EFFECTS OF IMPULSIVITY AND POWER DISCREPANCY ON

AGGRESSIVE BEHAVIOR IN MEN

by

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(Under the Direction of Amos Zeichner, Ph.D.)

ABSTRACT

The General Affective Aggression Model (GAAM), an integrated model for the control of aggressive behavior, was introduced by Anderson in 1997. The model posits that aggression is produced through three distinct but interrelated "pathways," which are marked by aggressive thoughts, hostile feelings, and real or perceived physiological arousal. According to this model, an "appraisal" process subsequently occurs, during which an individual surveys his/her situation and other relevant factors that may inform his/her decision to behave aggressively. The current study sought to examine the appraisal stage using data from participants reported to exhibit high and low levels of behavioral impulsivity, a trait that has been shown to undermine one's ability to engage in such contemplative processes. Participants engaged in the Response Choice Aggression Paradigm – Modified (RCAP-M), in which, under the guise of a competitive reaction time task, they were given the opportunity to administer shock to a fictitious opponent. Presentation or withholding of a situational cue indicating threat of massive retaliation from a provoker/target, which has been previously demonstrated to inhibit aggressive response to provocation, was used as a "power discrepancy" manipulation. Analyses revealed significant interactive effects for impulsivity and power discrepancy, whereby high-impulsive individuals exhibited no reductions in physical aggression in the presence of this inhibitory cue, while low-impulsivity participants exhibited significantly lower levels of aggression in the presence of this cue than in its absence. Additionally, low-impulsivity participants behaved significantly less aggressively than did high-

impulsivity participants in the presence of this cue. The apparent ability of individuals who are inclined to behave in a relatively careful, deliberate manner to inhibit aggressive behavior under threat of massive retaliation, combined with the failure of individuals poorly equipped to engage in careful appraisal of salient situational cues to do so, underscores the importance of “appraisal” processes in the control of aggressive behavior.

INDEX WORDS: Aggression, Impulsivity, Power Discrepancy, Threat, Retaliation

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INTRODUCTION

Aggressive behavior represents one of the most significant social problems facing humankind today. This phenomenon appears omnipresent; violent crime plagues major cities, children are kidnapped and murdered, criminal suspects are beaten or killed by police, horrific killings motivated by prejudice against minority groups occur, and religious fanatics incinerate thousands of American civilians and promise still more bloodshed. Reports of these and countless other incidents of violence and aggression are communicated daily to citizens via newspapers and magazines, 24-hour cable news networks, and the Internet.

Epidemiological studies of aggression and violence provide evidence of the pervasiveness of these phenomena in our society. Geen and Donnerstein (1998), in the preface of their text on human aggression, cite several alarming statistics underscoring the prevalence of aggressive and violent behavior, including that homicide is the second leading cause of death among individuals between the ages of 15 and 24, and that over half of a sample of fifth graders in New Orleans, Louisiana have reported being a

victim of violence (with 70% reporting having witnessed a weapon being used). Results of a ten-year study on child abuse indicate that abuse accounts for over 10% of all children under the age of five presenting to hospitals with blunt trauma (DiScala, Sege, Guohua, & Reece, 2000). Federal agencies report that, in the United States, a violent crime occurs every five seconds, an aggravated assault every 24 seconds, a rape or sexual assault every two minutes (Rennison, 2001), and a murder every 34 minutes (Federal Bureau of Investigation, 2001). In 2001, 75% of parents reported believing that a mass shooting could occur in their community (Gaughan, Cerio, & Myers, 2001).

In addition to these epidemiological data, empirical studies further suggest omnipresence of aggression and violence in American society. Specifically, data have been collected to examine the use of obscene gestures or abusive language by drivers in traffic (Novaco, 1991), physical confrontations between guests on daytime talk shows (Brinson & Winn, 1997), and increasingly graphic and violent content of television programs and news broadcasts (Frazier, 1988; Jason, 1984; Johnson, 1996).

While the United States is often targeted for criticism in the international community as a land of violence and crime, these are by no means exclusively

American phenomena. Recent studies conducted in Great Britain (Painter & Farrington, 1998), Japan (Kageyama, Hara, Ishii & Hasegawa, 1996), and Russia (Gondolf & Shestakov, 1997) indicate that violence is a social scourge that knows no borders. In light of the above, it could be argued that aggressive behavior represents an international blight and a potential threat to civilization itself. It is aggression and violence, manifested as muggings, bias crimes, murders, or warfare, which threaten not only our personal safety, but our way of life. The examination of aggression is, then, a worthy endeavor we can ill afford to neglect.

It is useful, at this point, to provide a formal definition of the term, "aggression." Though numerous definitions exist, many research-oriented texts have defined aggression as "any form of behavior that is intended to injure someone physically or psychologically" (Berkowitz, 1993). This definition is quite general and, hence, accommodates many of the forms of aggression evinced throughout the world. Using this general definition as a foundation, many "types" of aggression may be defined by examining other factors relevant to the behavior.

One of the most significant factors in distinguishing types of aggressive behavior is the motivation of the

aggressor. Outwardly indistinguishable behaviors may be motivated by vastly different goals and, hence, should be viewed in different ways. Specifically, behavior that appears to a casual observer to be aggressive may, in fact, be motivated by factors that compromise one's ability to classify it as such, using the definition noted above. For instance, children rated by peers and teachers to exhibit aggressive behavior only in a defensive capacity have been reliably distinguished form children who initiate aggressive interactions, in that defensive aggression was not a significant predictor of future aggressive behavior (Pulkkinen, 1987).

A similar example is that of a woman who shoots and kills a man who is threatening to harm her children. Such an individual differs greatly from one who exhibits the same reaction to being verbally insulted. This is not to say that the behavior of the woman acting in defense of her children is not, in a sense, aggressive (inasmuch as she desires to harm or injure her children's potential attacker), but the motivation to harm him is likely to be secondary to protection of her offspring. This example is offered to illustrate that aggressive behavior must be viewed in its proper context, and that the goal of an

aggressive act is an appropriate factor by which to classify it.

It could be argued that the first woman in the above example is exhibiting "maternal aggression." Often examined in animal literature, this type of aggression is defined by behavior intended to defend one's offspring from potential harm (Ebensperger, 1998). "Reproductive aggression," as illustrated by animal models, is a behavior that serves as a mechanism for males and females to secure reproductive rights to a certain partner (Kendrick & Schlinger, 1996). Animals often use aggressive behavior and displays as a way to procure food ("predatory aggression;" Koprowaska & Romaniuk, 1997) and defend their territory ("territorial aggression;" Goodson, 1998). One might argue that these types of aggression play a role in human behavior, though the complexity of human behavior rarely permits such discrete categorizations.

The distinction (in terms of motivation of aggression) most relevant to the present discussion is "instrumental" versus "impulsive" aggression (Cornell, Warren, Hawk, & Stafford, 1996; Kingsbury, Lambert, & Hendrickse, 1997; Zuzul, 1983). Whereas the latter refers to aggressive behavior whose sole purpose is the infliction of harm on another, the former refers to aggression driven by a

secondary reinforcer. This reinforcer (or set of reinforcers) may be represented by tangible (e.g., money, other material goods) or abstract (e.g., approval of others, assertion of dominance) items, and provide extrinsic motivation for an aggressive act. For instance, a mugger who shoots someone only in order to take their money or a child who assaults another child only in order to gain approval from peers are both examples of instrumental aggression. That is, the aggressive act is, at least in part, a means to an end.

As previously noted, the complexity inherent in human behavior precludes discrete classification of an aggressive act as strictly instrumental in nature (Dodge & Coie, 1987; Giancola, 1995). Rather, it is possible, even likely, that aggressors in the examples noted above derive a degree of pleasure from harming others. If not, why would the mugger not choose to pick pockets or burglarize vacant homes? Why would the bully choose to assert his dominance by aggressing against others, rather than through excellence at a sport or some other contest of strength? Though the present study is limited to impulsive aggression, in which the sole motivation is to harm another, questions like these have made the examination of aggressive behavior and

its motivational precursors a challenging and controversial enterprise.

The mechanisms through which impulsive aggression is produced have been extensively researched. In past decades, this research was heavily influenced by classical and instrumental learning theory (Berkowitz, 1971; Buss, 1961), as well as observational learning (Eron, Walder, & Leftowitz, 1971). Recently, psychophysiological and social-cognitive factors have also been incorporated into theoretical conceptualizations of aggression, as reflected in Berkowitz's (1993) previously noted definition.

General Affective Aggression Model

The General Affective Aggression Model (GAAM), an integrated model for the motivation and emission of aggressive behavior, was introduced by Anderson in 1997. The model posits that the likelihood of aggressive response may be increased by individual differences such as personality traits, attitudes and beliefs about violence, fighting skill, and/or situational variables including cognitive cues, pain or discomfort, or frustration. These factors may facilitate aggression through three distinct but interrelated "pathways" (cognitive, affective, and arousal), by facilitating access to aggressive thoughts, hostile feelings, and real or perceived physiological

arousal, respectively. According to this model, an individual also experiences an "appraisal" process, during which he/she survey his/her situation and other relevant factors prior to the emission of aggressive behavior. This model is depicted in Appendix B, Figure 1.

