive functioning abilities based on their performance or outcome on specified tasks or activities. Following a review of executive functioning measures is a discussion about the challenges in selecting and interpreting results of these measures.

Process measures. The most well known process measure of executive functioning is the Behavior Rating Inventory of Executive Functioning (BRIEF: Gioia et al., 2000), a questionnaire originally developed to assess executive functioning in children and adolescents. The respondent rates the frequency with which specific behaviours occur. The original versions were designed for parents and teachers to report on the behaviours of children between the ages of 5 and 18 years (Gioia et al., 2000). This 86-item measure yields eight subscales that load onto two broad domains of executive functioning based on factor analyses. The subscales assessing the abilities to inhibit behaviour, shift mindset, and regulate emotions load onto the Behavioral Regulation Index, whereas the subscales assessing the abilities to initiate tasks, plan tasks, organize materials to complete a task, monitor performance, and working memory load onto the Metacognition Index. Subsequent versions include a self-report version for adolescents between the ages of 11 and 18 years (Guy, Isquith, and Gioia, 2004), and a parent/caregiver report version for preschool-aged children (Gioia, Andrews Espy, & Isquith, 2005). The BRIEF has been demonstrated to be sensitive to frontal lesions but there appears to be little correlation with outcome measures of executive functioning, suggesting that they assess different aspects within executive functioning domain (Anderson, Anderson, Northam, Jacobs, & Mikiewicz, 2002). The advantage of using this measure is that it is not confined to the snapshot view of an individual's performance

on a highly contrived task such as the outcome measures described below. However, the obvious disadvantage of using this measure is responder bias.

Outcome measures. Most measures of executive functioning would be considered outcome measures. These measures typically involve a standardized administration procedure and often include a norm sample comparison. These measures assess various executive cognitive abilities. Sometimes multiple measures assess the same cognitive abilities and sometimes a single measure assesses multiple cognitive abilities. Although it is difficult to reliably categorize executive functioning measures based on which cognitive process they are assessing, for the sake of simplicity, the review of measures that follows attempts to distinguish the measures in this way. The focus will be on set shifting (cognitive flexibility), inhibition, and working memory, although it is recognized that some of these measures may assess multiple cognitive abilities.

Set shifting. The Wisconsin Card Sorting Test (WCST; Heaton, Chelune, Talley, Kay, & Curtiss (1993) requires a person to sort cards according to a category (i.e., shape, colour, number) that they have to discern based on feedback about where they place the cards (i.e., correct or incorrect pile). The category used for sorting the cards changes several times throughout the task, without the person's knowledge. This task is typically used to assess cognitive flexibility (the ability to adapt cognitive processes and strategies to meet the expectations of changes in the environment). Therefore, increased continuous errors after the category has been changed (i.e., perseverating on previously correct sorting category) are presumed to be a measure of deficits in this ability.

The principles underlying the development of the Iowa Gambling Task (Bechara, Damasio, Damasio, & Anderson, 1994) are rooted in the somatic marker hypothesis. It is arguably more ecologically valid than measures such as the WCST because it is said to “mimic real-life situations in the way it factors uncertainty, reward and punishment” (Bechara, Damasio, & Damasio, 2000, p. 297). The individual is asked to select cards one at a time from four piles of cards (A, B, C, and D). He is free to select a card from any pile and is free to switch piles as many times as he wants. The cards represent financial gains (rewards) or losses (punishments) and the goal is to maximize profit. Unbeknownst to the participant, two piles are advantageous (offering smaller rewards and smaller punishments but an ultimate net profit), while the other two piles are disadvantageous (offering larger rewards and larger punishments but an ultimate net loss). Thus, the participants’ decisions are presumably largely influenced by the schedules of reinforcement, which should carry with them affective markers. Aside from assessing one’s ability to develop and activate somatic markers, this task also involves working memory, cognitive flexibility, and sustained attention. Research has demonstrated that individuals with lesions in the prefrontal cortex of the brain perform more poorly than controls on the Iowa Gambling Task, after controlling for confounding factors such as working memory, and cognitive flexibility (Bechara, et al., 2000; Bechara, Damasio, Tranel, & Damasio, 1997; Manes et al., 2002).

Two types of verbal fluency tasks exist: phonemic and semantic fluency. Phonemic fluency requires individuals to say as many words as they can that begin with a specific letter within a set amount of time. Semantic fluency requires individuals to say as many words as they can that belong to a specific category (e.g., vegetables) within a set

amount of time. Some evidence suggests that phonemic fluency is affected more by frontal lobe damage than semantic fluency (Troyer, Moscovitch, Winocur, Alexander, & Stuss, 1998). Fluency reflects the ability to quickly generate specified information from memory. Deficits in cognitive flexibility can interfere with fluency resulting in difficulty shifting to novel responses (i.e., getting stuck).

Inhibition. The Stroop Colour Word Interference Test (Stroop: cf. McLeod, 1991) typically consists of three parts that require progressively more executive functioning ability. Individuals are asked to complete each task as quickly as possible. First, they are presented with a set of colour words (e.g., red, green, blue, etc.) printed in black ink and asked to read the words. Second, they are presented with a set of coloured squares and asked to name the colours. Third, they are presented with a set of colour words printed in incongruous coloured ink (e.g., the word BLUE printed in yellow ink) and are asked to name the colour of the ink (i.e., not read the words). This task assesses one's ability to inhibit prepotent (automatic) responses – in this case, the prepotent response is to read the words.

Another measure of inhibition is the Go-No/Go task. Several versions of this test have been developed for research and clinical use (e.g., Continuous Performance Test, Conners, 2002). Participants are required to respond to certain stimuli but not to others. Responding to stimuli that do not require a response reflects deficits in inhibition.

Working memory. Working memory reflects the ability to hold information in short-term memory and reproduce it (possibly after manipulating it) almost immediately after being presented with it. The information can be presented verbally or visually. Many different tests of working memory exist. Working memory subtests are included in

measures of intelligence (e.g., Wechsler Adult Intelligence Scale-Fourth Edition; Wechsler, 2008) general memory measures (e.g., Wechsler Memory Scale-Fourth Edition; Wechsler, 2009). A stand alone measure of working memory is the Self Ordered Pointing task (SOP; Milner, Petrides, & Smith, 1984). Twelve pictures are displayed in a 3x4 grid and the grid was presented 12 times with different ordering of pictures. Individuals are required to select one picture from each page without selecting the same picture twice.

Measurement Challenges. Two major challenges exist with respect to interpreting the results of executive functioning measures. The first is that performance on executive functioning measures is potentially confounded with a variety of factors other than executive functioning. Some examples include non-executive cognitive processes (e.g., intelligence, visual-spatial abilities, and general knowledge base), learning, and even the structure provided by the test itself. With respect to non-executive cognitive processes, some components of executive functioning have been demonstrated to be associated with general intelligence (Miyake, Friedman, Rettigner, Shah, & Hegarty, 2001; Salthouse, Atkinson, & Berish, 2003), likely due to the fact that they both involve complex reasoning and problem solving (Carroll, 1993). The relation between executive functioning and intelligence may not be as straightforward as it would seem. Freidman et al. (2006) examined the relationships of three specific executive functioning cognitive processes with intelligence: working memory, inhibition, and shifting. They found that working memory was most closely related to intelligence, sharing 41-48% of the variance. Inhibition and shifting shared less than 14% of the variance with intelligence. These results provide evidence that the relations between executive

functioning and intelligence may require a fine tuned examination focusing on the differential associations with specific executive functioning cognitive processes. Therefore, when interpreting the results of an individual's performance on executive functioning measures it is important to take into consideration the potential confounding effects of other factors. It may be useful to try to partial out the confounding effects statistically. It may also be helpful to administer multiple executive functioning measures to provide a more comprehensive assessment of this construct.

The second challenge relates to the fundamental issue of the conceptualization of executive functioning. That is, whether to consider executive functioning as a single underlying construct or a series of related but distinct component cognitive processes. Interestingly, studies often find low correlations between measures assessing the various executive cognitive processes ($r < .40$; Lethto 1996; Miyake, Friedman, Emerson, Witzki, & How-Erter, 2000, Salthouse, Atkinson, & Berish, 2003); however, it has been suggested that some executive processes are more strongly related than others (Miyake et al., 2000). Some researchers continue to support the unitary construct of executive functioning and aggregate scores from a variety of executive functioning measures (e.g., Godlaski & Giancola, 2009). There is a general consensus among current researchers of executive functioning that aggregating scores of measures is not a valid approach because information about the variations in ability across executive cognitive abilities is lost (personal communication, Hoaken, December 21, 2011). This highlights the importance for researchers to explicitly address the theoretical and empirical approaches that underlie the measurement of executive functioning in their studies.

