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Psychophysiological Markers of Cognitive Reactions to Depictions of Corporal Punishment

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Abstract

The following study assessed cognitive mechanisms, via physiological measures, in reaction to photos depicting conditions of corporal punishment, nonphysical punishment, and a neutral control. Detections in skin conductance (SCR) were used to examine autonomic stress response. The current study examined executive working memory (WM) processes as influenced by cognitive and psychophysiological response to viewing depictions of various punishments being implemented. Results of this study found that while participants reacted differently, autonomically and cognitively, to photo conditions, these differences were unrelated to other anticipated moderators such as tendency to internalize shame or greater personal exposure to corporal punishment. Subsequent analyses, however, discovered some unexpected significant trends and relationships.

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CHAPTER I

Introduction

Child rearing and discipline encompass a diverse nature of parental practices and beliefs from around the world. Physical punishment, namely spanking, has numerous advocates and opponents, and arguments over whether or not to spank has been debated on a world-wide scale. Thirty-three countries to date have actually banned the practice of corporal punishment (i.e., spanking), not only placing restrictions on schools and other institutional and public settings, but in private homes as well (see GITEACPOC, 2012). Furthermore, many additional countries are currently engaged in legislative processes aimed at outlawing corporal punishment within their nations.

Corporal punishment is defined by Strauss (1994) as "the use of physical force with the intention of causing a child to experience pain but not injury for the purposes of correction or control of the child's behavior" (p. 4). The term *spanking* is widely used in research to characterize various forms of physical and corporal punishment and thus has been used interchangeably with *corporal punishment* in prior research. For the purpose of the current study design, however, the definition of *spanking* will be restricted to modifying a child's behavior while avoiding injury and is conducted with **an open hand applied to the child's buttocks or extremities** (Friedman & Schonberg, 1996). This definition intentionally does not include injury-provoking and abusive disciplinary tactics, since they are both uncommon and widely regarded as harmful to the recipient.

Despite the opposition to corporal punishment as a disciplinary measure in a large number of countries, many families and cultures continue to use and advocate for spanking and other forms of physical punishment. MacKenzie, Nicklas, Brooks-Gunn, and Waldfogel (2011) reported that by their first birthday, 15% of American children had been spanked. This rate grew to 40% for children who had reached 18 months of age and progressed to almost 50% for children who had reached at least 20 months of age. MacKenzie and colleagues (2011) also discussed trends in disciplinary practice in terms of ethnic background between African American, Hispanic, and Caucasian households. In particular, African American caregivers tended to spank children at earlier ages than other racial groups began spanking. African American caregivers also tended to spank boys more often than other ethnic groups spanked boys. Furthermore, MacKenzie et al. (2011) reported that several social factors in a child's household—parental stress, difficult temperament of the child, young age for the mother, and birth order (i.e., being first-born)—were related to an increase in the likelihood that the child would be spanked. Straus and Stewart (1999) presented prevalence rates of corporal punishment in America, revealing that 94% of American parents have utilized corporal punishment on their children by the time a child was preschool age.

The frequency with which children have been subject to corporal punishment has been associated with several factors in addition to demographic information previously discussed. Variables such as socioeconomic status (Garbarino, 2013), whether or not the child's parent was physically punished (Graziano & Namaste, 1990), religious beliefs (Ellison & Bradshaw, 2009) and possibly gender (Boutwell, Franklin, Barnes & Beaver, 2011) have been associated with how likely children are to be spanked. In examining

demographic relationships, research has also pointed to potential disruptions in parent-child relationship (Gershoff, 2002; Graziano & Namaste, 1990) due to use of corporal punishment.

As stated, the use of spanking is controversial. To clarify and better inform the various platforms of the debate, any effects of spanking should be identified and examined. Clarifying the effects of spanking is necessary because answers may reveal profound implications for determining whether or not the practice of corporal punishment is directly harmful to development, and thus to the quality of life for the recipient. Researchers have examined these issues by studying child outcomes. Several child outcome constructs have been studied in order to determine likely relationships with use of corporal punishment (Gershoff, 2002). Examples include favorable outcomes such as moral internalization, mental health, quality of parent-child relationship, and immediate compliance as well as unfavorable outcomes including aggression, criminal and antisocial behavior, becoming a victim of physical abuse, or physically abusing others (see Gershoff, 2002).

Unfortunately, methods of measuring the effects of spanking are seldom able to illuminate the directionality or causality of associations with child outcome constructs. In other words, a statistically significant association linking history of spanking to any child outcome cannot sufficiently support that spanking *caused* that outcome because other variables could be confounding the data. Determining causal links between spanking and these constructs is nearly impossible due to the fact that personal history and exposure to spanking cannot be experimentally manipulated.

To date, most spanking and corporal punishment research has been correlational rather than quasi-experimental, which leaves ample room for subjective assumption about the real causes of developmental outcomes that have been linked to the use of spanking. How then can researchers better understand spanking? The following sections will elaborate on this topic to 1) provide a detailed description of spanking from its basic behavioral components, 2) discuss previous research related to child development and factors during development that might be impacted by spanking, 3) examine the neurobiological and cognitive applications of spanking when characterized as a source of stress, 4) summarize and integrate the findings from previous research, and 5) explain the current problem, which needs to be addressed in spanking research .

A Behavioral Approach to Spanking: Mechanisms of Operant Conditioning

As Chance (1999) describes, *punishment* is the "procedure of providing consequences for a behavior that reduces the frequency of the behavior" (p. 188). Spanking is a form of punishment, specifically *positive punishment* in which an aversive consequence is administered (or *added* to the situation) as a means to decrease the occurrence of a given behavior. This form of punishment is opposed to *negative punishment,* which is characterized by the *removal* of a stimulus the child likes as a means to reduce a behavior. As a disciplinary practice to reduce unwanted behaviors, spanking is intended to deter a child from participating in activities the caretaker deems undesirable (i.e. dangerous to the child's health or well-being, morally wrong, etc.). Chance (1999) asserts, though, that although some actions may be intended as *punishers*, the process is not actually punishment if the behavior in question does not actually

decrease as a result of the intended punishment (e.g. a parent continuously reprimands a child for violating curfew yet the child continues to do so without change). Likewise, punishment can occur without an express intent to weaken a behavior if the consequence decreases that behavior.

Conversely, *reinforcement* refers to any process aimed at increasing the occurrence of a behavior. *Positive reinforcement* is the act of adding a favorable stimulus to reward a behavior, whereas *negative reinforcement* is removing an aversive stimulus as a means of rewarding a behavior. Thus, punishment (suppressing behaviors) and reinforcement (strengthening behaviors) can both be classified according to whether or not a consequence includes adding something to the situation (i.e. positive classification) or removing something from the situation (i.e. negative classification).

Methods of operant conditioning (i.e. punishment and reinforcement), as Chance (1999) explains, may be easy to implement, but the behavioral outcomes of these methods are often dependent on other variables of the situation that can be difficult to detect or predict. This complexity is important to note because such extraneous circumstances may be responsible for causing behavioral outcomes that are not congruent with expected results in a given situation. For example, spanking can become a reinforcer if the child is seeking *any* kind of attention. Likewise, outcomes that are congruent with expectations may not indeed be due to the implementation of punishers and reinforcers. In other words, a child may behave favorably, yet do so as a result of extraneous situational factors outside the caregiver's control that were unassociated with the intended punishers or reinforcers.

Outcomes of punishment and reinforcement can also vary based on other factors including contingency and contiguity (Chance, 1999). A consequence must be implemented in such a manner that the response to a behavior is *contingent* upon the stimulus, so that the association between behavior and consequence is established. For example, if a child runs onto a road without looking for traffic, a punishment should be associated with the child's infraction, and thus administered directly when the child runs onto the road. Thus, behavior change will occur more quickly when the implementation of the consequence is directly contingent on the behavior.