The GAAM (Anderson, 1997) has been the subject of several empirical investigations since its introduction, which have sought to provide support for the pathways contained within it. Specifically, studies have demonstrated a link between extreme temperatures and aggressive affect (Anderson, Anderson, & Deuser, 1996; Anderson, Deuser, & Deneve, 1995; Bell & Baron, 1976), while other investigations have also suggested that cognitive cues (e.g., firearms, violent photo primes) activate aggressive thoughts (Anderson, 1997; Anderson et al., 1996; Anderson, Benjamin, & Bartholow, 1998, Bushman, 1998; Bushman & Geen, 1990). Perhaps more interesting are the findings that particular situational variables (e.g., cognitive cues, uncomfortable temperatures) appear to exert not only significant, but specific effects on subsequent pathways (i.e., cognitive cues produce significant increased in aggressive thoughts but not in hostile affect, physical discomfort results in significant increases in hostile feelings but not in aggressive thoughts).

Though promising and generally supportive of the GAAM, much of the research done on it has focused on the early stages of the model; that is, how the three pathways are activated by individual differences and situational variables. A recent investigation by Lindsay and Anderson (2000) examined the model in a more comprehensive fashion, by demonstrating significant effects of pain and cognitive primes on aggressive behavior, mediated by hostile affect and aggressive thoughts, respectively.

As the body of research on the GAAM continues to grow, one aspect of the model remains largely untested: the appraisal stage. As previously noted, this stage is theorized to occur between priming of cognitive, affective, or physiological pathways to aggressive behavior and the actual emission of that behavior. According to Anderson (1997), during this stage, an individual may survey relevant factors in order to make an appropriate decision regarding their behavioral choice (either to aggress or engage in an alternate behavior) that represents the final stage of the model. For instance, individuals may engage in self-monitoring of their affect (e.g., anger towards a target) or of their state of physiological arousal. They may also attempt to interpret their situation by reflecting on factors such as the harm caused by the target's

provocation, the target's intended malice, or potential consequences of their behavioral choice.

In spite of the relative paucity of pertinent research to date, the appraisal stage appears to represents a particularly important component of the model. Specifically, learning more about this stage may provide significant information regarding why factors such as aggressive thoughts, anger, and physiological arousal do not lead to aggressive behavior in every instance. Elucidation of intervening processes between activation of aggressive pathways and emission of aggressive behavior would not only serve to satisfy scientific curiosity, but may also have value on both clinical and social levels, to the extent that it helps in gaining a better understanding of situational and individual variables that may facilitate or inhibit aggressive behavior. The proposed study sought to examine two such variables in this pursuit: one related to individual differences and the other being situational in nature. Let us focus at this point on the former variable.

Impulsivity

A cursory search for the term "impulsive" in the psychological literature returns many thousands of references, some dating from the 19th century (Knapp, 1890).

Other historical references are evident in the work of William James ([1890] 1950), who argued that, though some voluntary acts do not require antecedent cognition, most behavior follows conscious thought, and discussed "control of impulses." Barratt (1994) discussed impulsivity as a comprehensive construct related to "self-control," "volition," "inhibition," and other concepts, which, he notes, emphasize "internal control of behavioral acts." This phenomenon has been reliably exhibited and frequently examined within numerous subject populations, including children (Cote, Tremblay, Nagin, Zoccolillo, & Vitaro, 2002), juveniles (Wulfert, Brock, Ana, Rodriguez, & Colsman, 2002), and inmates (Barratt, Felthous, Liebman, & Coates, 2000). Though impulsivity is often regarded as a stable personality dimension (or "trait"; Gertler, 1997; Gomez & Gomez, 2002; Steiger, Verdun, Lehoux, & Gauvin, 1999), brain injuries and/or dysfunction are often viewed as etiologically significant factors (specifically, prefrontal cortical areas; Miller, 1992; Stein, Hollander, Cohen, & Frenkel, 1993).

Support for the conceptualization of impulsivity as a failure of cognitive processing may be found in studies that have shown impulsive behavior to be significantly and inversely correlated with performance in cognitive tasks,

particularly those related to higher cognitive processes such as planning, analysis, and judgment, (Carella, 1998; Greve, Love, Sherwin, Stanford, Mathias, & Houston, 2002; Lemarquand, 2000). This propensity may frequently result in undesirable behavior, including aggression. Evidence of this particular association has been demonstrated in diverse populations, including children (Wiegner, 1999) adolescent criminal offenders (Peterson, 1997; Thornton, 1985), adult criminal offenders (Scarpa & Raine, 2000), spousal abusers (Stuart, 1998), and non-forensic adult populations (Elliot & Mirsky, 2002; Giancola & Zeichner, 1994; Netter, Hennig, Rohrmann, Wyhidal, & Hain-Hermann, 1998; Zillman, 1988).

Though much attention has been given to impulsivity and other variables that facilitate aggressive behavior, factors serving to inhibit aggression have also been examined. Variables demonstrating this effect include empathy (Richardson, Hammock, Smith, & Gardner, 1994; Shaw, 1996), monetary incentive (Lau & Pihl, 1996), self-focused attention (Ito, Miller, & Pollock, 1996), relaxation exercises (Tyson, 1998), possession of alternate problem-solving skills (Pulkkinen, 1984), and humor (Prerost, 1983). Several of the above factors concern individual differences, while others are related to situational

conditions. Let us now turn our attention to the second variable of interest in the proposed study, which is situational in nature.

Power Discrepancy

The relative power of an individual who is involved in a potentially aggressive exchange has been shown to constitute a significant situational factor in the behavioral choices made by that individual. In an early discussion of this issue, Dollard and colleagues (1939) suggested an inverse and linear relationship between levels of aggressive behavior and the magnitude of threatened punishment for such behavior. Subsequent investigations have yielded more specific information regarding this relationship, including a study by Shortell, Epstein, & Taylor (1970). This study demonstrated reliable suppression of aggressive behavior only with relatively high levels of threatened punishment.

This effect has been shown in animal studies, in which attack behavior in female rats was suppressed when they were confronted with larger male rats (versus males whose size was comparable to their own; Flannelly & Flannelly, 1985), and facilitating effects of ethanol dose on aggressive behavior were reduced when the size of the male target was increased (Blanchard, Flannelly, Hori, &

Blanchard, 1987). In both studies, the investigators attributed results to increased fear response in the female rats, which may have served to reduce aggressive tendencies.

In addition to the aforementioned study by Shortell and colleagues (1970), investigations have also demonstrated inhibitory effects of threatened retaliation on aggressive behavior in human populations. A study by Fitz (1976) indicated that angered individuals were more likely to displace their aggression from a target if they were led to fear the target and its capacity to issue severe retaliation. Similarly, a study by Michener and Cohen (1973) showed threatened retaliation from a target possessing superior force to be an effective inhibitor of aggressive behavior.

A review of studies on bullying behavior by Batsche and Knoff (1994) provides an alternate perspective on the effects of disparity of force on aggressive behavior is This survey indicated that the only physical characteristic significantly and reliably related to victim status is physical weakness (Olweus, 1973, 1978). Though they do not directly provide information about deterrence of aggressive behavior, Batsche and Knoff (1994) make several references to physical weakness and small stature as factors that

serve to encourage bullying in those prone to exhibit such behavior. It appears reasonable to infer, then, that inasmuch as bullies select their victims based on perceived weakness, they may avoid targets that appear physically capable of significant retaliation.

Additional evidence underscores the importance of aggression being retaliatory (rather than offensive) to maintain these inhibitory effects. Specifically, equal proportions of offensive aggression and counter-aggression (i.e., retaliation) emitted by targets have been shown to be effective in inhibiting aggressive behavior directed at them, while a disproportionately high amount of offensive aggression may serve to increase aggressive response (Kimble, Fitz, & Onorad, 1977). Ford & Blegen (1992) found that the combination of low levels of offensive tactics and strong retaliatory tactics on the part of the target was most effective in reducing attack behavior within an adult, non-forensic population.

Hypotheses

This study sought to examine the effects of impulsivity on the ability of individuals to inhibit aggressive behavior in the presence of an inhibitory situational cue. It was hypothesized that a significant main effect would be demonstrated for impulsivity, whereby

participants identified as “High Impulsive” would exhibit significantly higher levels of aggression over all trials than those identified as “Low Impulsive” (by scores on a self-report measure of impulsivity, discussed below). A significant interaction of impulsivity and power discrepancy was also expected, whereby the expected decrease in aggression in the presence of an inhibitory cue would only be observed in the “Low Impulsive” group.

Specific hypotheses regarding indices related to aggressive “flashpoint” (i.e., the latency between initial provocation and aggressive response, as well as qualities of that initial response) were advanced. High Impulsive participants were expected to endure significantly less provocation than those designated as Low Impulsive, and to respond more aggressively (in terms of shock intensity and shock duration) at their flashpoint relative to their low-impulsive counterparts. Additionally, Low Impulsive participants placed in a position of inferior power were expected to exhibit longer latencies to flashpoint than High Impulsive participants placed in this condition.

METHOD

Participants

Two hundred men were recruited from the University of Georgia Research Participant pool to participate in screening sessions during which they completed a self-report measure of impulsivity (Patton, Stanford, & Barratt, 1995). Based on their responses to this screening measure of these participants, 60 were recruited for participation in the experimental portion of the study. All participants received research credit for their participation. The sample size of 60 was informed by an automated computational power analysis program (G-Power; Erdfelder, Faul, & Buchner, 1996), with an alpha level set at .05 and an effect size of .60. The exclusion of females from this study was not intended to diminish the importance of examining aggressive behavior among women, but rather to focus on males, who, between 1976 and 1999, represented 87.8% of all homicide perpetrators and 76.4% of homicide victims (Fox & Zawitz, 2001), and have been identified as perpetrator of violent crime by eight in 10 injured victims (Simon, Mercy, & Perkins, 2001). The racial composition of the sample consisted of 54 Caucasians, three African

Americans, 2 Asian Americans, and one Hispanic American. Additional demographic data for the sample can be found in Appendix A, Tables 1 and 2.