Given the state of the literature and research on executive functioning, (i.e., no consensus on conceptualization or measurement) there is currently no gold standard measurement tool. A fairly recent survey of tests used by neuropsychologists to assess executive functioning provided some indication of the most commonly used tests. The results indicated that 56 tests of executive functioning were used by neuropsychologists (Rabin, Barr, & Burton, 2005). The most popular measure was the Wisconsin Card Sorting Test, used by 75% of respondents. There was evidence that multiple tests were typically administered to enhance evaluation. These results seem to reflect a common practice of including multiple measures of executive functioning in order to provide a more comprehensive and valid assessment.

Examining the Influence of Executive Functioning and Narcissism on Aggression

As previously mentioned, predicting aggressive behaviour requires the consideration of a complex interplay of multiple factors. Narcissism and executive functioning have been demonstrated to influence aggressive behaviour (e.g., Bushman & Baumeister, 1998; Seguin, et al., 1999, respectively). The research literature for these two predictors of aggression has existed in separate silos. The purpose of the present study was to examine potential concomitant effects of executive functioning and narcissism on aggression. The following chapter was written as a manuscript for publication. To avoid redundancy in this dissertation, the review of literature demonstrating narcissism's and executive functioning's relationships with aggression is provided in the manuscript.

CHAPTER 2: An Investigation of Narcissism and Self Regulation as Predictors of Aggression

Across Canada in 2009, 19% of all criminal code offences, including traffic violations, were violent offences (Statistics Canada, 2009). This number is quite substantial considering, it is impossible to determine the true prevalence of aggressive behaviour because there are numerous incidents that do not result in criminal charges (e.g., domestic violence, incidents of school bullying, general aggression between children, etc.). Aggressive behaviour has numerous negative consequences for individuals (e.g., physical, psychological, etc.), as well as for society at large (e.g., financial, political, etc.). In an effort to reduce these deleterious effects, researchers have sought to develop a better understanding of factors that contribute to aggressive behaviour in the hopes that identifying such factors will inform the development and implementation of prevention and intervention strategies. Aggressive behaviour is the result of a complex combination of interpersonal, contextual, and individual difference factors; therefore, developing a comprehensive and universal conceptual model of aggressive behaviour is also complex. Research on aggression has identified many different predictors of aggression and various models have been proposed that attempt to explain the determinants of aggressive behaviour. The overarching goal of the current study is to examine the integration of two models of aggression, one of which proposes that narcissism contributes to aggressive behaviour and the other which proposes that self-regulation plays a role in aggressive behaviour.

Threatened Egotism Model: Narcissism and Aggressive Behaviour

Over a decade ago, Baumeister, Smart, & Boden (1996) conducted a comprehensive literature review demonstrating links between threatened egotism and aggression. In this seminal paper, the authors challenged conventional wisdom at the time that suggested low self-esteem was associated with more aggression. It was believed that individuals with low self-esteem sought to enhance their self-esteem by aggressively dominating others (Wells, 1989). In contrast, the threatened egotism model proposes that individuals with *inflated* self-esteem (narcissists) are more prone to respond aggressively. It has been suggested that narcissism, a personality characteristic, serves as a proxy for the combination of inflated and unstable self-esteem (Jordan, Spencer, Zanna, Hoshino-Browne, & Correll, 2003; Kernis, Cornell, Sun, Betty, & Harlow, 1993). A discrepancy of perceptions arises when narcissists are provided with negative feedback. A choice point arises in which either the individual lowers his or her self-perception and experiences the associated negative affect, or they disparage the source of negative feedback by aggressing against the other (Baumeister, Bushman, Campbell, 2000).

Bushman and Baumeister (1998) investigated the linkage between narcissism and aggression in response to an ego-threat using a sample of undergraduate students. An experimental manipulation was employed to examine aggressive responses after receiving an ego-threat or an ego-praise. The results indicated that, as expected males were more aggressive and narcissistic than females, and that the ego-threat condition evoked more aggression than the ego-praise condition (i.e., people respond more aggressively when threatened). Importantly, the authors found that although narcissism was positively associated with aggressive behaviour across conditions and gender, there

was also a significant interaction between narcissism and ego-threat on aggressive responding (i.e., narcissism by condition interaction). This interaction indicated that people with high levels of narcissism were more aggressive after receiving an ego-threat compared to those low in narcissism. Furthermore, this interaction was consistent for males and females. The results of this study provided the first direct empirical support for the threatened egotism theory proposed by Baumeister et al. (1996). In the proceeding decade, many other studies yielded results supporting the relationship between narcissism and aggression in a variety of samples, including university students (Campbell, Bonacci, Shelton, Exline, & Bushman, 2004; Konrath, Bushman, & Campbell, 2006; Locke, 2009; Martinez, Zeichner, Reidy, & Miller, 2008; Papps & O'Carroll, 1998; Reidy, Zeichner, Foster, & Martinez, 2008; Stucke & Sporer, 2002; Twenge & Campbell, 2003), children (Barry, Chaplin, Lochman, Adler, & Hill, 2007; Thomaes, Bushman, Stegge & Otlhof, 2008; Washburn, McMahon, King, Reinecke, & Silver, 2004), criminal offenders (Bushman, & Baumeister, 2002), and across cultures (Ang, & Yusof, 2005; Fossati, Borroni, Eisenberg, & Maffei, 2010).

The literature suggests the threatened egotism model is applicable to males as well as females, although overall levels of aggression are expected to be higher for males. With respect to sex differences in aggression, it has been repeatedly demonstrated that males are typically more aggressive than females (c.f. Archer, 2004). All of the studies supporting the relationship between narcissism and aggression have included male participants and many have included female participants. There is consistent support for the relationship between aggression and narcissism in males. Most of the studies that included female samples support the link between aggression and narcissism in females

(e.g., Barry et al., 2007; Bushman & Baumeister, 1998; Martinez et al., 2009), although the relationship appears to be stronger for males.

It is important to acknowledge the positive association between self-esteem and narcissism because high self-esteem is typically associated with positive psychological well being. The Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979, 1981) is the most widely used measure of narcissism in the social psychological literature (Cain et al., 2008; del Rosario & White, 2005). Some have suggested that narcissism assessed by NPI is related to high explicit self-esteem and low implicit self-esteem, reflecting fragile or vulnerable self conceptions (Campbell, Bosson, Goheen, Lakey, & Kernis, 2007; Zeigler-Hill, 2006). Results of a recent study suggest that the NPI confounds the assessment of self-esteem with the assessment of narcissism (Rosenthal & Hooley, 2010). In particular, these researchers found a subset of NPI items that seem to correlate strongly with measures of self-esteem. The results of the study indicate a need to partial out the effects of self-esteem when examining the relationships of variables with narcissism assessed by the NPI full scale score. With respect to examining the ego threat model, research has supported the positive relationship between narcissism and aggression after controlling for self-esteem (Konrath, Bushman, & Campbell, 2006; Bushman & Baumeister, 1998). In a recent paper by Bushman and colleagues (Bushman, Baumeister, Thomaes, Ryu, Begeer, S., & West, 2009), in which they reanalyzed the results from their 1998 paper and conducted two new studies, more support for the ego threat model was found. They also found that the combination of high narcissism and high self esteem was linked with the highest levels of aggression. They concluded again that there was not a positive relationship between aggression and self esteem.

Konrath et al. (2006) acknowledged the importance of identifying strategies that moderate the link between threatened egotism and aggression in order to improve our theoretical understanding and inform applied practices that reduce aggression. To this end, the present study aims to investigate the impact of self-regulation on the relationship between narcissism and aggression. For example, the relationship between narcissism and aggression might be stronger for people with poor self-regulation than those with stronger self-regulation. Before this question is addressed in further detail, the relationship between self-regulation and aggression will be discussed.

Self-regulation Model: Executive Functioning and Aggressive Behaviour

Self-regulation broadly refers to one's ability to control, manage, or regulate one's thoughts, feelings, and behaviour. From the neuropsychological perspective adopted in the current study, self-regulation is achieved via cognitive processes known as executive function, "higher-level cognitive functions involved in the control and regulation of lower-level cognitive processes and goal-directed, future oriented behavior" (Alvarez & Emory, 2006, p. 17). Executive functioning is associated with the prefrontal cortex (Goldberg, 2001; Stuss and Benson, 1986; Stuss & Alexander, 2000), and measures of executive functioning have been able to differentiate individuals with frontal lobe damage from controls (Demakis, 2004).