In addition to contingency, *contiguity* must exist between the problem behavior and its consequence. Therefore consequences should occur immediately in time after a problem behavior has been committed. To compare the previous example, if a child runs onto a potentially dangerous road and is punished after several minutes or hours have passed, the child risks perceiving the consequence as being unassociated with the original infraction or even attributing the consequence to some behavior other than the actual infraction. Also, contiguity influences how quickly learning develops; the more quickly a consequence follows a behavior, the more effective it is in modifying the frequency of that behavior. Thus, for the child being punished for running onto the road, an *effective* punishment should consistently and immediately follow the unwanted behavior. Considering these factors of punishment and the distinction that punishment has occurred only when the behavior is actually decreased, how effective is spanking in the real world?

Some children can recall a parent threatening spanking ("Wait till your father gets home!"), but without the punishment occurring immediately after the unwanted behavior, it may not be effective as a disciplinary tool. While *threatening* spanking will occur later

after an infraction is not consistent with suggested factors of effective punishment (i.e., contingency, contiguity), some instances of physical punishment like scraping a knee due to risky behavior do occur immediately after the infraction. Immediate punishers, even if frequent and severe/intense enough, may not be sufficient to produce long-term behavioral change. These issues bring in question the effectiveness of physical punishment in parenting and in day-to-day life. While theories of behaviorism (i.e., operant conditioning) are doubtlessly applicable if not naturally relevant to understanding the effects of spanking, other domains of psychology including child development, cognitive psychology, and neuroscience have also examined the impact of spanking.

Impact of Spanking on Child Development

A growing field of research has taken on the task of exploring the actual effects of spanking and corporal punishment, especially to determine whether or not physical forms of punishment are harmful to normal development. Many longitudinal studies have shown that spanking and corporal punishment used on young children (i.e. children who are preschool age or younger) tend to predict negative behaviors and outcomes (i.e. aggression and externalization) later in the child's life (see Gershoff, 2002 for a review). Additionally, individuals who reported being slapped or spanked during childhood at all (not just those who were struck often) showed a significantly higher rate of anxiety disorders, alcohol abuse and dependence, and externalizing problems than their counterparts who reported never having been slapped or spanked (MacMillan, Boyle, Wong, Duku, Fleming & Walsh, 1999). Thus previous research on corporal punishment has established a near unanimous consensus among developmental psychologists that the

practice used on *young* children and infants is associated with negative outcomes later in life. However, the utility and outcomes of spanking for older children and adolescents is less clear, with some research indicating a possibility for neutral or even positive outcomes (Larzelere, 1996).

Corporal punishment is valued by its advocates for its effectiveness in gaining immediate compliance (Larzelere, 2000) which could be useful in emergency situations when immediate compliance is necessary to avoid danger or other negative consequences. The American Academy of Pediatrics (AAP), however, argues that spanking is actually less effective as a disciplinary strategy than time-out or removal of privileges. AAP explains that while spanking may produce immediate results in stopping undesired behaviors, spanking becomes less effective on the recipient's behavior as it continues to be used (Wolraich et al., 1998), a result that is consistent with the behavioral concept of *desensitization*. Consequently, the nature and effects associated with corporal punishment should be more fully evaluated.

Stacks and her colleagues (2009) conducted a longitudinal study to determine children's outcomes of aggression (after a history of spanking) which took into account the age at which children were spanked, ethnicity of the children's families, and a measure of the mother's warmth as a moderator variable. Results showed that maternal warmth did not moderate the impact of spanking on aggressive behavior, although child temperament was associated with such behaviors. Despite maternal warmth, spanking remained associated with aggressive outcomes. More recent research has also supported this finding (Lee, Altschul & Gershoff, 2013). These results indicate that the idea that

spanking out of love is beneficial while spanking out of anger is not, is not empirically supported.

Also during childhood and the teenage years, children are developing their self-concept, and its formation may be impacted by methods of discipline. Markus and Kitayama (1991) discussed types of individuals' self-construal (i.e. the way an individual perceives him or herself in relation to others) as independent or interdependent. People who identify with an *independent self-construal* see themselves as being independent of others and define themselves based on personal and internal characteristics rather than external factors in the environment. Conversely, people who identify with an *interdependent self-construal* see themselves in relation to others and as being defined by external, interpersonal factors. The authors discussed this independent-interdependent distinction in comparison to individualist and collectivist cultures, respectively, but the focal relevance for Markus and Kitayama's discussion to the topic of spanking is that certain emotions are elicited depending on type of self-construal. Specifically, interdependent self-construal is associated with emotions of sympathy and shame whereas independent self-construal is associated with emotions such as anger, frustration, and pride. If children who develop an interdependent self-construal are subject to being spanked, they could become more vulnerable to emotions of shame than they would have suffered otherwise whereas children who develop an independent self-construal might be more likely to become angry, frustrated, or possibly aggressive rather than feeling ashamed.

Erikson (1966) discussed shame as a possible outcome of crucial psychosocial stages early in life that influences the well-being of an individual's functioning in

adolescence and adulthood. Namely, if a child develops an outlook of shame rather than autonomy, the probability for optimal well-being later in life is diminished. Therefore, if the interaction between shame and a child's self-construal and spanking can be empirically observed, such an effect might have a profound impact on the risks of spanking and manner of punishment.

Spanking and Neurocognition

In addition to behavioral and developmental factors contributing to how spanking can impact an individual, there may also be neurobiological and cognitive consequences. To date, however, only two studies are known to have connected spanking with brain function and neurophysiology. This is minimal and lacking in comparison to the multitude of longitudinal and developmental research published on the topic of spanking and corporal punishment.

Tomoda, Suzuki, Rabi, Sheu, Polcari, and Teicher (2009) selected a sample of individuals based on spanking history, excluding participants who had been abused either physically or verbally, in order to examine any possible neurological differences between participants who were exposed to harsh corporal punishment. In this study, corporal punishment was operationalized as individuals who were exposed to any corporal punishment beginning before age 12 and occurring at least monthly for at least three years. The experimental group was comprised of participants who experienced harsh corporal punishment, defined by the authors as any corporal punishment in which an object was utilized for striking. The control group included participants who had only minimal if any history of corporal punishment. Results revealed a significant reduction in

cortical gray matter volume of the experimental group as compared to controls. This is important because grey or non-myelinated brain tissue allows the brain to quickly adapt, and is especially pivotal in conscious controlled processes including decision making, emotional control, and working memory (De Brito et al, 2013). Thus decreased grey matter is considered to have a negative impact on brain development and subsequently cognitive performance.

Elaborating on the discoveries of Tomoda et al. (2009), Sheu and colleagues (2010) found that individuals exposed to harsh corporal punishment showed functional and structural deficits in neuronal activity. Specifically, individuals who were exposed to harsh corporal punishment showed decreased working memory performance in comparison to controls, who had minimal to no history of corporal punishment exposure. Furthermore, Sheu and colleagues (2010) found deficiencies in dopaminergic systems and innervation in individuals who were exposed to harsh corporal punishment as compared to controls. This may actually explain an already established association between exposure to harsh corporal punishment and substance abuse as indicated in previous research (see MacMillan et al., 1999; Straus & Kantor, 1994).

Stress and Working Memory: Cognitive Implications of Spanking

Given the strong evidence that at least harsh corporal punishment, as defined by Tomoda et al. (2009) and Sheu et al. (2010), has a negative impact on the brain's development and subsequent cognitive development, it is important to consider potential neurocognitive sources. One likely source is stress. Spanking has clearly been associated with high levels of stress in research literature (e.g., Lansford et al., 2012;

Furusho, Matsuzaki, Nemoto, & Shibata, 2005; Medina et al., 2001) and should be further examined as a source of stress.