Experimental Design

This study used a 2 (Impulsivity: Low, High) X 2 (Power Discrepancy: Equal, Inferior) factorial design. Participants were assigned to High and Low Impulsivity groups based upon their overall scores on the Barratt Impulsivity Scale (BIS-11), a self-report measure of impulsivity. Specifically, those whose scores fell within the upper (BIS-11 > 67) and lower (BIS-11 < 57) quartiles of the obtained score distribution on this measure were designated as "High Impulsive" and "Low Impulsive," respectively. Additionally, half of the participants from each of these groups were randomly assigned to either an "Equal Power" or "Inferior Power" condition (related to the magnitude of shock accessible by them during the reaction time competition). These factors are discussed in greater detail below.

Apparatus

Barratt Impulsiveness Scale (BIS-11). Overall scores on the BIS-11 (Patton, Stanford, & Barratt, 1995) were used to screen and assign participants to "High Impulsive" and "Low Impulsive" groups. First introduced by Barratt

(1959), this measure has been shown to correlate significantly with scores on numerous indices of impulsive behavior, including other self-report measures and objective psychometric measures of response latency and accuracy (Barratt & Patton, 1983), as well as risk-taking behavior among college students (Stanford, Greve, Boudreaux, & Mathias, 1996). This scale has also been adapted for use in European (Fossati, Barratt, & Acquarini, 2002; Oquendo, Baca-Garcia, Graver, Morales, Montalvan, & Mann, 2001) and Asian populations (Chung & Lee, 1997; Someya, Sakado, Seki, Kojima, Reist, Tang, & Tagahashi, 2001).

The most recent revision of this instrument consists of 30 statements regarding behavioral and cognitive tendencies, on which respondents rate themselves using a 4-point Likert scale. It yields an overall score for impulsivity that can range from 30 to 120, as well as subscale scores for "Motor Impulsiveness," and "Nonplanning Impulsiveness." The authors report a mean overall score of 64.94 (standard deviation = 10.19) and a Cronbach's alpha coefficient of .82 for a sample of male university undergraduate students (n = 350). Examination of the obtained score distribution revealed a normal distribution of scores and descriptive statistics comparable to those

reported in the standardization sample, with a mean overall score of 63.18 and standard deviation of 9.48. The BIS-11, as well as all other self-report instruments, can be found in Appendix C.

Positive Affect-Negative Affect Schedule (PANAS). The PANAS (Watson, Clark, & Tellegen, 1988) was administered to assess participants' affect prior to and immediately following the reaction time competition, in order to detect any pre-existing affective differences among groups prior to or following completion of this task. This instrument consists of 24 items listing various mood descriptors, and is comprised of a 12-item Positive Affect and a 12-item Negative Affect scale. For each item, respondents rated the extent to which they were currently experiencing each descriptor on a 5-point Likert scale. The authors report internal consistency coefficients of .89 and .85 for the Positive Affect and Negative Affect subscales, respectively.

State Anger Scale (SAS). The SAS (Spielberger, Jacobs, & Crane, 1983) was also administered to assess pre-existing group differences with respect to state anger prior to and immediately following the reaction time competition. This measure is comprised of 10 statements on which respondents rate themselves using a 4-point Likert

scale and yields one score that can range from 10 to 40. The authors report an internal consistency coefficient of .95 for male college students.

Opponent Evaluation Scale (OES). This specifically-designed measure was administered immediately following completion of the reaction time competition in order to assess the success of the deception and power discrepancy manipulations. This instrument consists of 11 statements regarding the reaction time competition, the "opponent," and power discrepancy between the participant and "opponent," on which respondents rate their degree of agreement using a 5-point Likert scale. Specifically, items were constructed in order to assess the extent to which participants believed they were engaged in a legitimate reaction time competition, formed impressions of their "opponent," and were aware, if assigned to the Inferior Power condition, of their disadvantage with respect to their ability to inflict pain relative to their "opponent." Additionally, items were included to assess the extent to which participants perceived their "opponent" to exploit their superior position, experienced concern at the prospect of receiving the shock labeled "15," and their perception of the "opponent's" willingness to employ this switch.

Response-Choice Aggression Paradigm (Modified; RCAP-M). Under the guise of a 20-trial reaction time competition, participants used a white, metal console fitted with a reaction time switch, as well as 11 electrical switches and corresponding light-emitting diodes. The first 10 switches, numbered consecutively "1" through "10," are used by participants, if they so desire, to ostensibly deliver electric shocks to their opponent (confederate) as "punishment." The eleventh switch, situated at the extreme right-hand side of the console, is labeled "15." This switch is not used by participants in the course of the reaction time competition, and is obscured from view in the Equal Power condition. Over the course of the reaction time competition, participants are free to deliver fictitious shocks to the confederate following both "winning" and "losing" trials. Additionally, participants are told that they are free not to deliver any shocks at all throughout the reaction time competition. Shocks are generated by a Precision Regulated Animal Shocker (Coulbourn Instruments, Allentown, PA).

Seven measures of physical aggression are derived from the RCAP-M. "Mean Shock Intensity," calculated as the mean of shock intensities selected across trials on which a

shock is delivered, is conceptualized as a measure of direct physical aggression, the magnitude of which is based upon deliberate selection of shock intensities to be ostensibly delivered to the confederate. "Mean Shock Duration," based on the mean number of milliseconds shock keys are depressed across trials on which shocks are delivered, is also conceptualized as a measure of direct physical aggression, but one that may represent a less volitional expression of aggression than shock intensity. "Proportion 10," computed as the proportion of trials on which the highest available shock is selected, relative to total number of trials on which shock is delivered, represents the degree to which individuals display extreme levels of aggression when they choose to respond aggressively to provocation. These three indices are considered "magnitude" measures of aggressive behavior, which concern the overall level of aggression exhibited over all trials. These indices provide little information regarding participants' ability to defer retaliation, or about the quality of their behavior at the moment they elect to enter an aggressive exchange.

The remaining four aggression indices yielded by the RCAP relate specifically to one's ability to refrain from aggressive response, as well as to the moment at which

inhibition of this response ceases and one chooses to aggress (i.e., their "flashpoint"). "Shock Frequency," based on the mean number of trials, out of the maximum of 20, during which shocks are selected measures the frequency with which one chooses to respond aggressively to provocation as well as the frequency with which one inhibits such a response. "Flashpoint Latency," or the number of elapsed trials prior to selection of first shock, represents this interval, during which one inhibits aggressive response to provocation. This variable is unique among dependent measures yielded by the RCAP, inasmuch as it represents omission, rather than commission, of aggressive behavior. "Flashpoint Intensity" is the intensity of first shock selected by participant measures the force with which one retaliates at the moment they reach their "flashpoint." Finally, "Flashpoint Duration" is the duration, in milliseconds, of first shock selected by the participant and provides a measure of one's aggressive behavior at "flashpoint," but may represent a less deliberate behavioral choice than is represented by "Flashpoint Intensity."

Procedure

Research volunteers responded to an advertisement for a study entitled, "Competition, Reaction Time, and

Behavior," through the University of Georgia Research Participant Pool website. Groups of 10 to 30 participants were met by the experimenter in a room separate from the aggression laboratory, and provided an informed consent form detailing the screening procedure. They were asked to sign and return one copy of this form, and were provided a copy to retain for their records. They then completed the BIS-11, scores on which were used to assign them either High Impulsive or Low Impulsive groups.

Following computation of BIS-11 total scores, eligible participants (as determined by scores falling in either the upper or lower quartiles on this measure) were contacted to schedule an appointment to complete the experimental portion of the study. Participants were met by the experimenter outside the aggression laboratory and shown to the experimental chamber. Participants were allowed to view the outside of an adjacent chamber, the door of which was left ajar to facilitate participants' belief that this chamber houses the confederate (always identified as male).

Upon entering the chamber, participants were seated facing the reaction time/aggression console. After signing an informed consent form for the experimental procedure, they were asked to complete the PANAS and SAS, presented as

measures of "how [they] are feeling" prior to completing the RCAP.

The experimenter then familiarized the participant with the reaction time/aggression console. Participants were first given instructions regarding rules of the "competition." The task was presented as a reaction time competition comprised of one block of 20 consecutive trials, in which the participant in one chamber and the confederate in the other chamber would compete. Specifically, participants were instructed that a red LED labeled "get ready" would illuminate on the console, followed by a yellow "hit" LED (at which point they were instructed to depress the reaction time switch). Finally, a green "release" LED would illuminate, which signaled them to release the switch. They were informed that their reaction time would be determined by the latency between illumination of the green "release" LED and their actual release of the reaction time switch, and that they would receive feedback regarding the outcome of the trial by illumination of either a red LED (signifying a "loss") or a green LED (signifying a "win").

Participants were told that they could use switches "1" through "10" to deliver shock intensities to their "opponent" following each reaction time trial, regardless

of the outcome. Participants were informed that the range of shocks they and the confederate would receive would be defined according to a subjective pain assessment procedure completed by each of them prior to the start of the reaction time trials.