Although there is fairly consistent consensus on the broad definition of executive functioning, there is less agreement about how to conceptualize and assess the specific cognitive processes subsumed under the definition. For the purposes of the present paper a brief review of specific conceptual issues is provided. For a fuller discussion see Jurado & Rosselli, (2007) and Chan, Shum, Toulopoulou, & Chen (2008). There is some

question about whether to consider executive functioning as a single underlying construct or a series of related but distinct component cognitive processes. Some researchers view executive functioning as related but distinct cognitive processes (Ardila, Pineda, & Rosselli., 2000; Crinella and Yu, 2000; Friedman et al., 2006). These processes may include, but are not limited to, inhibition, cognitive flexibility, planning, self-monitoring, and working memory (Gioia, Isquith, Guy & Kenworthy, 2000; Knight & Stuss, 2002; Mesalun, 2002). The long list of executive cognitive abilities has translated into numerous measures developed to assess the construct of executive functioning. Interestingly, studies often find low correlations between measures assessing the various executive cognitive processes ($r < .40$; Lethto 1996; Miyake, Friedman, Emerson, Witzki, & How-Erter, 2000, Salthouse, Atkinson, & Berish, 2003); however, it has been suggested that some executive processes are more strongly related than others (Miyake et al., 2000). This highlights a fundamental issue with respect to the conceptualization of executive functioning. That is, whether to consider executive functioning as a single underlying construct (unitary theory) or a series of related but distinct component cognitive processes (non-unitary or fractionated theory). There are several theoretical models based on the unitary and fractionated conceptualizations that each have some empirical support (Baddeley & Hitch, 1974; 1994; Barkley 1997; Luria, 1973; Norman & Shallice, 1986; Stuss, 1992; Zelazo, Carter, Reznick & Frye, 1997). Some researchers support the unitary construct of executive functioning and aggregate scores from a variety of executive functioning measures (Godlaski & Giancola, 2009). It has been suggested that there is a general consensus among current researchers of executive functioning that aggregating scores of measures is not a valid approach because information about the

variations in ability across executive cognitive abilities is lost (personal communication, Hoaken, December 21, 2011). The debate continues, which highlights the importance for researchers to express their views and approach taken when conducting their research.

Executive functioning has been demonstrated to be associated with general intelligence (Maiyake, Friedman, Rettigner, Shah, & Hegarty, 2001; Salthouse, Atkinson, & Berish, 2003), likely due to the fact that they both involve complex reasoning and problem solving (Carroll, 1993). The relationship between executive functioning and intelligence may not be as straightforward as it would seem. Freidman et al. (2006) examined the relationships of three specific executive functioning cognitive processes with intelligence: working memory, inhibition, and shifting. They found that working memory was most closely related to intelligence, sharing 41-48% of the variance. Inhibition and shifting shared less than 14% of the variance with intelligence. These results provide evidence that the relationship between executive functioning and intelligence may require a fine tuned examination focusing on the differential associations with specific executive functioning cognitive processes. Therefore, when interpreting the results of an individual's performance on executive functioning measures it is important to take into consideration the potential impact of other factors. It may be useful to try to partial out the confounding effects statistically, or by administering tests of multiple executive functioning measures to provide a more comprehensive assessment of this construct.

Despite the existing conceptual and measurement issues, there is evidence that links executive functioning to aggressive behaviour. Contrary to the view that aggression is a learned behaviour, developmental research has shown that the capacity for aggressive

responding is innate or natural, typically peaking in frequency at around 2 years of age (Tremblay & Nagin, 2005). With development, children learn to regulate their aggression, finding alternative, more adaptive solutions to their problems. Seguin and Zelazo (2005) argue that the development of executive functioning coincides with, and contributes to the regulation of aggression over time.

There are a number of studies demonstrating the relationship between poor executive functioning and psychological disorders strongly associated with aggressive behaviour, such as psychopathy (Ishikawa, Raine, Lencz, Bihrlé, & Lacasse, 2001; Pham, Vanderstukken, Philippot, & Vanderlinden, 2003), conduct disorder (Moffitt, 1993; Nigg & Huang-Pollock, 2003), and ADHD (Barkely, 1997a; 1997b; Willcutt, Doyle, Nigg, Faraone, & Pennington, 2005), as well as between executive functioning and broad sets of behaviours such as externalizing, delinquent, and antisocial behaviour (Calkins, & Fox, 2002; Olson, Sameroff, Kerr, Lopez, & Wellman, 2005; Raine et al., 2005; Yang and Raine, 2009).

Hancock, Tapscott, and Hoaken (2010) found that an adult correctional sample presented with pervasive executive functioning deficits. Moreover, these researchers found that these deficits predicted frequency and severity of violent but not nonviolent offences. Other studies have also found support for an association between executive function deficits and violent offending (Barker & Ireland, 2007; Broomhall, 2005).

Executive function deficits have also been demonstrated to moderate the relationship between aggression and perceived stress, which evokes anger/hostility (Sprague, Verona, & Kalkhoff, 2011). Using questionnaires to assess aggression, one study found that it was associated with poor executive functioning, even after controlling

for language ability (Villemaire-Pittman, Stanford, & Greve, 2003). Another study found similar support among younger children (Giancola, Martin, Tarter, & Pelham, 1996). Other studies have employed experimental manipulations of the intensity of a provocation. Using this design, Hoaken, Shaughnessy, & Pihl (2003) found that a higher level of provocation predicted higher levels of aggression for both males and females. Moreover, they found weaker executive functioning to be associated with increased levels of aggression regardless of the level of provocation. These findings were supported by a similar study even after controlling for general intelligence and short-term memory (Giancola, 2004). Santor, Ingram, & Kusumakar (2003) found a relationship between verbal aggression and executive functioning in a sample of adolescents.

In their review of research conducted with brain injured patients as well as non-brain injured adults, Hawkins and Trobst (2000) concluded there was sufficient empirical evidence to support the association between executive functioning deficits and aggression. A more recent and systematic review of the literature also supported the association between physical aggression and executive function impairments (Seguin, 2008).

Two meta-analyses found a moderate effect size for the relationship between executive functioning and antisocial behaviour, such that poorer executive functioning was associated with more antisocial behaviour, including aggression (Ogilvie, Stewart, Chan, & Shum, 2011; Morgan & Lilienfeld, 2000). Ogilvie and colleagues also examined the relationships between executive functions and subtypes of antisocial behaviours. Their results revealed a moderate effect size for the relationship between physical aggression and executive functioning. Taken together, the results of these studies strongly

suggest that weaker executive functioning ability is associated with increased aggressive behaviour.

Integration of the Threatened Egotism and Self-Regulation Models of Aggression

While the two lines of research discussed above support the ego-threat and the self-regulation models of aggression, it remains unclear if and how the two models can be integrated. How do narcissism and self-regulation combine to predict aggression, or do they? A comprehensive literature review including a variety of search terms (narcissism, self-esteem, self regulation, executive functioning, executive functions, impulsivity, perseveration, inhibition, planning, self-monitoring) yielded no studies that explicitly claimed to examine relationships between aggression, narcissism, and the broad construct of self-regulation. However, some research has touched upon the relationship between aggression, narcissism, and specific executive cognitive processes (e.g., impulsivity). Morf & Rhodewalt (2001) proposed a model, which suggests that narcissists continuously rely on intrapersonal and interpersonal regulatory strategies to seek self-affirmation of their grandiose self-perceptions (i.e., regulation of their self perceptions). The inadvertent result is that many of the behaviours they engage in to achieve their goal elicit negative reactions from others, which challenges their inflated self views further. Vazire & Funder (2006) noted that this model presumes narcissists consciously strive to regulate their self-perceptions by engaging in self-defeating behaviours (e.g., self-enhancement, negative long-term consequences, and aggression), which do not elicit the positive feedback from others that they are seeking. Vazire and Funder suggested that narcissists engage in these behaviours because they are unable to inhibit these habitual reactions. They propose integrating the role of impulsivity into Morf & Rhodewalt's model in order to capture

both the implicit and explicit (i.e., unconscious and conscious) cognitive processes that may be involved. They examined the relationship between impulsivity and narcissism by conducting a meta-analysis. The results indicated a positive relationship between impulsivity and narcissism, and the authors found support for their claim that narcissists' lack of self-control may explain their tendencies to engage in self-defeating behaviours. Although this research did not focus specifically on aggressive behaviour, it offers a theoretical rationale for examining the integration of the threatened egotism and self-regulation models of aggression.

Aims of the Current Study

The overarching goal of this study is to test models explaining the relationships between narcissism and self-regulation on aggressive behaviour. There is little empirical evidence to guide the positing of specific hypotheses in this regard; therefore, it seems reasonable to expect that the most parsimonious model the risk factor (additive) model, will be supported. This model suggests that both narcissism and self-regulation deficits uniquely contribute to aggression. Individuals who are high in narcissism or have executive functioning deficits are at greater risk for aggression, and individuals with both of these characteristics are at even greater risk. The validity of another potential model, which is slightly more complex, will also be explored. The moderating (interaction) model suggests that individuals high in narcissism are only aggressive when they also have executive functioning deficits but not when they have strong executive functioning abilities.