Stress, a disruption in physical or psychological well-being and accompanied by a physiological (autonomic) response, is a well-known concept to most individuals because of its salient negative valence, and thus is typically viewed as a problem that needs to be reduced. Its impact on various aspects of health and function are well known, as explained by a large body of research that has addressed the impact of stress on psychological health and function (e.g. Sapolsky, 2004). When stress occurs frequently on a chronic basis, the resulting concentration of glucocorticoids destroy hippocampal cells resulting in memory deficits due to neural degeneration, and cause a vast array of further health and psychological problems (Sapolsky, 2004). Task related stress, specifically, can be characterized as overall arousal that negatively impacts mental and behavioral performance.

Stress, then, has been extensively studied for its impact on performance and attentional resources which are necessary for executive working memory. *Attention*, not being a unified (though layered and complex) concept, is one that is often referenced. Chun, Golomb, and Turk-Browne (2011) explain that "…attention determines how well the target information is processed, how fast and accurate a task and response are executed, and whether the event will be later remembered" (p. 75). Several factors characterize this broad construct: a) limited capacity for targets, b) selection of target information, c) modulation of selected target information, and d) the vigilance required to sustain focus on such target information (Chun, Golomb & Turk-Browne, 2011). These divisions are useful not only for dissecting the concept but for understanding the

importance of executive processes such as *working memory*. Working memory, as Chun et al. (2011) describe, exists on the overlap of external and internal attentional processes, operating on new and perceptive information while utilizing internal, cognitive control to select, sort, and sustain focus. With this in mind, working memory is integral to higher order executive processes, such as problem solving, which are necessary for health, safety, and survival. The remainder of this section will outline some discoveries in attention and working memory research when task related stress, especially autonomic arousal, is induced.

The widely known Yerkes-Dodson Law (Yerkes & Dodson, 1908) is characterized by a curvilinear relationship between performance and arousal (i.e., as autonomic arousal increases, one's performance improves but then declines). Easterbrook (1959), explained—in what is now referred to as the *Easterbrook hypothesis*—that the changes in an individual's performance as a function of arousal should actually be attributed to the effect arousal has upon the range of cues available to the individual. In other words, performance is mediated by the restriction in the range of cue utilization due to heightened arousal. As a result, an individual forfeits attentional resources that may be necessary to meet the demands of a task when s/he is highly aroused.

Anderson and Revelle (1982) designed a study to assess the validity of the *Easterbrook hypothesis*. The study included a proofreading task that included errors in grammar (interword) and spelling (intraword). The researchers hypothesized that participants' abilities to notice such errors would decrease as their level of arousal

heightened, and that detecting errors in spelling (low attentional demand) would be more successfully detected than errors in grammar (high attentional demand).

To test this hypothesis, Anderson and Revelle (1982) devised a method to measure the effects of arousal—a general increase of sympathetic physiological activity—as the independent variable. Attentional capacity, indexed by the ability to detect grammatical and spelling errors during a proofreading task was measured. They recruited participants with varying levels of impulsivity and assigned them to one of two conditions—caffeine or placebo—before implementing the proofreading activity, which instructed participants to read a passage and indicate any errors as well as error type. The caffeine condition provided the arousal manipulation. Participants who were given caffeine detected fewer errors than the placebo group (and overall, all participants failed to detect as many interword as intraword errors). Thus the study supported the original Easterbrook hypothesis in that increasing arousal was related to impaired cognitive performance and narrowed attention, resulting in further errors.

In continuing the research on attention-based cognitive processing, Wood, Mathews, and Dalgleish (2001) designed a series of experiments to assess the role of anxiety (i.e. stress), in cognitive inhibition. *Cognitive inhibition* is the process of avoiding or ignoring distracting information. Thus, it relies on the ability to maintain attention in the midst of interference from other stimuli. Operating on the notion that people who are characterized by high levels of anxiety are more easily distracted than those who have low levels of anxiety, Wood and her colleagues devised methods to test the hypothesis that people who have high levels of trait anxiety (anxiety level being the quasi-

independent variable) lack the normal ability to inhibit distracting stimuli, especially threatening stimuli.

In the first experiment, participants were presented with a sequence of homographs (i.e. words that are spelled identically but have different meanings) and instructed to match the homograph to a particular meaning (Wood et al., 2001). Stimulus words were presented on-screen and duration of display was manipulated. While display duration impacted response time, the quasi-independent variable of anxiety proneness did not show a significant effect on inhibition. In the second experiment, participants completed the same task but were grouped according to their working memory capacity as determined by an assessment of capacity for digit span. With the additional independent variable manipulating mental load, results showed significant deficits in inhibition for highly anxious participants. The third experiment utilized a sample of survivors of traumatic events to insure their sensitivity to detecting threatening meanings and the procedure for the previous two experiments remained the same. Results showed slower responses for this sample, in comparison to a volunteer control sample, as well as deficits in inhibition for high anxiety participants who had experienced violent trauma. Overall, high anxiety was shown to impair cognitive inhibition in regard to threatening stimuli when attention span was already compromised, which would suggest that several factors aside from anxiety can enhance its negative effects on attentional capacity.

The ability to refrain from distractions is necessary for selective attention. Finucane (2011) elaborated on the concept of interference in selective attention by incorporating emotional aspects of fear and anger using a *flanker task*. A flanker task is a type of response inhibition task that measures selective attention. It is comprised of

flanker stimuli formatted to surround a target to which the stimuli may or may not be congruent; if incongruent, the surrounding flanker stimuli serve as distractors (Eriksen & Eriksen, 1974). Finucane's study hypothesized, based on the Easterbrook hypothesis *and* findings that certain types of anxiety such as fear may actually increase ability for selective attention, that fear and anger would actually promote successful selective attention under certain conditions.

To manipulate emotion (fear and anger), participants were shown video clips that had previously been used to induce such emotions and a control group was shown a clip about nature. The dependent variable (i.e., selective attention) was assessed by using a flanker task in which participants were instructed to respond to trials of strings of letters (by reporting the letter in the middle) which were either identical or not, containing a different letter than the rest in the string. Interactions were revealed for the emotional factors which supported the hypothesis that people in fear and anger condition were more successful on incongruent trials than control subjects. Finucane explained that this outcome is likely a result of adaptation in order for individuals to remain attentive amidst threatening surroundings. Thus, stress in the form of fear and anger is not always necessarily debilitating and may actually be adaptive in threatening situations. Of further importance, these results also show an exception to the Easterbrook hypothesis because fear and anger are commonly used to heighten arousal.

The Easterbrook hypothesis has been cited in many studies but reportedly does not offer any explanation or model as to how attention capacity is impacted by stress (Booth & Sharma, 2009). In order to further explore this mechanism, Booth and Sharma created a study using the Stroop test, which is a test comprised of a list of words that

name colors (e.g., “BLUE,” “GREEN,” “RED,” etc.) that are printed in their congruent colors or in different, incongruent colors. Their aim was to determine the roles of working memory (WM) span (high or low) in attentional control and selection during a high-interference activity.

The researchers hypothesized that individuals with high WM spans would have the ability to ignore irrelevant information in the midst of interference, whereas individuals with low WM spans would mistakenly ignore information that was actually important. To test this hypothesis, they administered the Stroop test to participants while playing either extremely loud white noise as high stress interference, meant to distress participants by impairing focus, or they played unstressful, low noise, thus manipulating the first independent variable. Two more independent variables included the type of trial in the Stroop task—manipulated as either congruent or incongruent—and the ratio of congruent trials during the task segment. Afterward, participants were given an Ospan test (Turner & Engle, 1989), a measurement of WM that requires maintaining a list of words in WM while engaging in a mathematical problem distractor. The hypothesis was supported in that individuals with high WM attention spans were successfully able to ignore unimportant information (color incongruence) in the Stroop test amidst the high stress manipulation, whereas individuals with low WM attention spans were not. Booth and Sharma argue that although their results supported Easterbrook’s hypothesis, the nature of the results also suggest that a more defined model of the effect of stress on attention (i.e., WM span) is necessary to fill the gap in theory.