The experimenter then attached a shock electrode to the index and middle fingers of the participants' nondominant hand in preparation for the pain assessment. Participants were informed that the pain threshold of the confederate would be assessed prior to determining their own pain threshold. Additionally, participants were informed that they would be able to hear the confederate's responses over an intercom and that the confederate would be able to hear the participant's responses. This procedure was intended to reinforce participants' belief that they would compete against another individual. First, assessment of the confederate's pain threshold was heard over an intercom in the participant's chamber. In actuality, an audiotape was played in which the confederate read a list of predetermined statements regarding his pain experience. Next, the participant's pain thresholds were assessed to determine the parameters for the intensities shocks he would receive. This was accomplished via administration of short-duration shocks (500 milliseconds)

in an incremental stepwise intensity method from the lowest available shock setting, which is imperceptible, until the shocks reached a reportedly "painful" level.

Immediately prior to the start of the reaction time competition, participants assigned to the Inferior Power condition were informed that, through a process of random assignment, it had been determined that their "opponent" would be given access to the 11th switch labeled "15." Additionally, they were told that this switch, although visible on their console at all times, would remain inoperable throughout the reaction time competition. The "15" switch was characterized as a "high intensity" switch whose amperage "significantly exceeded" any of the shocks perceived during the pain assessment procedure. Participants assigned to the Equal Power condition were provided no additional instructions and the 11th switch on their console remained obscured from their view by a plastic cover throughout the procedure.

The entire competition consisted of one block of 20 consecutive trials. Trials were spaced by 5-sec intervals, with participants "winning" 10 trials and "losing" 10 trials within each block. The win/lose sequence was presented in a randomized fashion; however, all participants received the same sequence. Participants

received shock (ostensibly delivered by the confederate) only following "losing" trials. The win/lose sequence was predetermined and incorporated into a computer program that executed the reaction time task, delivered shocks to participants, and recorded shocks selected by participants.

Participants received shocks equivalent to 85%, 90%, or 95% of the level of voltage identified by them as "painful," which were accompanied by illumination of diodes specifying these shock intensities as "8," "9," or "10," respectively. Following the procedure, participants again completed the PANAS and SAS in order to assess their positive and negative affect and level of state anger after completing the RCAP. They also completed the OES in order to assess the success of the deception manipulation, as well as the extent to which participants were aware of the power manipulation and, if assigned to the Inferior Power condition, felt as though they were at a "disadvantage" relative to their "opponent." They were also informed of the true purpose of the study at this time and given research credit for their participation.

RESULTS

Manipulation Check

Participants' responses to the OES were analyzed in order to assess the success of experimental manipulations. The believability of the deception manipulation (i.e., that participants competed against an opponent in a reaction time task) was assessed by items 1, 3, and 4, which concerned the adequacy of the task as a measure of reaction time and solicited impressions of the "opponent." Participants' responses generally reflected agreement that the task constituted a "good test of reaction time," and utilization of personifying descriptors of the "opponent." Participants who characterized the task as a poor test of reaction time or declined to describe their "opponent" were further queried as to their reasons for so stating or declining. Participants who responded in this fashion, but cited reasons that failed to suggest failure of the deception manipulation (e.g., "The [reaction time] button didn't seem very sensitive," "I don't really know him well enough at this point") were included in analyses. Three participants were excluded from analyses for citing suspicion about the viability of the task (e.g., "I think

it was rigged") and/or the existence of their "opponent" upon this query (e.g., "I don't think I really had an opponent").

Results of items 5, 6, and 7 of the OES were used to assess the success of the Inferior Power manipulation, which was contingent upon participants in this condition to manifest several beliefs and attitudes about their position (with respect to power) relative to their "opponent." Responses of participants assigned to the Inferior Power condition generally indicated agreement with statements that their "opponent" had been provided access to a higher-intensity shock ("15") switch, while their own access to this switch had been restricted, that they were at a disadvantage with respect to the range of shock intensities they could employ, and that their "opponent" could inflict more pain on them than they could inflict on their "opponent." Participants assigned to the Equal Power condition expressed significantly less agreement with these statements, suggesting a successful Power Discrepancy manipulation (see Appendix A, Table 3). Two participants were excluded from analyses for providing responses that suggested failure of the Power Discrepancy manipulation.

As discussed above, the inhibitory influence of this type of power discrepancy manipulation is not only

contingent upon an individual's awareness of his inferior position, but also upon factors related to his adversary's attitudes and behavior; specifically, the degree to which he believes his adversary is actually willing to employ superior force, but, at the same time, fails to exploit his advantage in an offensive manner. The responses of participants assigned to the Inferior Power condition to items 8, 9, 10, and 11 of the OES indicated that they experienced uncertainty as to their "opponent's" willingness to employ the "15" switch, "wondered" when their "opponent" might "nail" them with a shock at the "15" switch level, and were "concerned" about this prospect, but generally did not feel as though their "opponent" used his power in an exploitative manner. Data regarding the Power Discrepancy manipulation is presented in Appendix A, Table 3.

Preliminary Analyses

In order to identify any pre-existing differences among participants, a multivariate analysis of variance (MANOVA) was performed using scores on the pre-task PANAS and SAS as dependent measures. This analysis failed to reveal significant differences in scores on the SAS, or on the "Positive Affect," "Negative Affect," or "Anger/Hostility" subscales of the PANAS. These results

suggest equivalence of groups with respect to negative affect, positive affect, and anger upon presentation to the laboratory. MANOVAs also failed to indicate significant disparities among groups with respect to age, years of education, mean annual income, or ethnicity.

Behavioral Aggression Indices

In order to assess effects of Impulsivity (High, Low) and Power Discrepancy (Equal, Inferior) on behavioral aggression indices yielded by the RCAP, a MANOVA was performed using the six of the seven aggression indices (i.e., mean shock intensity, mean shock duration, proportion "10," flashpoint intensity, flashpoint duration, and shock frequency) as dependent measures. Flashpoint latency was excluded from this analysis, as its measurement of passivity (i.e., how long one refrains from engaging in aggressive behavior), rather than of activity (i.e., how intensely, for what duration, or how often one actively engages in aggressive behavior) renders it theoretically distinct from the other six behavioral aggression indices yielded by the RCAP. This MANOVA revealed a significant interactive effect of Impulsivity and Power Discrepancy (Pillai's Trace = .214, $F[1,59] = 2.32$, $p < .05$). A series of 2 X 2 ANOVAs was subsequently performed in order to

examine effects of these factors on each behavioral aggression index.

Mean Shock Intensity. A 2 X 2, general factorial ANOVA was performed using Mean Shock Intensity as a dependent measure. This analysis revealed a significant main effect of Power Discrepancy ($F[1,59] = 4.83$, $p < .05$), with participants assigned to the Equal Power condition delivering higher intensities of shock than those assigned to the Inferior Power condition. A significant interactive effect of Impulsivity and Power Discrepancy was also detected ($F[1,59] = 8.98$, $p < .01$). Post-hoc planned comparisons indicate that, while no effect of Power Discrepancy on Mean Shock Intensity was evident among High Impulsivity participants, Low Impulsivity participants assigned to the Inferior Power condition delivered significantly lower intensity shocks than those assigned to the Equal Power condition ($F[1,29] = 10.31$, $p < .01$). Moreover, mean intensity of shocks delivered by Low Impulsivity participants was significantly lower than that delivered by High Impulsivity participants in the Inferior Power condition ($F[1,29] = 6.82$, $p < .05$), while no such difference was evident in the Equal Power condition. These data are summarized in Appendix B, Figure 2.

Mean Shock Duration. A 2 X 2, general factorial ANOVA was performed using Mean Shock Duration as a dependent measure. This analysis revealed no significant main effects, but revealed a significant interactive effect of Impulsivity and Power Discrepancy (F[1,57] = 4.95, $p < .05$). This interaction was explicated using one-way ANOVA procedures, which demonstrated no significant effect of Power Discrepancy on Mean Shock Duration among High Impulsivity. However, Low Impulsivity participants assigned to the Low Power condition administered shocks of significantly shorter duration than did those assigned to the Equal Power condition (F[1,27] = 7.30, $p < .05$). Moreover, mean duration of shocks delivered by Low Impulsivity participants was significantly shorter than that delivered by High Impulsivity participants in the Inferior Power condition (F[1,27] = 5.86, $p < .05$), while no such difference was evident in the Equal Power condition. These data are summarized in Appendix B, Figure 3.

Proportion "10". A 2 X 2, general factorial ANOVA was performed using Proportion "10" as a dependent measure. This analysis revealed a significant main effect for Power Discrepancy (F[1,59] = 4.16, $p < .05$), with participants assigned to the Equal Power condition employing the highest

shock available more often, as a proportion of the total number of shocks they administered, than those assigned to the Inferior Power condition. A significant interactive effect of Impulsivity and Power Discrepancy was also detected ($F[1,59] = 5.03$, $p < .05$). The significant interaction was explicated using one-way ANOVA procedures, which indicated no significant effect of Power Discrepancy on High Impulsivity participants' employment of the highest shock intensity available. Low Impulsivity participants assigned to the Inferior Power condition employed the highest shock intensity available with significantly lower frequency (as a proportion of the total number of shocks administered) than did those assigned to the Equal Power condition ($F[1,29] = 8.99$, $p < .01$). Additionally, Low Impulsivity participants delivered the highest shock intensity available with significantly lower frequency than did High Impulsivity participants in the Inferior Power condition ($F[1,29] = 11.38$, $p < .01$), while no such difference was evident in the Equal Power condition. These data are summarized in Appendix B, Figure 4.