Three specific aims were identified for the present study. The first is to replicate the threatened egotism model, thereby further strengthening the case that higher levels of

narcissism are associated with more aggression in response to an ego-threat (i.e., narcissism by condition interaction) after controlling for self esteem. The second aim is to test the hypothesis that weaker executive functioning is associated with more aggression after controlling for intelligence. The third aim is to compare the relative power of narcissism and executive functioning in predicting aggression by examining the competing theoretical models. The additive model will be supported if both narcissism and executive functioning uniquely predict aggression. The moderator model will be supported if narcissism and executive functioning demonstrate an interaction effect on aggression (i.e., narcissism by executive functioning interaction).

Method

Participants

Participants were 347 undergraduate students (55% female) recruited from a university in southwestern Ontario. Participants ranged in age from 17 to 30 years ($M = 18.7$, $SD = 1.66$) and were largely Caucasian (78%) in ethnic composition. Course credit was provided as compensation for participation in the study. Participants completed a battery of measures and were randomly assigned to one of two experimental conditions in which they received either an unfavourable/negative evaluation (ego-threat condition) or a favourable/positive evaluation (ego-praise condition). They were then given an opportunity to aggress in a competitive reaction time task against a non-existent same-sex partner whom they believed provided the evaluation. Twenty-four participants were omitted from the final sample for various reasons. Ten of these participants were excluded due to missing data and three due to suspicions about the deception procedure (i.e., there was no actual competitive partner). When the regression models were

conducted with the remaining 334 participants, eleven participants were identified as multivariate outliers (i.e., their aggression score was greater than 3 standard deviations beyond the predicted aggression score; for details see relevant analyses below). The final sample consisted of 323 participants (55% female; 48% ego-threat condition).

Measures

Demographics. Participants indicated their sex, age, and ethnicity.

Intelligence. The Wechsler Abbreviated Scale of Intelligence (WASI; Weschler, 1999) was used to assess intelligence as a potential covariate. One verbal and one performance subtest (Similarities and Matrix Reasoning, respectively) from the WASI was administered. The Similarities subtest requires individuals to identify conceptual relationships of two words, and the Matrix Reasoning subtest requires individuals to select a missing piece of visual pattern from several potential options. Scores from the two subscales were significantly correlated, $r(323) = .57, p < .001$; therefore, they were standardized and summed together to create an overall intelligence score. Higher scores reflect greater intelligence.

Self-Esteem. The Rosenberg Self-Esteem Scale (1965) is a 10-item self-report questionnaire assessing an individual's self-esteem. The items are rated on a 7-point likert scale. Responses are summed together to create a global self-esteem score, with higher scores indicating higher self-esteem. This measure is one of the most widely used measures of self-esteem. It has demonstrated strong psychometric properties and validation (e.g., Byrne, 1996; Gray-Little et al., 1997; Robins, Hendin, & Trzesniewski, 2001; Wylie, 1989). The value of Chronbach's Alpha in the present study was .85, indicating strong internal reliability.

Aggression. A revision of the Taylor Aggression Paradigm (Taylor, 1967) developed by Bushman and Baumeister (1998) was used in the current study to assess direct aggressive behaviour. Participants were told that they were competing on a reaction time task with another same-sex participant (their ostensible *partner*). The task, described further below, consisted of nine trials and the loser of each trial received a blast of white noise heard through a set of headphones. For this task, participants were asked to select the intensity or volume (55 to 105 decibels) and duration (0 to 5 seconds) of the white noise they would like their opponent to endure if he or she lost the next trial. After the trial was played, the loser received the sound blast. Consistent with previous research (Bushman & Baumeister, 1998), the outcome variable of aggression was computed as the sum of the standardized intensity and duration scores on the first trial, representing the initial aggressive act, most likely influenced by the valence of feedback received (i.e., ego-praise or ego-threat). The levels of intensity and duration on the first trial were significantly correlated, $r(323) = .56, p < .001$.

Narcissism. The Narcissistic Personality Inventory (NPI; Raskin & Terry, 1988) is a self-report questionnaire consisting of 40 items. Participants responded to each item presented in a dichotomous True/ False format (e.g., “I am going to be a great person”). This measure has been widely used and shown to have adequate psychometric properties (Miller, Gaughan, Pryor, Kamen & Campbell, 2009; Miller, Maples, & Campbell, 2011; Raskin & Terry, 1988). In the present study Cronbach’s alpha for the NPI total was .78.

Self-Regulation. Three measures of executive functioning were administered. These measures were chosen because the literature indicates they assess three fundamental executive processes: cognitive flexibility, working memory, and inhibition.

In addition, these measures have demonstrated adequate psychometric properties in the past and are relatively quick and easy to administer.

The computer version of *the Wisconsin Card Sorting Test—Fourth Edition* (WCST-CV4; Heaton, PAR Staff, & Goldin, 2003) is an instrument frequently used to assess problems in executive functioning associated with frontal lobe damage (Heaton, 1993; Robinson, Heaton, Lehman, & Stilson, 1980). Research has indicated comparable findings across manual and computerized versions of the WCST (Artiola i Fortuny & Heaton 1996; Hellman, Green, Kern, & Christenson, 1992). The task requires participants to sort a series of cards with various shapes of different colour and quantity (e.g., five yellow circles). The sorting rule (i.e., colour, shape, number) must be discerned by trial and error. With each attempt, they receive visual and auditory feedback about their choice (i.e., right or wrong). Throughout the task, the sorting criterion changes up to six times, which requires them to monitor their performance and rethink their plan. The number of perseverative errors made (i.e., placing cards according to previous rules that are no longer in effect) serves as a measure of executive functioning. Greater number of perseverative errors indicates higher levels of perseveration, which reflects poor cognitive flexibility.

The *Self Ordered Pointing* task (SOP; Milner, Petrides, & Smith, 1984) was also administered. It assesses the ability to plan, organize, and monitor one's performance, and draws heavily on working memory ability. Participants were presented with 12 pictures displayed in a 3x4 grid. The grid was presented 12 times with different ordering of pictures. The participants were asked to select one picture from each page without selecting the same picture twice. Two versions of the task (concrete and abstract) were

presented two times each for a total of 48 presented screens. The concrete version presents contextually meaningful pictures (e.g. telephone, clock, building), whereas the abstract version presents pictures of unidentifiable shapes and patterns. Higher numbers of repetitive errors committed (i.e., the number of times a picture was selected more than once) can reflect greater difficulties with working memory involving executive functions, such as planning and organization (Ross, Hanouskova, Giarla, Calhoun, & Tucker, 2007). These authors also found high test-retest reliability of this measure in a community sample of young adults.

The third measure of executive functioning was a Go/No-Go task. Several versions of this measure exist. In a recent meta-analysis, Go/No-Go measures have demonstrated adequate convergent validity and were associated with other measures of self regulation (Duckworth & Kern, 2011). In the present study a reward-punishment version of the *Go/No-Go* discrimination task (Helmers, Young, & Pihl, 1995) was administered. Participants were presented with eight two-digit numbers in random order. They were provided an opportunity to learn which four numbers reward a response (i.e., pressing a button), and which four punish a response. The reward consisted of an increase in points and the punishment a decrease in points. Participants were presented with 80 trials (i.e., each number flashed on the screen ten times). The total number of commission errors (i.e., pressing the button for “punishing” stimuli) provided measures of impulsivity. Higher numbers of commission errors reflect greater deficits in inhibition. This measure has previously been associated with increased aggressive responding (Hoaken et al., 2003).

Debriefing questions. As a component of the post-study debriefing, participants answered several brief questions. Prior to revealing the deception, the research assistant asked a series of questions about the participant's experience of the study and their partner. The questions started off open-ended, general and vague (e.g., What did you think of the study? What did you think of your partner?), and ended off being very specific and rated on a likert scale from one to ten (e.g., How suspicious were you that there was not really another participant?). In addition, participants were asked to rate three items (How angry, insulted, and offended were you after receiving your evaluation?) to assess the validity of the experimental manipulation. After the deception was revealed, the reasons for the use of deception were explained, and participants were asked to sign the debriefing form providing consent to use their data. All participants consented to the use of their data.

Procedure

The procedures and software employed by Bushman and Baumeister (2002) to assess aggression were utilized in the present study. Nine senior level undergraduate psychology students received extensive training in the procedures of the present experiment and served as research assistants facilitating the study.

Participants were told they were going to complete several computerized tasks and interact with another participant (their ostensible "partner") who was supposedly in a different room. Their interactions involved evaluating each others' essays about their stance on abortion and competing on a reaction time task via computer network connection. Participants were randomly assigned to a male or female research assistant,

to the ego-threat or ego-praise condition (48% ego-threat), and to evaluate either a pro-life or pro-choice essay (51% pro-life) supposedly written by their partner.