Attention, namely WM capacity, has been examined in a variety of ways and methods. The Easterbrook hypothesis has influenced the formulation of new hypotheses

on topics that relate stress to WM capacity and the ability to inhibit interference. While research has discovered specific outcomes for WM span and control as determined by stress, these outcomes have depended on the type of stress and arousal as well as the nature of other present factors impacting attention-based cognitive processes. Whereas Finucane's (2011) results showed enhanced performance in fearful or dangerous settings, most studies examining physiological arousal and anxiety responses to threat have shown negative effects on WM span and information processing. Emotions related to anxiety, however, do not necessarily show the same pattern.

For example, with anxiety being a form of stress that is related to fear and worry, it is necessary to consider the nature of the relationships that link stress and these emotions to cognitive processing. The current varying models that researchers use to base their hypotheses allows for differing expectations depending on the types of variables involved. For example, Finucane (2011) formulated hypotheses based on the Easterbrook hypothesis and other theories which guided a prediction that some types of stress should enhance attentional abilities whereas other researchers predicted that any demands of cognitive space, especially by anxiety, would result in attention span deficits.

In light of the possibility that a child or individual may develop post-traumatic stress disorder (PTSD) after being exposed to corporal punishment (Junichi, Kumiko, Yoshiko & Reiko, 2005), the relationship between traumatic or high emotional salience and cognitive process should be noted. Chun and colleagues (2011) describe the role of saliency in attentional features, explaining that processing is enhanced within these features due to selection of target based on it saliency. Based on this reasoning, that attentional resources are directed to emotionally salient targets (among others), this

attentional selection and modulation would likely be enhanced in individuals who suffer from posttraumatic stress.

Though stress has been seen to repeatedly impair cognitive processes, it is important to note what factors may be mediating or moderating these influences and these situations in light of the evidence that certain types of stress and arousal actually enhance attentional selection and control rather than interfere with those processes. **WM span and ability to control attention thus are not predictable simply by the presence of stress.** Specifying the type of stress is necessary before predicting attentional outcomes. Furthermore, considering that spanking is an action that induces stress upon an individual, it is important to consider the possible risks of utilizing this method of discipline and any impairment it might cause. Likewise, it is important to consider whether any claim of harm attributed to spanking is overstated, considering some forms of stress have been seen to enhance important cognitive processes.

Detecting Stress and Autonomic Arousal

Stress can be discussed as both the process and result of autonomic nervous system arousal. The autonomic nervous system is comprised of two branches: the sympathetic autonomic nervous system and the parasympathetic autonomic nervous system (Bear, Connors, & Paradiso, 2007). The sympathetic nervous system branch is responsible for what is traditionally referred to as the "fight-or-flight" response that occurs when an individual experiences some type of arousal such as fear or distress. The parasympathetic nervous system is responsible for bringing the body's activity back to a normal homeostasis.

Activation of the sympathetic and parasympathetic branches of the autonomic nervous system, according to Bear and colleagues (2007) are actually complementary rather than oppositional even though they seem to defy each other. Parasympathetic nervous system activity calms the body after a stress response and allows for normal physiological functioning (e.g. digestion, blood flow to gastrointestinal tract, excess of blood leaves muscles, etc.) to resume. When the sympathetic nervous system is activated, however, this increase in autonomic activation serves as an involuntary eruption of physiological activity that can then be subject to detection and analysis. Fluctuations in physiological autonomic activity, then, can show the amount of arousal, especially distress that a person is experiencing. Also, upon analysis of the nature of the fluctuation, certain measures can detect what type of stress, or autonomic arousal, the individual is experiencing.

Because the stress response has characteristic physiological components (i.e., increases in autonomic physiological activity upon encountering an arousing stimuli), physiological measures can be taken that detect changes in the individuals' autonomic nervous system. Multiple methods can be used to detect a stress response (i.e. autonomic arousal), one of which is characterized by measuring an individual's skin conductance, or rather, the skin conductance response (SCR).

SCR is a physiological measure used to detect changes in autonomic arousal and activity (BIOPAC). Electrodes are used to detect small changes in impedance, or electrical activity on the surface of the skin, which occur due to sweating. During sympathetic autonomic arousal, minute increases in sweat reach the skin's surface; thus, increases in SCR measures indicate an autonomic stress response has occurred.

Summary of Prior Research

Corporal punishment and spanking are disciplinary practices that are widely debated across international boundaries. A large body of research examining punishment has shown that it can reliably stop or diminish unwanted behaviors. Corporal punishment in the form of spanking is a common punishment utilized by caregivers as an indication to the recipient (i.e. the child) that an action was wrong or undesirable. Spanking, thus is often used to decrease unwanted actions. Spanking has been shown, however, to be associated with many harmful secondary consequences including increased stress, lower intelligence, and attentional and memory declines. The extent to which spanking may be harmful is not fully clear, though, with some research suggesting that spanking, being a source of stress, might possibly have some positive outcomes by increasing selective attention (Finucane, 2011; Booth & Sharma, 2009). Still the preponderance of research has connected spanking to adverse effects on the child target, and these harmful consequences are thought by most academicians to outshine any decrease in problem behaviors.

Spanking has been heavily debated in the political sphere as well as its social and developmental implications. Less research using empirical measures have been performed, however, with a relatively small number of studies examining the cognitive and psychophysiological implications of spanking. This trend yields a limitation in that discoveries of such associations between spanking and possible outcomes do not offer any causal explanations that would illuminate the actual nature and effects of spanking.

Maternal warmth carries major social value for a child's social development. However, maternal warmth in relation to spanking was shown to have no significant

[positive] impact on children's behavioral outcomes, specifically concerning a child's tendency to act out in aggressive manners (Stacks et al., 2009). Thus this specific context of being spanked did not seem to impact the tendency for the child to later act in an aggressive way. So it appears that the act of spanking may be harmful, and the conditions under which spanking occurs (e.g., spanking out of anger or not) are not as critical as the act of spanking itself. Such findings may implicate harmful effects of spanking via cognitive systems for implicit processing, relate to automatic, attentional and memory systems. This point is important because arguments have often focused on why a parent spanks his/her child, and not the cognitive and psychophysiological consequences of spanking itself.

Determining the nature of impact that physical punishment has on individuals is at present a priority in spanking research. Until this impact is established, any specific effects of spanking cannot be examined. Subsequently, we should determine whether the stress that physical punishment induces is any worse or different from the stress that other nonphysical forms of disciplinary punishment induce in individuals, especially children. It is imperative that these distinctions be made clear initially to permit the possibility for experimentally assessing the nature of the specific effects that spanking and corporal punishment have on children who experience this disciplinary method and thus its potentially harmful consequences to development. Stress is often measured as indicated by an increase in sympathetic nervous system activity which can be measured through various physiological methods. A common method of collecting physiological data that characterizes stress responses is the skin conductance response (SCR), a measure of stress-induced sweating on the surface of the skin.

Statement of the Problem

The purpose of the current thesis is to expand on our understanding of the cognitive and psychophysiological consequences of spanking. While the majority of prior research concludes that spanking is harmful, the full nature of these effects remains unclear. Studies have shown that spanking is associated with high levels of stress (Lansford et al., 2012; Furusho, Matsuzaki, Nemoto, & Shibata, 2005; Medina et al., 2001). Utilizing both behavioral (accuracy, response time) and psychophysiological measures (skin conductance), the current research will advance our understanding of how psychophysiological markers of arousal (i.e., SCR), attention, and working memory processes are impacted by corporal punishment.