Flashpoint Intensity. A 2 X 2, general factorial ANOVA was performed using Flashpoint Intensity as a dependent measure. This analysis failed to detect any main

effects, but revealed a significant interactive effect of Impulsivity and Power Discrepancy (F[1,59] = 4.28, $p < .05$). This significant interaction was explicated using one-way ANOVA procedures, which indicate that, while no significant effect of Power Discrepancy on the intensity of the first shock delivered was found among High Impulsivity participants, Low Impulsivity participants assigned to the Inferior Power condition administered lower intensities of shock at their "flashpoint" than those assigned to the Equal Power condition (F[1,29] = 6.19, $p < .05$). Moreover, intensity of shock delivered by Low Impulsivity participants at "flashpoint" was significantly lower than that delivered by High Impulsivity participants at their "flashpoint" in the Inferior Power condition (F[1,29] = 9.11, $p < .01$), while no such difference was evident in the Equal Power condition. These data are summarized in Appendix B, Figure 5.

Shock Frequency. A 2 X 2, general factorial ANOVA was performed using Shock Frequency as a dependent measure. This analysis revealed no significant main effects, but demonstrated a significant interactive effect of Impulsivity and Power Discrepancy (F[1,59] = 5.41, $p < .05$). This significant interaction was explicated using one-way ANOVA procedures. These analyses indicate no

significant effect of Power Discrepancy on Shock Frequency among High Impulsivity participants, but indicate that Low Impulsivity assigned to the Inferior Power condition administered fewer shocks than did those assigned to the Equal Power condition (F[1,29] = 4.29, $p < .05$). Low Impulsivity participants also delivered significantly fewer shocks than did High Impulsivity participants in the Inferior Power condition (F[1,29] = 6.80, $p < .05$), while no such difference was evident in the Equal Power condition. These data are summarized in Appendix B, Figure 6.

Flashpoint Duration. A 2 X 2, general factorial ANOVA was performed using Flashpoint Duration as a dependent measure. Interactive effects revealed by this analysis were at the level of statistical trend (F[1,57] = 3.55, p = .065).

Flashpoint Latency. A 2 X 2, general factorial ANOVA was performed using Shock Latency as a dependent measure. This analysis revealed no significant main or interactive effects.

DISCUSSION

This study sought to examine the effects of impulsivity and power discrepancy on aggressive behavior and, in so doing, examine the "appraisal" stage of the General Affective Aggression Model (GAAM; Anderson, 1997). This goal was pursued using data from participants reported to exhibit high and low levels of behavioral impulsivity, a trait that has been shown to undermine one's ability to engage in such contemplative processes (Barratt, 1994; Carella, 1998; Greve et al., 2002; Lemarquand, 2000). These participants completed a laboratory aggression paradigm, the methodology of which was manipulated to present or withhold a situational cue indicating threat of massive retaliation from a provoker/target (i.e., the latter's use of a shock switch ostensibly equivalent to 150% of the total amperage identified by the participant as his upper pain threshold). Such methodology has been previously demonstrated to inhibit aggressive response to provocation (Blanchard et al., 1987; Flannelly & Flannelly, 1985; Fitz 1976; Michener & Cohen, 1973; Shortell, Epstein, & Taylor, 1970).

It was hypothesized that significant interactive effects of impulsivity and power discrepancy would be revealed, such that high-impulsivity individuals would fail to attenuate their aggressive behavior in the presence of this inhibitory cue, while low-impulsive individuals would exhibit significantly lower levels of aggression in its presence than in its absence. These effects were expected to be evident across several behavioral indices of aggression; specifically, with respect to the magnitude and duration of aggressive strikes (both at the commencement of attack and over the entire course of the interaction), the latency between initiation of the task and first aggressive strike, employment of extreme levels of aggression, and overall frequency of strikes. High-impulsive individuals were also expected to exhibit generally higher levels of aggression than low-impulsive individuals, in accordance with past findings (Elliot & Mirsky, 2002; Giancola & Zeichner, 1994; Netter, Hennig, Rohrmann, Wyhidal, & Hain-Hermann, 1998; Zillman, 1988).

Nearly all of these hypotheses were confirmed. First, significant interactive effects of impulsivity and power discrepancy were found for mean shock intensity and mean shock duration. These results indicate that, while all high-impulsivity individuals attacked with similar

intensity and for similar duration irrespective of the threat of massive retaliation, the intensity and duration of attacks were significantly lower in the presence of this cue among low-impulsivity individuals. These significant differences were evident not only over the course of the entire interaction, but also at time of the initial aggressive strike, or "flashpoint;" the moment at which behavioral inhibition ceases and an individual unleashes an aggressive response.

Significant interactive effects were also revealed for an index of extreme aggressive response, indicating that high-impulsive individuals chose to attack with the greatest amount of force available to them with equal frequency regardless of massive retaliatory threat, whereas low-impulsivity individuals significantly curtailed their use of such force when presented with this threat. Finally, high-impulsive individuals attacked with equal frequency irrespective of power discrepancy, while those identified as low-impulsive chose to attack less frequently when threatened with massive retaliation from the provoker/target. Analyses also indicate that low-impulsivity individuals behaved less aggressively when presented with this threat than did high-impulsivity individuals (as indicated by each of the dependent measures

discussed above), while no such differences were evident in this cue's absence.

Several hypotheses were not confirmed. First, no significant differences were detected with respect to the latency to first shock or duration of first shock administered. These findings indicate that the threat of massive retaliation failed to significantly or differentially affect the latency between the initiation of the interaction and the first aggressive response emitted by high- and low-impulsivity individuals or the duration of that first response. These findings would appear to indicate that latency to first attack and duration of first attack represent two dimensions of aggression on which high- and low-impulsivity individuals do not differ as a function of inhibitory situational cues. However, in light of other results (specifically, the significant interactive effect on "flashpoint" intensity), it also appears possible that this finding reflects a propensity on the part of low-impulsive individuals, when confronted with the threat of massive retaliation, to "attack" at low levels and/or for relatively brief periods, perhaps as a way to communicate non-threatening intentions to the provoker/target. Alternatively, it is possible that a larger number of participants or a sample recruited from a non-student

population may add more information about these variables. This notion is considered worthy of further examination, as means for these indices suggested differences, albeit non-significant, supportive of the stated hypotheses.

Results also failed to demonstrate the hypothesized main effect of impulsivity, whereby high-impulsive individuals were expected to exhibit significantly higher levels of aggression overall than those identified as low-impulsive. Although these results stand in contrast to past findings regarding the effects of impulsivity on aggression (Elliot & Mirsky, 2002; Giancola & Zeichner, 1994; Netter et al., 1998; Peterson, 1997; Scarpa & Raine, 2000; Stuart, 1998; Thornton, 1985; Wiegner, 1999; Zillman, 1988), the use of high levels of provocation may have served to obscure the effects of this trait. Specifically, the exclusive use of this level of provocation (i.e., shock intensities representing not less than 85% of the total amperage identified as upper pain threshold) may have proven sufficiently provoking to stimulate relatively high levels of aggressive response for all participants. Examination of cell means demonstrates that no group delivered a mean shock intensity of less than 5.00 (of a possible 10 switches), perhaps providing support for this contention. Moreover, results of another study conducted

in this laboratory revealed significant effects for provocation, in which mean shock intensity fell at or below 4.00 under conditions of low provocation (i.e., provocation using shock intensities constituting 45% to 50% of the total amperage identified as upper pain threshold; Parrott & Zeichner, 2002).

Results of this study underscore the importance of "appraisal" processes in the production of aggressive behavior, as proposed by Anderson (1997) in his General Affective Aggression Model (GAAM). This author has suggested that the genesis of aggression occurs through interactive effects of individual differences and situational factors, which may activate one or more of three aggressive "pathways," characterized by aggression-related cognitions and beliefs, hostile affect, or physiological arousal. The "appraisal" stage is posited to represent the final stage through which an individual progresses immediately prior to making a decision regarding emission of aggressive behavior.

Although no explicit examinations of this stage of the GAAM have been performed prior to the present study, Anderson (1997) has suggested that such processes may be marked by observation and consideration of relevant situational factors, which may reinforce or attenuate an

individual's motivation to aggress. The present examination of the interactive effects of a trait that undermines one's ability to appraise salient situational cues, as well as presentation or withholding of such a cue (i.e., threat of massive retaliation from the provoker/target), provides support for Anderson's contention that such processes significantly influence emission of aggressive behavior. Specifically, the apparent ability of individuals who are inclined to behave in a relatively careful, deliberate manner to inhibit aggressive behavior under threat of massive retaliation, combined with the failure of individuals poorly equipped to engage in careful appraisal of salient situational cues to do so, suggests a significant role of "appraisal" processes in production of aggressive behavior. Moreover, these differences were evident across nearly every index of aggressive behavior examined in the present study, including magnitude and duration of aggressive strike both at the commencement of attack and over its entire course, employment of extreme levels of aggression, and overall frequency of strikes.