After participants provided consent to participate in the study they completed the three measures of executive functioning, followed by questionnaires assessing narcissism and demographic information. The experimental reaction time (aggression) task began with participants being asked to write a brief essay supporting their stance on abortion (i.e., pro-life or pro-choice). All participants were given the same instructions about expectations for the essay. They were allotted 5 minutes to complete the essay. After the essay was completed, they evaluated their ostensible partner's essay while their partner supposedly evaluated their essay. The evaluation consisted of ranking several domains (e.g., creativity, originality, persuasiveness, etc.) on a scale from -10 to +10, as well as an optional written comment section. Participants assigned to the ego-praise condition received positive feedback (e.g., This is a great essay!) and those assigned to the ego-threat condition received negative feedback (e.g., This is the worst essay I've read!). Immediately after receiving feedback on their essay, participants began the reaction time task selecting the intensity and duration of the sound blast to be dealt to their opponent. Upon completion of the reaction time task, the research assistant administered the WASI. All participants were debriefed at the close of the study. Throughout the testing session the research assistants engaged in various behaviours to help make the deception (i.e., existence of an opponent) more believable (e.g., referring to the opponent while giving instructions, leaving the room to check on the opponent and the other research assistant).

Results

Preliminary Analyses

Diagnostic analyses of the data included examinations of descriptive statistics, boxplots, and various scatter plots. No major concerns with respect to statistical assumptions were identified. As previously mentioned, data from 11 participants were excluded from the main analyses. Regression analyses testing the threatened egotism model, the self-regulation model and the integrated model consistently identified 11 participants as potential multivariate outliers. An examination of the standardized residuals indicated that their predicted aggression scores were more than 3 standard deviations below their actual aggression scores (i.e., they were much more aggressive than expected). The primary difference between these 11 participants and the rest of the sample was their aggression scores, which were significantly higher than the rest of the sample, $t(332) = 13.16, p < .001$. These participants did not differ from the rest of the sample with respect to executive functioning, narcissism, or level of suspicion. Given the lack of systematic explanation for their elevated aggression scores, it was decided that these participants represent true outliers and were subsequently dropped from further analyses (Pedhazur, 1997).¹

The predicted and residual values for each of the regression analyses described below were included in various scatter plots. The plots were examined for indications of potential violations of the assumptions for regression (i.e., linearity, normalcy, homoscedasticity, and independence). No violations of these assumptions were identified.

¹ It is also worth noting that when the proceeding analyses were conducted with these participants included, the trend in results was consistent with the findings of analyses excluding the outliers.

Finally, the Variance Inflation Factors for each regression did not indicate any concerns about multicollinearity of independent variables.

Correlations and descriptive statistics for the independent, dependent, and covariate variables are provided in Table 1 and Table 2. Correlations and means are provided for the full sample, the ego-threat condition, and the ego-praise condition. Perservative errors on the WCST was the only executive functioning measure significantly correlated with aggression. Intelligence was slightly negatively correlated with the other two measures of executive functioning deficits. Narcissism and perseverative errors were correlated with aggression in the expected directions within the ego threat condition (i.e., more narcissism and perseveration was associated with more aggression). Narcissism was not correlated with aggression in the ego praise condition or across the full sample. Perseverative errors were positively correlated with aggression in the ego praise condition and in the full sample.

Two types of experiment manipulation checks were conducted: the extent to which the negative feedback was experienced as ego-threatening, and the extent to which participants believed they were engaging with a real person in the reaction time task.

Participants in the ego-threat condition endorsed feeling more insulted, $t(304) = 14.80, p < .001$, offended, $t(304) = 13.48, p < .001$, and angry, $t(303) = 11.19, p < .001$ than participants in the ego-praise condition. Secondly, participants in the ego-threat condition responded with more aggression towards their ostensible partner in the reaction time task, $t(321) = 4.50, p < .001, d = .50$. Thus, the negative feedback from the ostensible opponent appears to have elicited the intended ego-threat and aggression from participants.

Participant's level of suspicion was rated by participants themselves as well as by the research assistants using a 10-point likert scale (higher scores reflect more suspicion). Participant and research assistant ratings were highly correlated, $r(295) = .76, p < .001$, therefore a composite suspicion score was computed by summing the two standardized scores. A hierarchical regression analysis assessed first order and interaction effects of participant gender, suspicion, and feedback condition on aggression. The first order predictors were entered in the first step, two-way interactions in the second step, and three-way interaction in the third step. The full regression model was significant $F(7, 308) = 4.27, p < .001$; however, only condition was a significant predictor, $B = -.23, p < .01$. Although participants in the ego threat condition were more suspicious, results did not yield any significant relations between suspicion and aggression.

The Threatened Egotism Model of Aggression

Consistent with previous research, narcissism was significantly associated with aggression in the ego-threat condition (see Table 1). The correlation between narcissism and self esteem was also statistically significant ($r = .23, p < .001$). The full regression model was examined using a narcissism (continuous) X gender (female, male) X condition (ego-threat, ego-praise) hierarchical regression.² In order to reduce collinearity between first order predictors and interaction terms and to increase interpretability of the results, narcissism was mean centered and the dichotomous variables (gender and condition) were dummy coded +/-1 (Aiken and West, 1991). Narcissism, gender, and

² When self esteem was entered as covariate in the regression model, it was not a significant predictor. Furthermore, the results of the other predictor variables did not change. Therefore, for the sake of simplicity, only the results of the regression model without self esteem as covariate are presented in this paper.

feedback condition were entered in the first step of the regression, two-way interactions in the second step, and three-way interactions entered in the third step.

Results showed main effects for feedback condition and gender with a trend for narcissism (see Table 3). Significant two-way interactions were found for narcissism X condition and narcissism X gender. Of greatest interest and qualifying these results was the significant three-way narcissism X gender X condition interaction. A visual representation of the three-way interaction is presented in Figure 1. The lines in the graph represent differences in aggression between feedback conditions. There are two lines for males and two for females, representing individuals high and low in narcissism (i.e., +/- 1 SD). An examination of simple slopes indicated that males high in narcissism were more aggressive in the ego-threat condition than the ego-praise condition ($b = .86, t = 4.22, p < .001$). There was no difference between conditions for males low in narcissism. For females, there was a trend towards greater aggression in the ego-threat condition, regardless of whether they were high or low in narcissism ($b = .34, t = 1.76, p < .10$ and $b = .44, t = 2.18, p < .05$, respectively). Results support the threatened egotism model, however, it would seem that the model is a more accurate representation of male and not female aggression.

Self-Regulation Model of Aggression

Prior to evaluating the self-regulation model, it had to be determined how best to handle the self-regulation construct in the analyses, given the conceptual and measurement issues with executive functioning. The relationships between the three executive functioning measures were examined using correlational analyses, which indicated that none of the three executive functioning measures were strongly inter-

correlated (see Table 1). This suggests they did not adequately assess a single underlying construct; therefore, subsequent analyses treated each of the measures as an independent component of executive functioning.

Correlations in Table 1 also demonstrate that intelligence was differentially associated with the three measures of executive functioning. Hierarchical regression analyses were conducted³. Executive functioning, gender, and feedback condition were entered in the first step, two-way interactions in the second step, and the three-way interaction in the third step. The results of the regression model with the Wisconsin Card Sorting Test (WCST – perseveration) as a measure of executive functioning are presented in Table 4. Similar to the analyses above, main effects were found for all predictor variables. No significant effects were found for the two-way interactions. Of greatest interest was the significant three-way interaction. The three-way interaction is graphed in Figure 2. The lines in the graph represent differences in aggression between feedback conditions. There are two lines for males and two for females, representing individuals high and low in perseveration (i.e., +/- 1 SD). An examination of simple slopes indicated that males high in perseveration were more aggressive in the ego-threat condition than the ego-praise condition (i.e., executive functioning deficits; $b = .70, t = 5.78, p < .001$). These results offer support for the self-regulation model of aggression in males. For females, there was no difference in aggression between conditions when they were high in perseveration ($b = .22, t = 1.57, p > .10$); however, when low in perseveration, the ego-threat condition elicited more aggression ($b = .59, t = 3.66, p < .001$). It was seen that

³ When intelligence was entered as covariate in the regression model, it was not a significant predictor. Furthermore, the results of the other predictor variables did not change. Therefore, for the sake of simplicity, only the results of the regression model without intelligence as covariate are presented in this paper.

well-regulated women in the ego-praise condition decreased their level of aggression to below the average in the present sample.

Similar regression analyses were conducted using the other two measures of executive functioning. Main effects and interaction effects on the Self-Ordered Pointing Task (i.e., repetitive errors) were not significant, with Beta coefficients ranging from $-.03$ to $.04$, $ps > .10$. Similar results were found for the Go/No-Go task (i.e., commission errors), with Beta coefficients ranging from $-.06$ to $.07$, $ps > .10$.