The current study examined college undergraduates on three levels. Participants were asked a series of questions that determine their prior history of corporal punishment and given a survey used to assess a person's tendency to internalize shame. All participants were then asked to perform a cognitive task, a 2-back task with distractors (flankers) embedded, in order to assess WM. Although the n-back (2-Back) task has not received strong support for construct validity as a measure of WM span, it has been shown to account for variance separate from that of WM on measures of general fluid intelligence (Raven, Raven, & Court, 1998). Furthermore, studies have shown associations between 2-back performance with IQ (Gevins & Smith, 2000; Hockey & Geffen, 2004) and academic performance of children as rated by their teachers (Aronen, Vuontela, Steenari, Salmi, & Carlson, 2005). The task utilized 40 separate color image photos, with 10 photos illustrating examples of harsh corporal punishment, 10 photos

depicting open-hand spanking, 10 photos depicting nonphysical punishment, and 10 photos depicting neutral, non-punishment scenarios.

The study was designed to examine whether the childhood incidence of corporal punishment is found to be related to reactions of being spanked, *and* if these individuals who experienced spanking and corporal punishment showed significant deficits in attentional and WM abilities as compared to individuals who were *not* spanked. These examinations are needed to fill an extensive gap in spanking research literature.

This study proposed the following hypotheses:

1. Individuals who possess a higher tendency to internalize shame will show more pronounced autonomic stress activation to photos depicting physical punishment.
2. Given the nature of spanking and corporal punishment as a physical method of discipline (i.e., punishment), participants will show increased and more pronounced stress reactions via physiological increases in skin conductance to images that portray corporal punishment than for images that depict nonphysical punishment and non-punishment.
3. Individuals who were exposed to more severe levels of corporal punishment in childhood will show different working memory performance for situations where distractors (flankers) depict intense corporal punishment (HCP) rather than for low intensity corporal punishment (spanking) or other nonphysical forms of punishment. This hypothesis will be examined by the Flanker Embedded 2-Back Task. If the salience of the corporal punishment images allows for greater activation of memory systems, then high spanked participants should have increased memory performance.

If, however, the spanking images create a stressful event for high spanked participants, then memory declines would be expected.

4. Due to the emotional salience of depictions of punishment, participants with a stronger history of corporal punishment exposure will more accurately recall depictions of punishment in the order of intensity: HCP, spanking, nonphysical punishment, then non-punishment scenarios.

CHAPTER II

Method

Participants

A sample of 60 adult EKU students (12 males, 48 females) ranging from age 18 to 72 (M = 24.27, SD = 9.47) volunteered to participate in this study by registering via an online student account with the university's SONA research system. A sample size of 59 was determined from performing a power analysis with parameter estimates of alpha = .05, effect size of 0.20, 3 predictor variables, and three criterion variables (Soper, 2014; Cohen, 1983). Individuals who participated were not pregnant, had correct or corrected vision, and reported no history of neurological, memory, or learning disorder.

Six participants reported no religious affiliation for their family during childhood while the remaining 54 reported various denominations of Christianity. Forty-seven participants reported that their primary disciplinarian was spanked during childhood while 3 reported that the primary disciplinarian was not spanked and the remaining 10 reported "Don't know" to the same item. In addition, when responding to items concerning quality of current relationship with primary childhood caregiver, most participants rated their relationships as being "Close" or "Extremely Close." A more detailed collection of participant demographic information with visual representation is available in Appendix D.

Materials and Apparatus

Corporal Punishment Survey. Each participant's experience with corporal punishment was assessed using an exploratory 22 item survey (Appendix A) before proceeding in the experiment. Items on this survey assessed multiple areas of participants' personal exposure (i.e., as the recipient) and attitudes toward corporal punishment, using a combination of open-ended and multiple choice response formats. Several items in the survey were reverse worded in order to avoid a scale bias. (These items were reverse-coded prior to scale evaluation and later analyses.)

The response format was integral in deriving a useful coefficient from the survey. Most items were measured quantitatively. With the exception of the first five questions, remaining items were formatted according to a 5-point Likert scale with "1" indicating "Strongly Disagree" and "5" indicating "Strongly Agree." Responses to these items were coded with numerals 1 through 5, respectively, in the final data set. Of the first five items, only the second (i.e., "How many times in your childhood were you physically punished…?") was measured quantitatively.

Because possible responses to this item ranged ordinally from 1 to 10, with higher numbers corresponding to higher incidence, responses to this item were standardized to a 5-maximum scale (e.g., '3' becomes '1.5') to avoid inflating averages calculated with Likert items. To account for participants who had never received corporal punishment, a sixth response option, "I was never spanked," was available for exposure relevant items. In order to mathematically reflect the absence of corporal punishment exposure and parse non-recipients from recipients, these responses were coded as "0" within the final data set. Due to the complexity and diversity of responses to qualitative items, I decided to

use only quantitative items (i.e., 2, 6-22) in analyses in order to ensure reliable and valid interpretation of results.

Noting how these items were measured, the efficacy of the Corporal Punishment Survey was evaluated. The survey was designed with the intention to examine four separate subcomponents, including 1) attitudes concerning the use of corporal punishment, 2) degree of distress at recalling corporal punishment, especially spanking intensity and perceived harm, 3) degree to which participant felt corporal punishment was deserved, and 4) frequency of having received corporal punishment. Although the survey was created to index the degree of an individual's exposure, items relating to opinions and attitudes were included so that information that might be highly confounding was not neglected. A scale reliability analysis yielded a Cronbach's alpha of .86; thus, the scale was determined to have favorable internal consistency. Appendix B outlines how factor analysis of all quantitatively measured items (i.e. items 2, 6-22) was used to inspect the structure of this survey to derive the optimal formula for a corporal punishment exposure (CPE) coefficient.

Demographic Questionnaire. A demographic questionnaire was administered to gather social and personal information about each participant (Appendix C). This questionnaire asked the participant's age, ethnicity, and several personal and family history variables. The questionnaire also included items concerning personal information (e.g., socioeconomic status, religious subscriptions, education level, etc.) that may confound participant responses about punishment attitudes and experience.

Internalized Shame Scale (ISS). Participants completed the Internalized Shame Scale (ISS; Cook, 1987). The ISS is a 30 item questionnaire that examines an

individual's tendency to internalize shame using a 5-point Likert type rating scale with "0" indicating "Never" and "4" indicating "Almost Always" as responses. Only 24 of the items are measures of affect and cognitions involving internalization of shame (also referred to as *trait shame*). Responses to these 24 items only, were averaged to calculate participants' tendency to internalize shame. The remaining 6 items—1, 3, 9, 10, 20, and 29—comprise a measure of the individuals' level of self-esteem as adapted from the Rosenberg Self-Esteem Scale (Rosenberg, 1965). The positively worded self-esteem scale items are not calculated as part of the individual's shame index but rather are included to counterbalance the negatively worded internalized shame items. (Self-esteem measures were not analyzed in this study.)

Reliability and validity analyses for the ISS revealed favorable results. Test-retest reliability for the shame scale items and self-esteem scale items showed coefficient alphas of .81 and .75, respectively (del Rosario & White, 2006). Measures of internal consistency for the shame and self-esteem scales yielded Cronbach's alphas of .97 and .90, respectively (del Rosario & White, 2006). Discriminant and convergent validity of the ISS were also assessed by comparing guilt measures to the shame scale and performing correlational analyses between the ISS and the Tennessee Self-Concept Scale. Results revealed significant positive associations between the scales, thus lending support for construct validity of the ISS (Swearer, 2001).