Despite the generally robust results yielded by this study, limitations are evident. First, the obtained sample of participants exhibited a high degree of homogeneity, as

a significant majority were single and Caucasian, and all were male high school graduates. Given the pervasiveness of aggression across all segments of society, examination of these factors among more diverse and potentially high-risk populations constitutes an important endeavor. Additionally, aggressive behavior evinced by women, although perhaps not as deleterious to society (from an epidemiological perspective) as that perpetrated by men, also represents an issue worthy of examination.

Exclusive use of high levels of provocation constitutes another limitation of the present investigation. As previously noted, this factor may have served to restrict the range of aggressive response exhibited by participants to relatively high levels and, hence, obscured group differences demonstrated in other studies. Use of varying levels of provocation might lend more ecological validity to this type of investigation, as it is plausible to assume that many, if not most, aggressive exchanges are triggered by low to moderate levels of provocation. Although a more comprehensive understanding of aggressive behavior across more diverse populations and under varying provocation conditions constitutes a worthy long-term objective, this

investigation makes a significant, if preliminary, contribution to the understanding of these processes.

Future research in the area of human aggression should continue to focus on integrated models such as the GAAM (Anderson, 1997), which endeavor to account for cognitive, affective, and physiological variables (manifested in both individual differences and situational factors) that serve to facilitate or inhibit this type of behavior. Specifically, studies are needed to establish aggressive "pathways" proposed in the GAAM in a more comprehensive fashion by simultaneously examining interactive factors contributing to their activation and tracing these "pathways" from their genesis, through the "appraisal" stage, and, finally, to their behavioral endpoint. Such investigations would contribute significantly to our understanding of the phenomenon of aggressive behavior and, perhaps, elucidate mechanisms for its diminution.

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APPENDIX A

TABLES

Table A.1

Descriptive Statistics (Age, Education, and Income)

Variable	Mean	*SD*
Age	19.58	1.64
Years of Education	13.99	1.07
Estimated Annual Income*	5.62	2.87

* Data coded such that 0 = $0-$5,000, 1 = $5,000-$10,000, 2 = $10,000-$20,000, 3 = $20,000-$30,000, 4 = $30,000-$40,000, 5 = $40,000-$50,000, 6 = $50,000-$60,000, 7 = $60,000-$70,000, $8 = $70,000+

Table A.2

Descriptive Statistics (Marital Status, Ethnicity)

Variable	Percent of Sample
Marital Status	
Single	95.00
Married	1.70
Cohabitating	1.70
Divorced	1.70
Ethnicity	
Caucasian	90.00
African-American	5.00
Asian	3.30
Hispanic	1.70

Table A.3

Means and Standard Deviations of OES Ratings with ANOVA Statistics by Power Discrepancy Group

	Mean (*SD*)		One-Way ANOVA
OES Item	Inferior Power	Equal Power	*F* value (*p* value)
1."Good RT test"	4.22 (0.69)	3.63 (0.97)	6.67 (.013)
3."Fair"	3.41 (1.01)	3.11 (1.22)	0.95 (.335)
4."Bully"	2.70 (1.13)	2.78 (1.22)	0.05 (.818)
5."Disadvantage"	3.96 (0.76)	1.85 (0.82)	96.65 (.000)
6."More pain"	3.93 (0.92)	1.74 (0.76)	90.51 (.000)
7."Extra switch"	4.33 (0.73)	1.85 (0.86)	129.39 (.000)
8."Not sure"	4.11 (0.93)	2.37 (1.15)	37.34 (.000)
9."Exploited"	2.22 (1.12)	1.56 (0.75)	6.59 (.013)
10."Wondered"	4.00 (1.24)	2.15 (1.16)	31.92 (.000)
11."Concerned"	3.33 (1.27)	2.07 (1.07)	15.49 (.000)

Table A.4

Means and Standard Deviations for Aggressive Magnitude Indices by Impulsivity and Power Discrepancy Group

Impulsivity Group	Power Group	Mean Shock Intensity (*SD*)	Mean Shock Duration (*SD*)	Proportion "10" (*SD*)
Low	Equal	8.26 (1.42)	721.63 (527.55)	0.39 (0.24)
	Inferior	5.07 (3.57)	310.43 (247.06)	0.16 (0.17)
	Total	6.66 (3.13)	501.35 (446.04)	0.27 (0.24)
High				
	Equal	7.11 (2.56)	590.05 (375.28)	0.35 (0.24)
	Inferior	7.60 (1.12)	736.48 (659.05)	0.36 (0.16)
	Total	7.35 (1.96)	660.74 (526.91)	0.36 (0.24)

Table A.5

Means and Standard Deviations for Aggressive Flashpoint (FP) Indices by Impulsivity and Power Discrepancy Group

Impulsivity Group	Power Group	FP Latency (*SD*)	FP Intensity (*SD*)	FP Duration (*SD*)	Shock Frequency (*SD*)
Low	Equal	3.00 (2.39)	6.00 (2.67)	325.46 (174.46)	11.40 (4.70)
	Inferior	4.50 (6.25)	3.47 (2.89)	232.33 (175.99)	7.27 (6.12)
	Total	3.67 (4.49)	4.73 (3.02)	275.57 (625.65)	9.33 (5.76)
High	Equal	3.07 (2.37)	5.93 (2.94)	273.00 (186.15)	10.33 (5.20)
	Inferior	2.53 (1.96)	6.27 (2.12)	363.79 (197.87)	12.47 (4.70)
	Total	2.79 (2.14)	6.10 (2.52)	316.83 (193.99)	11.40 (4.99)

APPENDIX B

FIGURES

Figure B.1

General Affective Aggression Model (GAAM; Anderson, 1997)

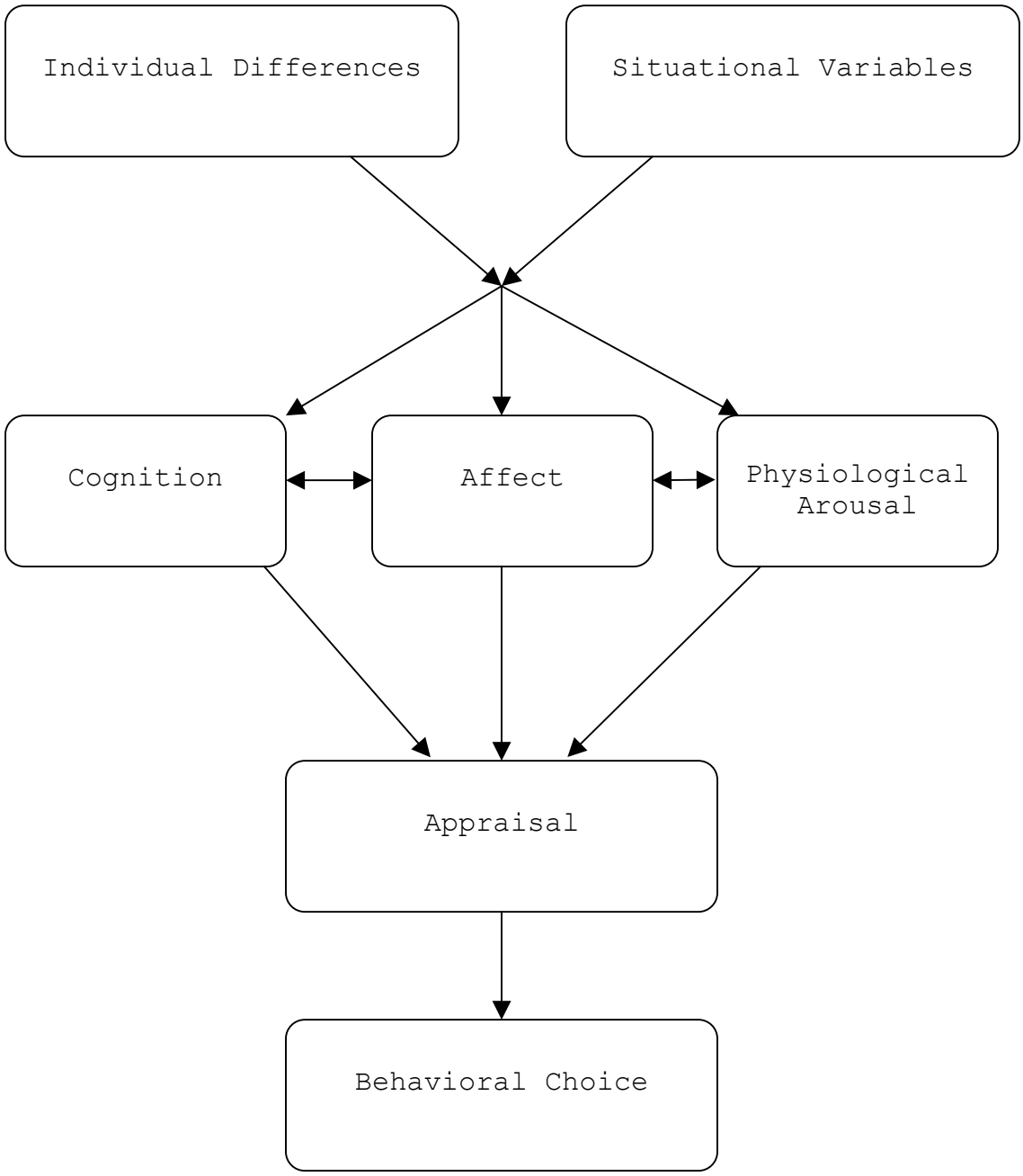


Figure B.2

Mean Shock Intensity (Impulsivity X Power Discrepancy)