Integrating the Threatened Egotism and the Self-Regulation Models of Aggression

A hierarchical regression procedure was conducted once again. Narcissism, perseveration, condition, and gender were entered on the first step, two-way interactions were entered on the second step, three-way interactions on the third step, and the four-way interaction on the fourth step. Results presented in Table 5 indicate significant main effects for condition and gender, similar to previous analyses. Results for the two-way interactions were the same as the previous analyses. The feedback X narcissism and gender X narcissism interactions found in the threatened-egotism model were again significant here, even after covarying all the other interaction effects. As was found with analyses in the self-regulation model, no two-way interactions with perseveration were found to be significant. The condition X gender X narcissism interaction which was significant in the threatened-egotism model remained significant, however, the significant condition X gender X perseveration interaction found in the self-regulation model dropped below significance in the full model, ($B = -.10$, $p = 0.13$). The moderated effect of condition X gender X narcissism X perseveration interaction was not significant. All of these results can be found in Table 5.

It was decided that an exploratory approach to examining the integrated model would be employed. This decision was based on the facts that there are statistical limitations (i.e., low power) of finding evidence of a four-way interaction effect in a hierarchical regression model with numerous predictor variables, and that the effects of both narcissism and perseverance on aggression were moderated by participant gender and feedback condition (i.e., three-way interactions) in the previous regressions. It was decided that the additive and moderator models would be explored within participant gender and feedback conditions by conducting four hierarchical regressions (i.e., one regression each for males in the ego-threat and ego-praise conditions and females in the ego-threat and ego-praise conditions).

In each of these regressions narcissism and perseverance were entered on the first step, and the narcissism X perseverance interaction was entered on the second step. Two of the four regressions were found to be statistically significant and the interaction between narcissism and perseverance were not significant predictors in either regression. For males in the ego-threat condition, the main effects model accounted for 23% of the variance in aggression, $\Delta F(2, 67) = 9.94, p < .001$, with more narcissism ($B = .38, t = 3.58, p < .001$) and perseverance ($B = .26, t = 2.42, p < .05$) uniquely predicting more aggression. These results indicate that narcissism accounted for approximately 16% of the variance in aggression and executive functioning accounted for an additional 7%. The interaction effect of narcissism X executive function was not found to be significant.

The other significant regression model was for females in the ego-praise condition. In this regression, the main effects model accounted for 7% of the variance in aggression, $\Delta F(2, 89) = 3.27, p < .05$. Narcissism was not a significant predictor of

aggression while perseveration was significant ($B = .27, t = 2.59, p < .05$). Neither narcissism, nor perseveration, nor their interaction predicted aggression for females in the ego-threat condition or for males in the ego-praise condition.

Discussion

Aggressive behaviour is undoubtedly influenced by a complex interplay of multiple contextual, as well as inter- and intra- personal factors. Many theoretical models have been developed to help explain aggressive behaviour. Narcissism and executive functioning are two intrapersonal characteristics that have historically been independently examined as predictors of aggression. Narcissism is examined in the threatened egotism literature and executive functioning in the self-regulation literature. Consistent with past research, the present results indicated that more narcissism and executive functioning deficits predict more aggression, although these relationships were only true for males. The present study extends the current literature by integrating these two models of aggression. Given the lack of an empirical or theoretical basis, the risk factor model (additive effects) and moderating model (interaction effects) were both examined. The results support a risk factor model of aggression, whereby higher levels of narcissism and weaker executive functioning abilities uniquely contribute to increased risk of aggressive behaviour in response to an ego-threat. The results did not support moderating effects of narcissism and executive functioning on aggression. As expected, results indicated that males are more aggressive than females, and that ego-threat elicits more aggression than ego-praise regardless of gender.

According to the threatened egotism model, narcissistic individuals are more prone to receiving or perceiving ego-threats from others because their inflated self

perceptions do not match the realistic evaluation of their skills, abilities, efforts, and so forth. Given that threats generally increase people's aggressive responding and that narcissistic individuals are more likely to perceive threats from others, it is not surprising that narcissistic individuals are more aggressive in response to a threat. It has been suggested that narcissistic individuals use aggression to assert dominance and regain the high sense of self-appraisal they had prior to the threat. Thus, comments or behaviours from others that are intended to reflect objective appraisals of the narcissist are likely to be perceived as a threat to their ego. A direct insult, such as the ego-threat issued in the present study is quite salient. Outside the laboratory, less obvious perceived threats could include social rejection, a misinterpreted glance or gesture (e.g., perceived as disrespectful or demeaning), or the absence of praise when expected or anticipated (Baumeister, et al., 1996). In theory, any event or situation that the individual perceives to challenge his positive self appraisals in some domain of his life (e.g., intelligence, athletics, social, vocational, etc.) increases the likelihood of aggressive responding.

The self-regulation model of aggression also provides a conceptual explanation for understanding the results of the present study, which support the association between weak executive functioning and aggression. Broadly speaking, dysregulation of emotion and behaviour is linked with increased aggression (Anderson & Bushman, 2002). From a developmental perspective, Seguin and Zelazo (2005) suggest that the typical decline in aggressive behaviour starting in toddlerhood reflects the process of increased regulation that coincides with the development of executive functioning. These authors also propose a variation of the social information processing model presented by Crick and Dodge (1994), that emphasizes the impact of executive functioning on the representation of

problems (e.g., perspective taking, biases, attributions), and response generation, evaluation, and selection. They suggest that executive functioning deficits likely hinder aspects of this problem solving process in ways that make aggression a more likely response. For example, it may be that people who tend to perseverate have a difficult time shifting to take other's perspectives, which would have a negative impact on their ability to make appropriate attributions. These individuals may also have difficulty generating a variety of potential response options because they focus on their habitual response (i.e., aggression), and difficulty evaluating outcomes because they focus only on their expected outcome while ignoring negative consequences. Although these are potential explanations for the relationship between executive function and aggression, the fact is that the measurement and conceptual issues with respect to executive functioning at this stage in development of executive functioning research, limits our ability to understand specific processes that link executive functioning with aggression.

The gender differences found in the present study with respect to narcissism (i.e., the absence of support for the threatened egotism model for females) are consistent with one previous study (Barry, Chaplin, & Grafeman, 2006). Other studies have supported the model for females, although the relationship between narcissism and aggression was stronger for males (Bushman & Baumeister, 2002). There were also gender differences with respect to self-regulation in the present study, which indicated that well-regulated females became less aggressive (i.e., nicer) in response to an ego-praise but not that dysregulated females became more aggressive in response to an ego-threat. There may be different processes that contribute to aggression in males and females indicating a need to explore nuances of gender differences in the development of future studies.

As previously mentioned, the novel contribution to the literature provided by the current study is the examination of integrating the two models of aggression. The risk factor and moderator models were evaluated. The results indicated that the risk factor model was supported, suggesting that narcissism and self-regulation uniquely predict aggressive behaviour in response to an ego threat for males.

At a practical level, these results provide some indication that gathering information about a male's narcissistic traits and his self-regulation abilities may provide some indication about his risk for engaging in aggressive behaviour when faced with an ego-threat. More specifically, males who are either high in narcissism or low in executive functioning are at heightened risk for aggression, and if they possess both of these characteristics, their risk for aggression increases further. This is consistent with empirically supported forensic assessments for determining levels of risk to reoffend or engage in violence such as the Youth Level of Service/Case Management Inventory (YLS/CMI; Hoge, Andrews & Leschied, 2002), the Level of Service Inventory-Revised (LSI-R Andrews, & Bonata, 1995) and the Structured Assessment of Violence Risk in Youth (SAVRY; Borum, Bartel, & Forth, 2003). These measures include aspects of narcissism (e.g., grandiosity) and executive functioning (e.g., impulsivity) along with several other risk factors (e.g., past behaviour, antisocial attitudes, etc.). These findings also suggest that interventions addressing inflated narcissistic traits (e.g., inflated self-appraisals) and self-regulation deficits will assist in lowering individuals' risk for aggression. More research with respect to predictive validity at an individual level, as well as intervention options and effectiveness is needed to support these potential practical implications.

At a theoretical level, the risk factor model can potentially be understood using the social information processing framework (Crick & Dodge, 1994). One of the most robust findings in this literature is the association between a hostile attribution bias and reactive aggression (i.e., response to a perceived threat). The hostile attribution bias reflects a cognitive distortion, whereby an individual tends to attribute hostile intent to other's behaviour or comments, even when their intent is ambiguous. The threatened egotism model might be understood in terms of narcissists tending to have an hostile attribution bias, in that they are likely to misinterpret interpersonal cues as threatening. In fact, narcissists have been demonstrated to be hypervigilant for worthlessness in response to an ego-threat (Horvath and Morf, 2009), which speaks to their appraisal of social information. It has been suggested that that executive functioning is required at various stages of the social information processing model in order to planfully engage in goal oriented behaviour (Ellis, Weiss, and Lochman, 2009; Seguin and Zelazo, 2005). Furthermore, Godlaski and Giancola (2010) found that the relationship between executive functioning and aggression is mediated by irritability, which was described as the "tendency to adopt a hostile attitude and act impulsively, conversely, or rudely to the slightest provocation and at the slightest disagreement" (p. 392). This definition seems to reflect hostile attribution bias, which suggests that it may be an individual's hostile attribution bias that mediates the relationship between executive functioning and aggression, as well as between narcissism and aggression. Given these demonstrated associations between narcissism, hostile attribution bias, and executive functioning, the social information processing model may be a potential framework to guide the understanding of the risk factor model in the present study.