2-Back Task. A 2-back task for measuring executive working memory (WM) processes was administered using the E-Studio program in E-Prime software (Appendix E). A 2-back paradigm is a specification of the *n-back* task (Kirchner, 1958), which is a measure of continuous-recognition that requires a participant to determine whether each

stimulus presented in a sequence matches the stimulus that was presented *n* stimuli ago. Thus, a 2-back sequence requires the participant to respond whether each stimulus as it is presented in a sequence *matches* or *does not match* the stimulus that occurred **two** presentations before.

A 2-back paradigm (rather than a 1-back, 3-back, or more) was selected after preliminarily piloting several versions of the task (i.e., 1-back, 3-back, 500-ms stimulus duration, 1500-ms stimulus duration, etc.). These differences were piloted in order to refine procedural details that would allow for a practical level of task difficulty for participants. Ultimately, I modified previously studied n-back procedures (Kane, Conway, Miura & Colflesh, 2007) to instead use longer stimulus and interstimulus intervals—3000-ms and 1000-ms, respectively—in order to produce a task suitable for a participant sample with diverse and extreme scores in accuracy; thus, all participants could perform the task without risking sample-wide ceiling or floor effects.

The 2-Back Task used in this study was programmed to present a target stimulus lasting 3000-ms followed by a blank white screen, which lasted for 1000-ms to create an interval between stimuli. Any target stimulus presented on screen was one of 6 possible geometric shapes: triangle, diamond, circle, hexagon, square, or angled parallelogram. Each shape was designed as a white image outlined in black and had a width of 45x45 pixels. Note that words and letters were not chosen as targets in order to eliminate any potential confounds in some individuals' ability to retain phonetic memories more easily than others.

Response settings were programmed to accept an entry of either "1" or "3" for any trial, indicating "match" and "nonmatch," respectively. A random sequence of target

presentations was programmed by first generating a random number sequence to determine the order of match versus nonmatch trials. This was organized by assigning each even number as a *match* trial and each uneven number as a *nonmatch* trial. From this randomized sequence, a block of 42 trials was created, allowing for 2 initial trials to be presented prior to any match/nonmatch decision, and 40 stimulus trials containing an equal number of both match (n=20) and nonmatch (n=20) trials. (Using an equal number of match and nonmatch trials eliminated the risk of accuracy bias, especially in the potential event that a participant responded strictly "match" or "nonmatch.") After confirming that no more than three match or nonmatch trials in a row existed in the sequence block, geometric shape targets were randomly chosen to adhere to the trial sequence. Thus, a full sequence block was created. All participants received the same sequence of trials for the task. Lastly, an answer key was programmed into the E-Studio 2-back paradigm to calculate correct and incorrect responses, i.e., for each *match* trial, the correct response was "1" and for each *nonmatch* trial, the correct response was "3." Any trials to which a participant did not respond were considered incorrect.

Image Rating Task. The Image Rating Task included both an image rating sequence and simultaneous physiological data collection. Participants were shown each of 40 photographic color images (see examples in Appendix F) digitized and presented on a computer monitor via the E-Studio program in E-Prime software and asked to rate how distressing each image was on a scale from 0 to 9.

Images were characterized by four distinct categories which included a) harsh corporal punishment (*HCP*) scenarios (n=10), b) open-hand spanking scenarios (n=10), c) nonphysical punishment scenarios (n=10), and d) neutral, non-punishment scenarios as

controls (n=10). HCP scenarios depicted children being struck with an object, e.g., belts, paddles, etc. Spanking scenarios depicted children being struck by a parent's open hand on the buttocks. Nonphysical punishment scenarios depicted children receiving a verbal reprimand or time-out. (Children in time-out were shown standing or sitting in a corner while verbal reprimand was indicated by a parent, usually pointing a finger, exhibiting a stern facial expression toward the child.) These distinctive scenario depictions were selected in order to make photos consistent with the aforementioned operationalizations of corporal punishment, namely HCP and spanking.

Each of the four photo conditions was created according to additional parameters to ensure consistency across several variables as a means to eliminate confounds. The number of photos for each condition was proportional in terms of a) visibility of the child's face, b) gender of child, c) gender of disciplinarian, d) whether disciplinarian was visible, e) ethnic appearance of child, f) age appearance of child, and g) quality or grittiness of the photo image itself. All photos were edited to match in size, approximately 37,500 pixels^2 in area, which yields a 110 KB file size. Furthermore, internal consistency for each group of photos, using skin conductance values for comparisons, was established before continuing subsequent statistical analyses. Highly favorable reliability coefficients emerged for each photo type, including HCP photos (Cronbach's $\alpha = .85$), open-hand spanking photos (Cronbach's $\alpha = .92$), nonphysical punishment photos (Cronbach's $\alpha = .91$), and neutral photos (Cronbach's $\alpha = .92$).

E-Prime Image Presentation Paradigm. Within the E-Studio computerized sequence, images were programmed to appear centered on a white screen and remain for a total of five seconds while skin conductance reactions (SCR) were recorded. A 5-

second duration interval was designated in order to allow for skin conductance reactions to fully develop, uninterrupted. SCRs typically peak during 1-3 seconds to 1-4 seconds after stimulus onset (Cacioppo, Tassinary & Bernston, 2007). Upon termination of image presentation, a blank white screen was programmed to reappear, followed by rating instructions and a 10-point scale ranging from 0 to 9 (for the participant's reference) by which to rate the previous image displayed. The rating segment and instructions directed participants to enter their explicit response of emotional distress on the 0 to 9 scale with "9" meaning the photo was extremely distressing and "0" meaning the photo was not distressing at all.

Physiological Apparatus. In conjunction with computerized experiment implementation, participants were suited with equipment to collect physiological data (i.e., skin conductance and pulse). A webcam was used during the Image Rating Task in order to monitor participants for possible bodily movement which would interfere with SCR signals. Preparation materials included alcohol swabs for cleaning the skin's surface, isotonic recording electrode gel (for signal conductance), two Velcro® finger electrodes, and one Velcro® pulse monitor. Physiological signals were detected, transmitted, and transduced with the use of BioPac channel equipment and AcqKnowledge program software (BIOPAC).

Furthermore, the E-Studio image presentation paradigm was programmed to function in accordance with AcqKnowledge software. By linking the programs, physiological data represented within AcqKnowledge displayed six channels—four channels, one assigned to each of the four image types, one channel for SCR, and one channel for pulse tracking. By creating separate channels within AcqKnowledge for each

image type, it was possible to 1) maintain a visual representation of stimulus onset and duration (i.e., image presentation) as a function of time, and 2) efficiently identify and classify each trial from AcqKnowledge into a comprehensive data set. Also, AcqKnowledge was used to track and record time of target and stimulus onset during experiment administration in E-Prime.

Flanker Embedded 2-Back Task. A flanker task, embedded in a 2-back task, was created using the E-Studio program in E-Prime software (see Appendix G). By utilizing performance on the 2-back task as a baseline, a subsequent task incorporating distractors (i.e., flankers that appeared alongside each target presentation) was used to measure divergence in participants' performance due to the flankers. Using the same randomization method described in the aforementioned 2-Back Task, 4 trial blocks were created to comprise the Flanker Embedded 2-Back Task. Likewise, each block contained 42 trials (2 initial reference trials and 40 match/nonmatch trials with no more than 3 match or nonmatch trials in a row) and an optional post-block break.

The four trial blocks were distinguished by the four photo types used in the Image Rating Task—HCP, open-hand spanking, nonphysical punishment, and neutral, non-punishment scenarios. With the exception of adding flanker images to each trial, programming for the 2-back portion within the Flanker Embedded 2-Back Task remained identical to the simple 2-Back Task previously described. Flankers were programmed to cycle four times in a pseudo-random fashion—with the exception of the first two trials—so that each flanker was represented with equal frequency. In addition, trial block sequence differed so that no block would contain the same order of matches versus nonmatches as another. Flankers for the initial two trials were also chosen at random.