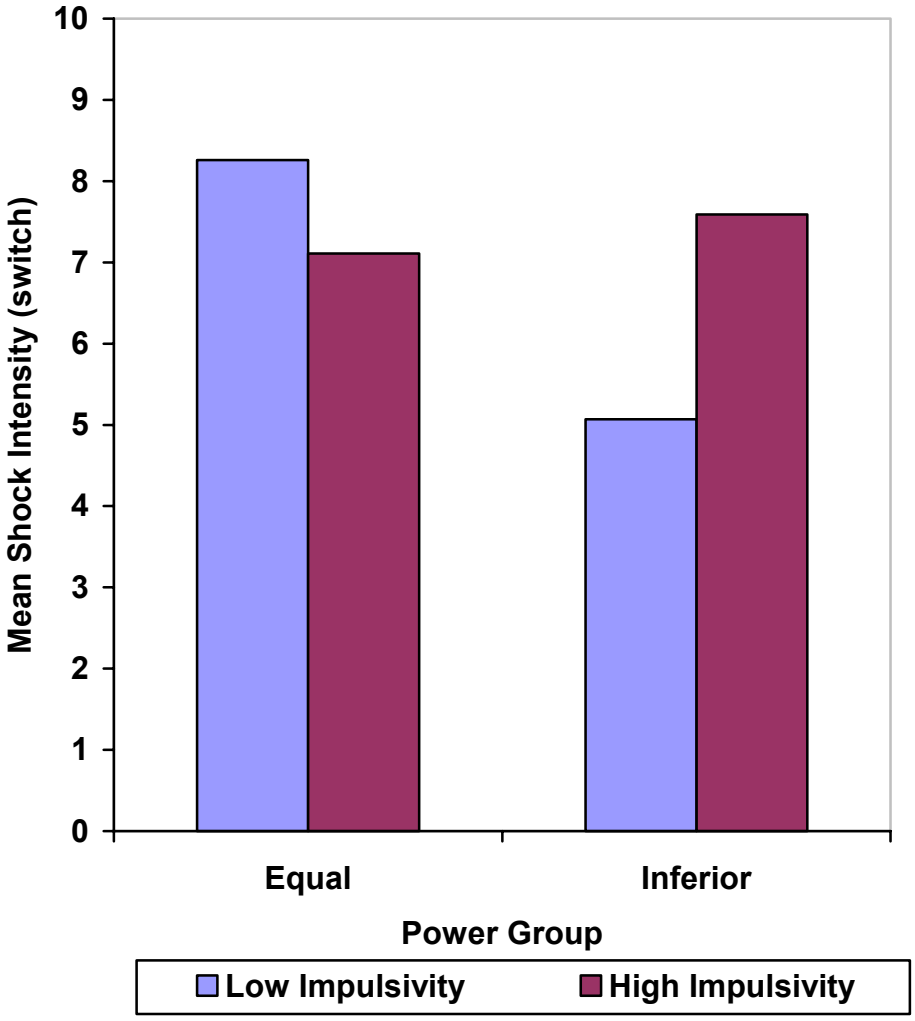


Figure B.3

Mean Shock Duration (Impulsivity X Power Discrepancy)

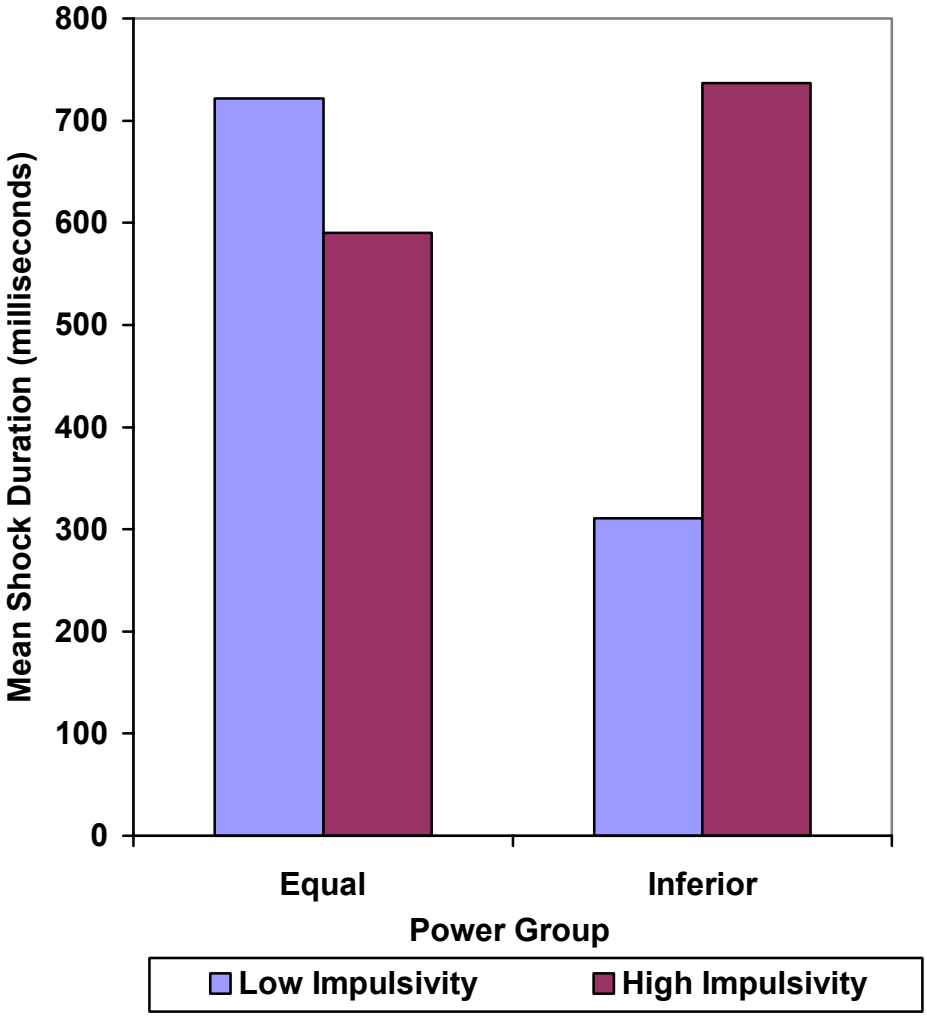


Figure B.4

Proportion "10" (Impulsivity X Power Discrepancy)

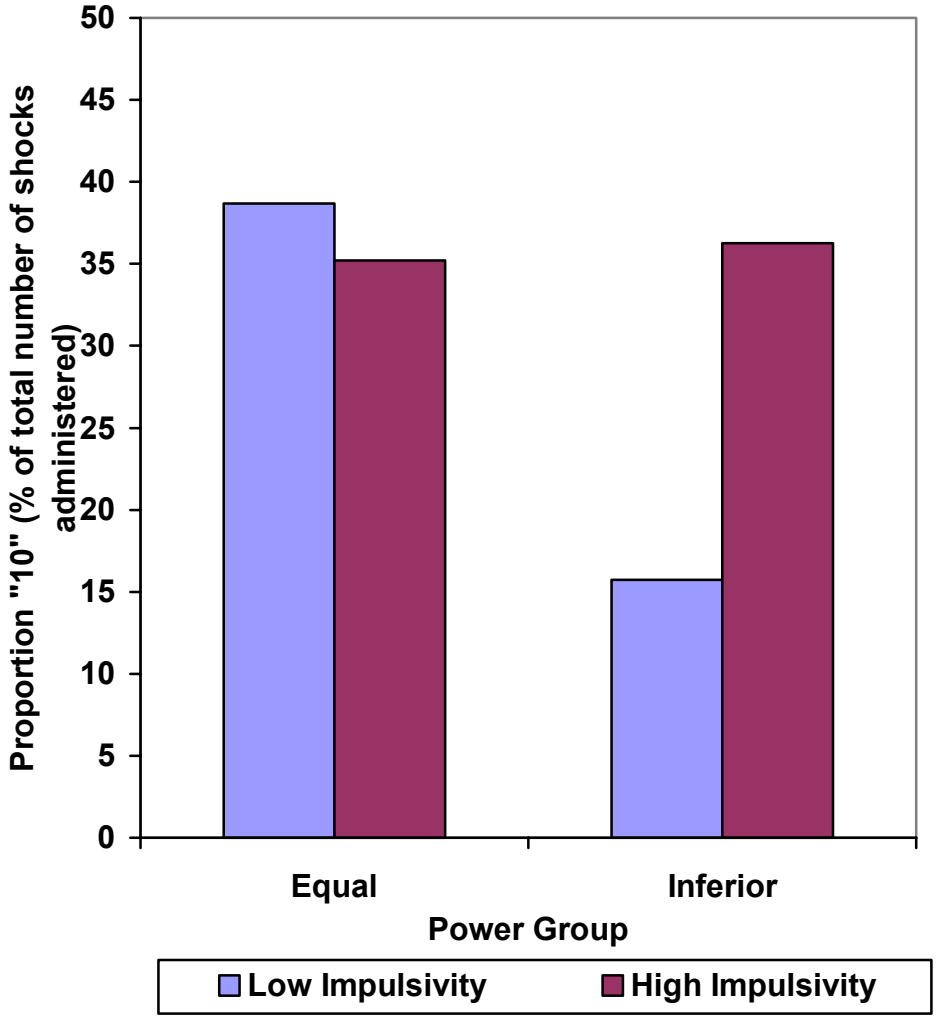


Figure B.5

Flashpoint Intensity (Impulsivity X Power Discrepancy)