A more comprehensive model of aggression that can be used to capture the results of the present study is the General Aggression Model (Anderson & Bushman, 2002). Although this model acknowledges the roles that distal factors play in aggressive behaviour (i.e., biological, environmental, and personality), the focus is on the proximal factors of the person and the situation that affect the likelihood of aggression. The model emphasizes the influence of knowledge structures on aggressive behaviour. Knowledge structures include perceptual schemata (i.e., identification of objects, events), person schemata (i.e., perceptions or beliefs about a person or group of people), and behavioural scripts (i.e., expectations of sequences of events in contextual situations). Knowledge structures develop over time, are influenced by experiences, can become automatized with increased activation, and may be associated with affective states. In the model, person factors and situation factors are referred to as inputs. The present study primarily addressed factors that would be considered inputs. Person factors assessed in this study include characteristics such as sex, narcissism, executive function, self-esteem and intelligence. Situation factors assessed would include the ego-threat or ego-praise and the intensity and duration of the sound blast. The inputs are believed to influence situational outcomes via the present internal state, which includes cognition (e.g., attributions, scripts), affect (e.g., mood and emotion, expressive motor responses), and arousal (i.e., physiological arousal). The present internal state reflects the mediating factors or processes by which aggression is elicited. Examination of hypotheses about the role of the hostile attribution bias or emotional responses would be reflected in this part of the model. These three internal states have reciprocal relationships, which yield information that is processed in the portion of the model called outputs. The authors identify

automatic processing (i.e., immediate appraisals) and controlled processing (i.e., reappraisals), which result in impulsive or thoughtful actions, respectively. In the present study, the aggressive responses could not be distinguished between impulsive or thoughtful actions with the available information. This may be a point of consideration for future research. Finally, General Aggression Model includes a feedback loop from the social encounter (e.g., aggressive incident) to the distal factors. Overall, the General Aggression Model provides a parsimonious theory for understanding the development and use of aggressive behaviour. Using the General Aggression Model as a framework for examining aggression goes beyond using the social information processing model because it explicitly takes into consideration both the situational and person factors involved. It emphasizes various processes by which these factors impact aggressive responses, providing a framework to examine not only which factors predict aggression but also how they predict aggression (e.g., mediational processes).

Limitations and Future Directions

As suggested above, the social information processing model may provide a framework for interpreting the present results. Future research examining the potential influences of narcissism and executive functioning at the specific stages of the social information processing model or General Aggression Model is necessary to examine these interpretations in more detail. It would also be useful to examine whether or not hostile attribution bias is a mediator in the risk factor model (i.e., mediates the relationship between narcissism and self regulation, and aggression).

Some have argued that laboratory studies of aggressive behaviour using variations of the Taylor Aggression Paradigm (Taylor, 1967), as employed in the present study, are

too far removed from the naturalistic environment to yield generalizable results (Ferguson, Smith, Miller-Stratton, Fritz, & Heinrich, 2008; Tedeschi, & Quigley, 1996). However, other studies demonstrate the validity of using this approach (Anderson, & Bushman, 1997; Giancola, & Chermack, 1998; Giancola, & Parrot, 2008). The debate about the validity of employing laboratory measures of aggression highlights the importance of acknowledging the advantages and disadvantages of using these procedures. Although there is reason to test theories in a more naturalistic environment (e.g., longitudinal studies using records of aggressive behaviour) in order to support generalization, there does not appear to be reason to discount or ignore these research findings based on the use of this methodology.

The decision to eliminate eleven participants from data analyses due to their extreme aggression scores may be viewed as a limitation by some. It is important to acknowledge that this decision was not made without careful consideration, and that it was based on recommendations in the literature (e.g., Pedhazur, 1997). There were no systematic reasons to explain the extreme aggression scores, suggesting that these participants' aggression was due to confounding factors such as bogus responding or situational effects outside the study (e.g., life events).

The ego-threat applied in the present study targeted writing ability, which may be specific to an individual's academic self-concept. This specific aspect of one's self-appraisals may be highly salient in a sample of undergraduate students who likely have at least some investment in their academic success. It is unclear whether the results would be different had a different aspect of self-concept been targeted (e.g., athletic ability, physical attractiveness, social skills, etc.) or had the same threat been used in a sample of

similar aged participants who had no post-secondary education. As a result, the use of an undergraduate sample as well as the particular ego-threat issued in the present study may be considered limitations with respect to generalizability. Interpretation of the results with respect to other populations must be made with caution. Nevertheless, the results of the study provide an important stepping stone for future research in this area.

Another potential limitation has to do with the conceptualization and assessment of narcissism. The Narcissistic Personality Inventory was used to measure narcissism in the present study. This measure is a very commonly used measure in social/personality research using non-clinical samples. Distinctions have been made between conceptualizations of narcissism along a continuum from adaptive to subclinical to clinical (i.e., Narcissistic Personality Disorder). Some have suggested that the NPI only assesses narcissism at the lower end of the continuum (Pincus & Kowitsky, 2009), while others value it across the spectrum (Miller, Gaughan, Pryor, Kamen & Campbell, 2009). The results of the present study are based on a non-clinical sample; therefore, there were likely few, if any participants who exhibited clinical levels of narcissism. As a result, conclusions may not generalize to individuals with Narcissistic Personality Disorder. From a theoretical perspective, the link between narcissism and aggression supported by the threatened egotism model should hold true in individuals with clinically significant narcissism. In fact, aggression may be elicited more easily in these individuals because the grandiose self perceptions and need to preserve them are likely more engrained in their personality style. It is less clear whether the relationship between narcissism and executive functioning would be different in individuals with Narcissistic Personality Disorder. In the present study, there were no significant associations between narcissism

and any of the executive functioning measures. Therefore, it is important to note that the present results cannot be generalized to a clinical population, although they may be used to inform directions of future research in this area.

In the present study, only one of the three executive functioning measures administered was found to be associated with aggression. The WCST assessed perseverative behaviour (i.e., repeatedly responding with a response that is no longer appropriate), which reflects cognitive flexibility deficits. There is research linking boys' history of aggression with their current tendency toward perseveration (Seguin, Arseneault, Boulerice, Harden, & Tremblay, 2002). The three measures of executive functioning used in the present study did not appear to assess a single underlying construct, consistent with the fractionated theory of executive functioning (i.e., distinct executive cognitive processes). This seems to highlight the ongoing conceptual and measurement issues related to executive functioning. The WCST was the only measure associated with aggressive behaviour in the present study. This measure has historically been one of the most widely used and empirically supported measures of executive functioning (Butler, et al., 1991; Donders & Wildeboer, 2004; Jodzio, & Biechowska, 2010; Rabin, Barr, & Burton, 2005), which offers support for concluding that the results reflect a genuine assessment of executive functioning. The other two measures, SOP and Go/No-Go, have been previously demonstrated to assess aspects of executive functioning and have relationships with aggression (Hoaken, Shaughnessy, & Pihl, 2003; Petrides, & Milner, 1982; Ross, Hanouskova, Giarla, Calhoun, & Tucker, 2007; Shulz, Fan, Magidina, Marks, & Hahn, 2007). These studies offer empirical and theoretical support for relationships between these measures of executive functioning and aggression. There

is no clear explanation for the absence of this association in the present study. The WCST was administered first; therefore, it is possible that factors associated with the order in which the measures were administered (e.g., participant fatigue, frustration, boredom, etc.) played a role. It has been suggested that the SOP may lack sensitivity to adequately discriminate the abilities of higher executive functioning individuals (Giancola, & Zeichner, 1994), which may have been the case for the SOP and Go-No/Go measures in the present study. The lack of significant findings might have simply been due to sampling error. Replication of this research can test these possibilities by using different samples, including more and different measures of executive functioning (e.g., Delis-Kaplan Executive Function System) and randomly reordering the administration of the measures.

The hypothesis that there might be moderating effects of narcissism and executive functioning on aggression was not supported. Vazire and Funder (2006) suggested that narcissists engage in self-defeating behaviour (e.g., aggression) because they have difficulty inhibiting their behaviour response. The present results suggest this may not be the case, as there was no significant association between narcissism and executive functioning and no significant narcissism X executive functioning effect. Investigating a multiplicity of risk factors for aggression in a single study can significantly reduce statistical power necessary to detect predictor variables, particularly when interaction effects are included in the models. In order to increase statistical power, it may be helpful for future research to examine predictors of aggression only in response to an ego-threat (i.e., eliminating the ego-praise condition).