The order of the four trial blocks was counterbalanced across participants in order to account for practice effects, fatigue effects, and other confounds due to fluctuations in attentional vigilance. Instructions for the Flanker Embedded 2-Back Task remained consistent with regard to the target stimulus in that the Flanker Embedded 2-Back Task also required participants to determine whether the target being viewed matched the target shown two presentations ago.

Image Recognition Task. Participants completed an Image Recognition Task (Appendix H) in order to check the images previously used during the Image Rating Task and Flanker Embedded 2-Back Task. The Image Recognition Task, like the previous tasks, was computerized and presented on-screen via E-Studio. Each of the 40 collective images *and photo-edited mirrors* of each of the 40 images (80 images total) was programmed to be presented at random with instructions for the participant to respond whether s/he had seen each image before in previous tasks. A response of "1" was programmed to indicate "yes" (i.e., the participant had seen the image before) and "2" was programmed to indicate "no" (i.e., the participant had *not* seen the image before). An answer key was also programmed to recognize "1" as correct for all 40 of the original images and "2" as correct for all 40 mirror images made from the originals. Programming for image presentations did not include time limits.

Procedure

The current study was arranged with both online and in-lab components where participants completed all survey material online via a survey research system, and other tasks in person with the experimenter. Prospective participants were introduced to the

study using the title *Thinking and Punishment*. This title was designed to eliminate any performance-oriented biases that might otherwise have primed participants' response behavior, prior to completing several surveys about corporal punishment.

Participants who volunteered to participate in the study consented and then began the survey portions of the study, including the Corporal Punishment Survey (Appendix A), Demographic Questionnaire (Appendix C), and Internalized Shame Scale (ISS). Participants completed each of these materials in a randomized (counterbalanced) order. Additionally, this online portion required participants to complete all surveys in one login session, but no time limit was imposed.

After completing the survey materials, participants were presented with a final item onscreen reminding the participant to complete the in-person portion of the study. Participants then scheduled individual appointments to complete the remainder of the study in-lab. Upon arrival, each participant was given a paper copy of the consent form s/he was offered via the online SONA system, and a signature of informed consent was obtained at this time. The lab suite remained illuminated with fluorescent lighting.

At this time, I explained the goals and guidelines of completing the 2-Back Task, instructing him/her to keep fingers placed on the '1' and '3' keys in order to respond 'match' or 'nonmatch' to upcoming trials. Next, the participant practiced the computerized 2-Back Task with a shortened sequence taken from the 2-Back Task in E-Studio. When the participant reported that s/he understood how to perform the 2-Back Task *and* I observed that s/he was in fact performing in accordance with the instructions, the participant was then permitted to begin the actual 2-Back Task, alone in the lab suite.

After completing the 2-Back Task, the participant was hooked up to the physiological signal detection apparatuses. I first inspected the surface of the participant's skin to ensure cleanliness and presence of natural moisture. If a participant's skin was too dry, I suggested that the participant engage in light cardio activity for several seconds in order to activate the skin's sweat glands and reintroduce normal moisture on the skin. Next, the finger electrodes were applied to the index and middle fingers of the participant's non-dominant hand. The pulse monitor was wrapped around the ring finger on the same hand.

While hooking-up participants, I explained the instructions of the Image Rating Task, emphasizing the importance of remaining still during the task, especially while an image was onscreen. After a verbal explanation of instructions, participant reviewed the typed instructions. Then after ensuring that physiological and camera equipment were functioning properly, I turned off the fluorescent lighting to avoid any electrical interference with equipment, and informed the participant that s/he could begin the task.

Throughout the Image Rating Task, each trial was signaled to present *only* when the participant was sitting still and when the onscreen waves indicating physiological activity (in AcqKnowledge) were not fluctuating past baseline. Due to individual differences in how still some participants were in comparison to others, this task lasted anywhere from 10 to 35 minutes. SCR data for each trial was measured using a pre-trial baseline, calculated as the mean during the 500-ms previous to stimulus onset, subtracted from the maximum amplitude that occurred within 4000-ms after stimulus onset. With the use of video monitoring, bodily movements (e.g., hand movements) were heavily supervised.

Upon data collection, SCR waveforms were visually inspected, and any trials containing artifact (approximately 5-10% for a given participant) were removed. Furthermore, if baseline in physiological activity had not reestablished in the time assumed and a decrease in amplitude appeared immediately after stimulus onset, the corresponding baseline was used as the tonic measure.

Once the participant had completed the Image Rating Task, I removed all physiological data collection equipment from his/her person and turned the fluorescent lighting back on. At this time, I opened the Flanker Embedded 2-Back Task activity and explained directions for the task verbally while instructions were also present on-screen. I emphasized, the only difference between this task and the earlier 2-Back Task was that the pictures they had just rated would accompany the target, changing at random for every new screen. I did specify to participants, however, to watch the entire screen throughout the task while basing match/nonmatch responses on the geometric shape targets. Because this task included four blocks rather than a single block (e.g., the 2-Back Task) and the order of trials had to be preserved in order for the 2-back relationships to remain intact, the presentation of blocks could not be randomized. For this reason, I manually altered the structure of this task within E-Prime to reorder the blocks according to a randomized list of permutations containing 1, 2, 3, and 4—one digit to represent each flanker (photo) type. By performing this alteration after each participant, the order in which each participant completed the four blocks was effectively counterbalanced.

Upon completion of the Flanker Embedded 2-Back Task, participants were given instructions to the Image Recognition Task. I emphasized that only half the photos had

been presented because the other half—the mirrors—were edited images made from the original 40 photos. Once participants indicated understanding of instructions, they were allowed to begin the task. After completion of this task which generally lasted between 2-5 minutes, participants were debriefed, thanked for their participation, and asked to not divulge any information concerning their experience with the experiment so as to avoid contaminating data of future participants.

Due to the format in which programs such as E-Prime and AcqKnowledge retain and reflect data, several steps in data preparation and coding were taken to ensure optimal representation of values for final data analysis. Tonic and phasic skin conductance values, which are represented in micromho units, were entered into a spreadsheet that calculated the difference between these values. Thus, the resulting SCR value represented the change from baseline to maximum skin conductance for a given trial. An average SCR value was then calculated for each of the four photo types to be used in the final analyses.

Using accuracy scores and reaction times from the 2-Back Task and Flanker Embedded 2-Back Task, delta-values (i.e., the change from baseline to later task performance) for accuracy and for reaction time were calculated for each photo type using data from the 2-Back Task as a baseline. Thus, the *changes* in accuracy and reaction time were used to examine distractibility posed by the flanker conditions, as compared to originally having completed the task with no flankers.

While preparing 2-Back and Flanker Embedded 2-Back data for analyses, a specialized approach to flagging cases was taken. In a 2-back paradigm, there are two responses possible, ‘match’, and ‘nonmatch.’ However, there are two ways to receive an

incorrect score for a given trial: submitting the wrong response, or not responding at all. With two response options, it may seem intuitive to eliminate participant scores from comprehensive analyses if accuracy is close to 50% which could suggest random responding, or accuracy at the chance level. With the possibility, however, that responses could be labeled as 'incorrect' simply due to *lack* of response, which could indicate task difficulty, a central theme in the current hypotheses, participants were not eliminated as long as accuracy for trials to which they actually responded was greater than 65%.

Ultimately, accuracy scores for two participants were eliminated due to extremely low accuracy and a failure to follow instructions, only responding to 'match' situations during the Flanker Embedded 2-Back Task. In addition, SCR data was not included for two individuals who exhibited severely unreactive waveforms, indicating a faulty connection in conductivity. Data from other tasks for these individuals, however, was not extracted from the final data set.