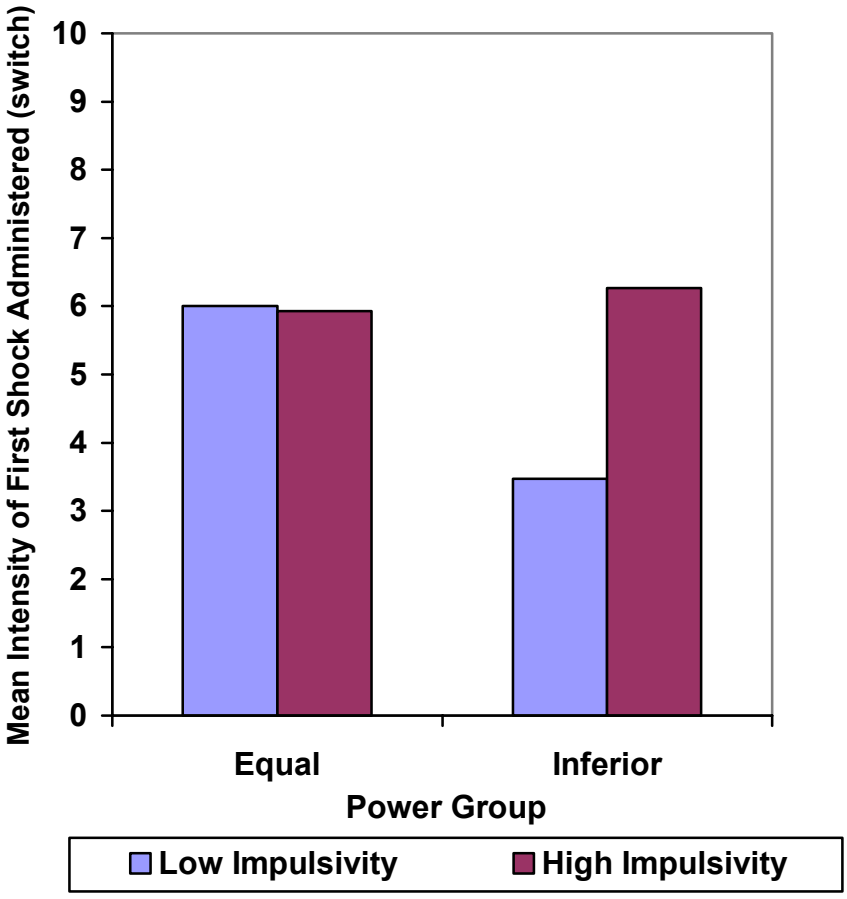
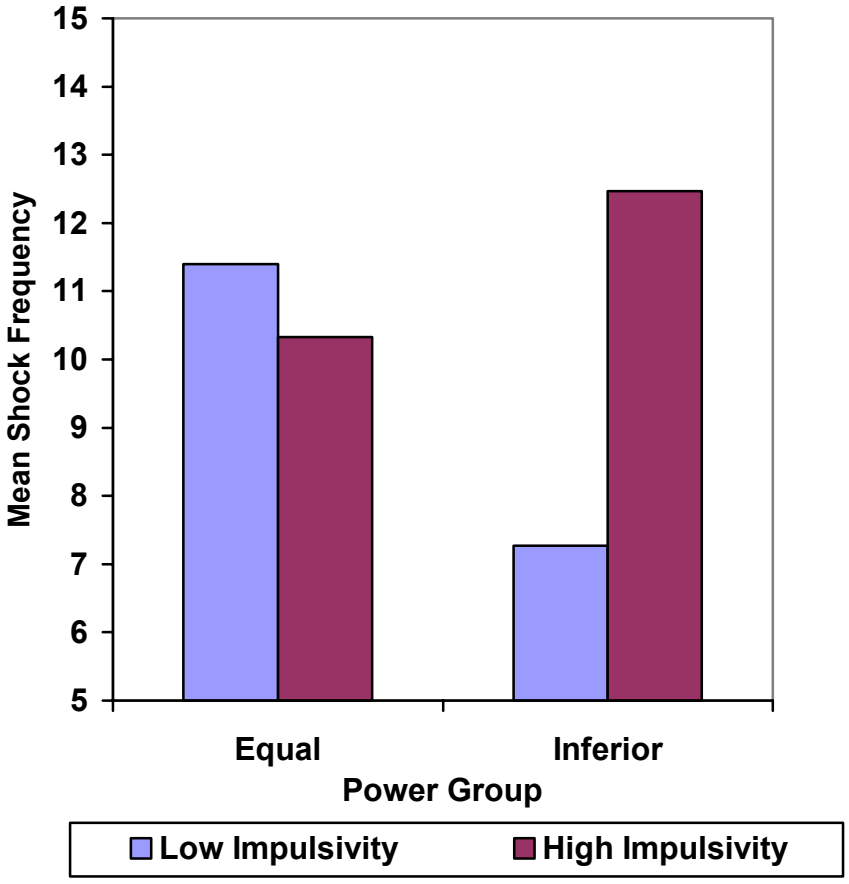


Figure B.6

Shock Frequency (Impulsivity X Power Discrepancy)



APPENDIX C

MEASURES

Measure C.1

BIS-11

Please indicate the degree to which each statement applies to you by circling the appropriate number. Circle only one response per item, and please make sure to answer each item.

	Rarely/Never	Occasionally	Often	Almost Always/Always
1. I plan tasks carefully.	1	2	3	4
2. I do things without thinking.	1	2	3	4
3. I make up my mind quickly.	1	2	3	4
4. I am happy-go-lucky.	1	2	3	4
5. I don't "pay attention."	1	2	3	4
6. I have "racing" thoughts.	1	2	3	4
7. I plan trips well ahead of time.	1	2	3	4
8. I am self-controlled.	1	2	3	4
9. I concentrate easily.	1	2	3	4
10. I save regularly.	1	2	3	4
11. I "squirm" at plays or lectures.	1	2	3	4
12. I am a careful thinker.	1	2	3	4
13. I plan for job security.	1	2	3	4
14. I say things without thinking.	1	2	3	4
15. I like to think about complex problems.	1	2	3	4

	Rarely/Never	Occasionally	Often	Almost Always/Always
16. I change jobs.	1	2	3	4
17. I act "on impulse."	1	2	3	4
18. I get easily bored when solving thought problems.	1	2	3	4
19. I act on the spur of the moment.	1	2	3	4
20. I am a "steady thinker."	1	2	3	4
21. I change residences.	1	2	3	4
22. I buy things on impulse.	1	2	3	4
23. I can only think about one problem at a time.	1	2	3	4
24. I change hobbies.	1	2	3	4
25. I spend or charge more than I earn.	1	2	3	4
26. I often have extraneous thoughts when thinking.	1	2	3	4
27. I am more interested in the present than the future.	1	2	3	4
28. I am restless at the theater or lectures.	1	2	3	4
29. I like puzzles.	1	2	3	4
30. I am future oriented.	1	2	3	4

Measure C.2

PANAS

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what you *feel* this way right now, that is, *at the present moment*. Use the following scale to record your answers.

1	2	3	4	5
Very slightly	A little	Moderately	Quite a bit	Extremely

_____	Interested	_____	Irritable
_____	Distressed	_____	Alert
_____	Excited	_____	Ashamed
_____	Upset	_____	Inspired
_____	Strong	_____	Nervous
_____	Scornful	_____	Determined
_____	Guilty	_____	Loathing
_____	Scared	_____	Attentive
_____	Hostile	_____	Jittery
_____	Enthusiastic	_____	Active
_____	Angry	_____	Afraid
_____	Proud	_____	Disgusted

Measure C.3

SAS

A number of statements that people use to describe themselves are given below. Read each statement and then circle the number that indicates how you *feel right now*.

	Not at all	Somewhat	Moderately	Very much
1. I am furious.	1	2	3	4
2. I feel irritated.	1	2	3	4
3. I feel angry.	1	2	3	4
4. I feel like yelling at somebody.	1	2	3	4
5. I feel like breaking things.	1	2	3	4
6. I am mad.	1	2	3	4
7. I feel like banging on the table.	1	2	3	4
8. I feel like hitting someone.	1	2	3	4
9. I am burned up.	1	2	3	4
10. I feel like swearing.	1	2	3	4

Measure C.4

OES

You have just completed a competitive reaction time task against an opponent. Below are several statements to solicit your evaluation of the task, your opponent's behavior, and other facets of the interaction between you. This will complete your participation in this study and results of this measure will not be shared with your opponent.

Please use the following code to respond to the following questions.

1	2	3	4	5
Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree

Reaction Time Task

1. _____ The task was generally a good test of reaction time.

2. _____ I think I was generally quicker than my opponent.

My Opponent

3. _____ He was fair.

4. _____ He was a bully.

Relationship Dynamics

5. _____ I was at a disadvantage with respect to the range of shocks I could use.

6. _____ He could inflict more pain on me than I could inflict on him.

7. _____ He had one, extra, higher-intensity shock button that was available *only* to him.

8. _____ During the task, I was not sure if he would use that button or not.

9. _____ My opponent really exploited the extra shocking power he had.

10. _____ I wondered when he might really "nail me" with that extra button.

11. _____ I was concerned about him hitting me with that extra button.