These results will need to be replicated in order to confirm the validity of the risk factor model. In working towards developing a parsimonious model of aggressive behaviour, other potential risk and protective factors should be considered and examined. For example, past research has found that individuals high in narcissism and low in self-concept clarity are particularly likely to respond aggressively after receiving an ego-threat (Stucke & Sporer, 2002). Other research has demonstrated that the effects of narcissism on aggression can be attenuated by identifying similarities between the individual and his potential victim (Konrath, et al., 2006). Researchers may consider including these variables, or other mediating variables in future research.

While it is important to acknowledge the limitations of the present study, they do not take away from its strengths. A major strength of this study is that the measures were administered using different methods (i.e., questionnaire and behavioural measures), mitigating potential confounding effects of shared method variance (e.g., using only questionnaire measures), and strengthening the legitimacy of the results, which indicate that narcissism and self-regulation are important risk factors for aggression in response to an ego-threat. Future research will benefit from employing multiple measures using different administration methods for assessing the various constructs included in the study.

Conclusion

To my knowledge, the present study is the first designed to simultaneously examine the effects of narcissism and executive functioning, with the intent of evaluating an integrated model of aggression. The results indicate that more narcissism and executive functioning deficits are uniquely associated with more aggression, supporting a

risk factor model. Interestingly, these results were only supported for males and not females. Future research should be aimed at addressing the study limitations discussed above, replicating the results, and examining processes that mediate the relationships between these predictors and aggression. Proceeding this way will help inform the understanding of aggressive behaviour, as well as the development of intervention and prevention strategies to mitigate these processes.

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Table 1

Correlations of Measures

Measures	1.	2.	3.	4.	5.	6.
1. Narcissism		-.09	.23 ^{***}	.07	.01	.01
2. Intelligence			.06	-.11	-.16 ^{**}	-.19 ^{**}
3. Self Esteem				-.01	-.06	.04
4. Preservative Errors (WSCT)					.12 [*]	.06
5. Repetition Errors (SOP)						.10 [†]
6. Commission Errors (GNG)						
7. Aggression						
Ego-Threat	.21 ^{**}	.01	.05	.16 [*]	-.06	.11
Ego-Praise	-.03	.02	.16 [*]	.17 [*]	.03	.04
Total	-.09	.01	.04	.14 [*]	-.02	.10 [†]

Note. WCST = Wisconsin Card Sort Task, SOP = Self-Ordered Pointing Task, GNG = Go/No-Go Task.
[†] $p < .10$ ^{*} $p < .05$ ^{**} $p < .01$ ^{***} $p < .001$ ($N = 323$)

Table 2

Descriptive Statistics of Measures

Measures	M	SD
1. Narcissism	.54	.15
2. Intelligence	0	1.77
3. Self Esteem	3.21	9.87
4. Preservative Errors (WCST)	9.87	9.05
5. Repetition Errors (SOP)	6.81	6.33
6. Commission Errors (GNG)	8.91	9.55
7. Aggression		
Ego-Threat	.44	1.89
Ego-Praise	-.42	1.52
Total	0	1.76

Note. Means are values calculated to centring variables for inclusion in the regression analyses. WCST = Wisconsin Card Sort Task, SOP = Self-Ordered Pointing Task, GNG = Go/No-Go Task.

† $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .001$ ($N = 323$)

Table 3

Hierarchical Regression Analyses Predicting Aggression within the Threatened Egotism Model

Variables	ΔR^2	<i>F</i> change	β
Aggression			
Step 1. Condition (C)	.09	10.81 ^{***}	-.23 ^{***}
Gender (G)			.16 ^{**}
Narcissism (N)			.10 [†]
Step 2. C X N	.03	3.40 [*]	-.10 [*]
G X N			.14 ^{**}
C X G			-.01
Step 3. C X G X N	.02	6.20 [*]	-.14 [*]

Notes: Standardized beta weights presented in this table are from the full regression model

[†] $p < .10$ ^{*} $p < .05$ ^{**} $p < .01$ ^{***} $p < .001$

Table 4

Hierarchical Regression Analyses Predicting Aggression within the Self-Regulation Model

Variables	ΔR^2	<i>F</i> change	β
Aggression			
Step 1. Condition (C)	.11	12.68***	-.24***
Gender (G)			.17**
EF-Perseveration (P)			.13*
Step 2. G X P	.00	.47	-.08
C X P			-.02
G X C			-.01
Step 3. C X G X P	.01	4.51*	-.12*

Notes: EF = Executive Functioning. Standardized beta weights presented in this table are from the full regression model

† $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .001$

Table 5

Hierarchical Regression Analyses Predicting Aggression within the Integrated Model

Variables	ΔR^2	F change	β
Aggression			
Step 1. Condition (C)	.11	10.13***	-.23***
Gender (G)			.17**
Narcissism (N)			-.09
EF-Perseveration (P)			.11
Step 2. G X P	.04	2.20*	.04
C X P			-.01
N X P			.08
N X C			-.12*
N X G			.14*
C X G			.00
Step 3. C X G X N	.03	2.44*	-.13*
C X G X P			-.10
G X N X P			.01
C X P X N			-.02
Step 4. C X G X N X P	.00	.02	-.01

Notes: EF = Executive Functioning. Standardized beta weights presented in this table are from the full regression model

† $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .001$

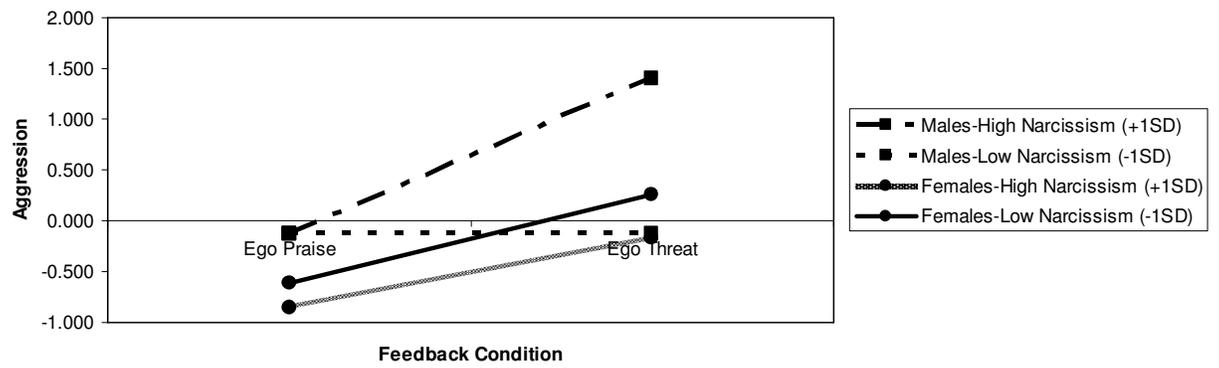


Figure 1. Interaction Effects of Narcissism, Gender, and Feedback Condition on Aggression

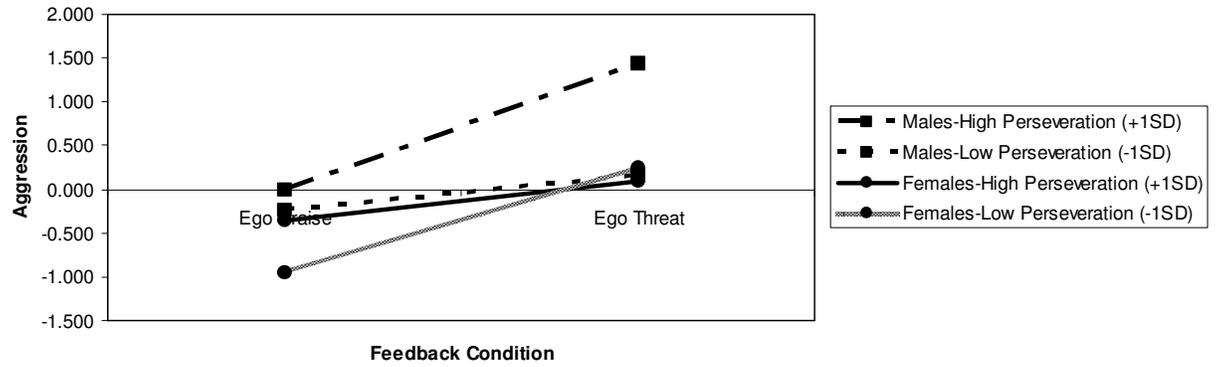


Figure 2. Interaction Effects of Perseveration (Executive Functioning), Participant Gender, and Feedback Condition on Aggression
Notes: high perseverance = weak executive functioning; low perseverance = strong executive functioning