CHAPTER III

Results

Examining Hypotheses

The proposed statistical procedure is comprised of two steps—analysis of covariance (ANCOVA) and follow-up multiple regression—where performing regression analyses is contingent upon significant covariate interactions in the ANCOVA. This procedure of using ANCOVA and multiple regression is explained further in Lawson, Gauer, and Hurst (2012) which used a similar research design incorporating physiological and behavioral variables in conjunction with personal information data. In order to examine the first three hypotheses, ANCOVAs were conducted to examine the effect of photo type on three corresponding dependent variables as the first of the two-step procedure. Table 1 summarizes means and standard deviations of each dependent variable in each of the four conditions of photo type.

A one-way repeated measures ANCOVA was calculated comparing the average skin conductance response (SCR) values for each of the four photos types—HCP, open-hand spanking (OpH), nonphysical punishment (NonP), and neutral (Neu) scenarios—while covarying out participants' internalized shame index (ISI) and history of corporal punishment exposure (CPE). (The CPE coefficient, as previously noted, was derived based on the factor analysis inspections described in Appendix B.) A significant main effect, as illustrated in Figure 1, was found for photo type in relation to SCR ($F(3,141) = 4.90$, $p < .01$, $\eta^2_p = .10$). The covariates ISI and CPE, however, were not significantly

Table 1

Means and Standard Deviations of Dependent Variables for Each Photo Type.

Dependent Variable	Photo Type	Mean	SD
SCR (μʊ)	Neu	.21	.34
	NonP	.24	.41
	OpH	.38	.55
	HCP	.43	.50
ACC	Neu	-.08	.11
	NonP	-.00	.11
	OpH	-.08	.11
	HCP	-.08	.14
RT	Neu	109.09	237.21
	NonP	8.85	291.87
	OpH	118.51	218.08
	HCP	134.32	212.31

Note. ACC represents ΔACC, the calculated change in accuracy from 2-Back Task to Flanker Embedded 2-Back Task. RT represents ΔRT, the calculated change in reaction time from the 2-Back Task to the Flanker Embedded 2-Back Task. Neutral, Nonphysical Punishment, Open-hand Spanking, and Harsh Corporal Punishment photo types are abbreviated to Neu, NonP, OpH, and HCP, respectively.

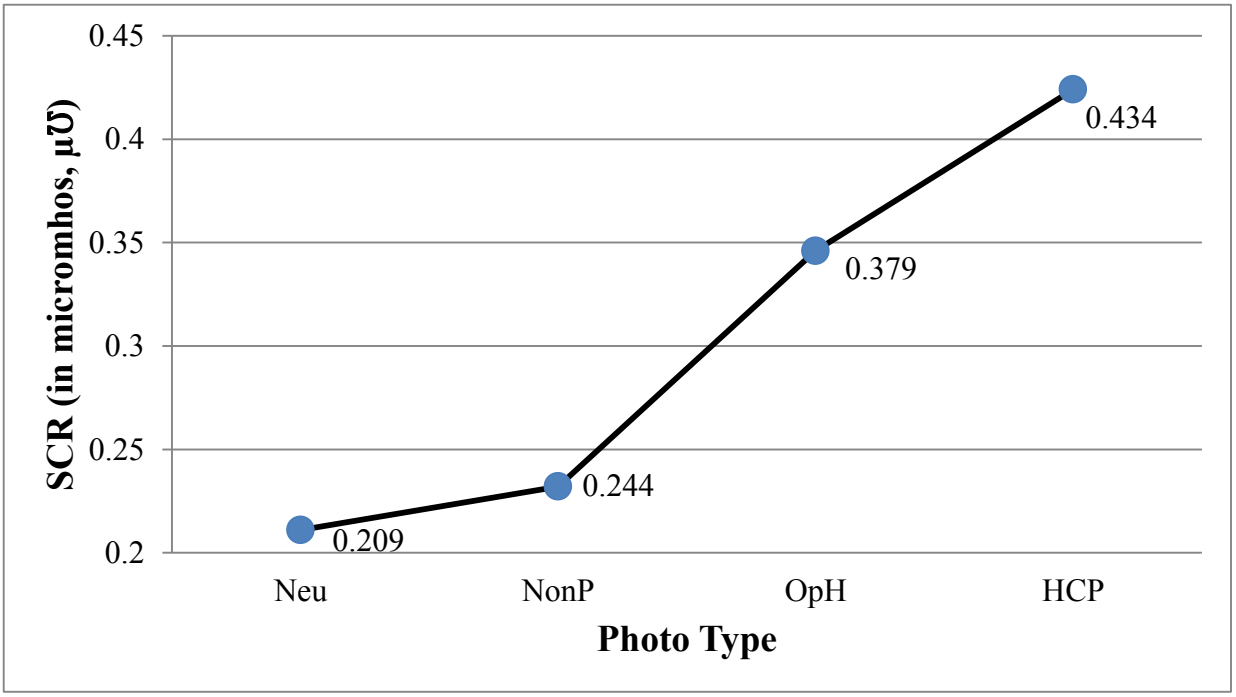

Figure 1. *Mean SCR Recordings for Photo Types Depicting Forms of Punishment.*
Note. Neutral, Nonphysical Punishment, Open-hand Spanking, and Harsh Corporal Punishment photo types are abbreviated to Neu, NonP, OpH, and HCP, respectively.

related to SCR ($F_{PhotoTypexISI}(3,141) = .02$, $p > .05$; $F_{PhotoTypexCPE}(3,141) = .81$, $p > .05$). Based on these results, the hypothesis that individuals who possess a higher tendency to internalize shame would show more pronounced autonomic stress activation to photos depicting physical punishment, was not supported. The hypothesis that participants would show increased and more pronounced stress activation for physical punishment images than other images, however, was supported in that SCR was significantly greater for images that depicted corporal punishment than for images that did not (see Table 2).

Table 2

Pairwise Comparisons of Participants' Average SCR for Corresponding Photo Types.

Photo Type					95% CI	
I	J	Mean Difference (I-J)	*SE*	*p*[a]	LL	UL
Neu	NonP	-.036	.02	0.53	-.092	.021
	OpH	-.170**	.04	<.001	-.278	-.062
	HCP	-.226**	.04	<.001	-.321	-.130
NonP	OpH	-.134*	.03	.002	-.229	-.039
	HCP	-.190**	.03	<.001	-.278	-.102
OpH	HCP	-.056	.03	.46	-.140	.029

Note. CI = confidence interval; LL = lower limit; UL = upper limit. Neutral, Nonphysical Punishment, Open-hand Spanking, and Harsh Corporal Punishment photo types are abbreviated to Neu, NonP, OpH, and HCP, respectively.
*$p < .01$ **$p < .001$
[a]Significance calculated using Bonferroni adjustment for multiple comparisons.

A one-way repeated measures ANCOVA was calculated examining the effect of photo (flanker) type on average deviation in accuracy (ACC) while covarying out ISI and CPE. (Delta (Δ) scores reflecting the deviation from 2-Back Task (baseline) ACC to ACC within each of the four Flanker Embedded 2-Back Task blocks, were derived using the formula $\Delta ACC_{FlankerType} = ACC_{FlankerBlock} - ACC_{Baseline}$.) Results showed that the main effect for photo (flanker) type as represented in Figure 2, was significantly related to accuracy ($F(3,135) = 3.09$, $p < .05$, $\eta^2_p = .06$). Photo (flanker) type did not, however, significantly interact with either covariate, ($F_{PhotoTypexISI}(3,135) = .56$, $p > .05$; $F_{PhotoTypexCPE}(3,135) = 1.49$, $p > .05$). Table 3 shows pairwise comparisons in accuracy

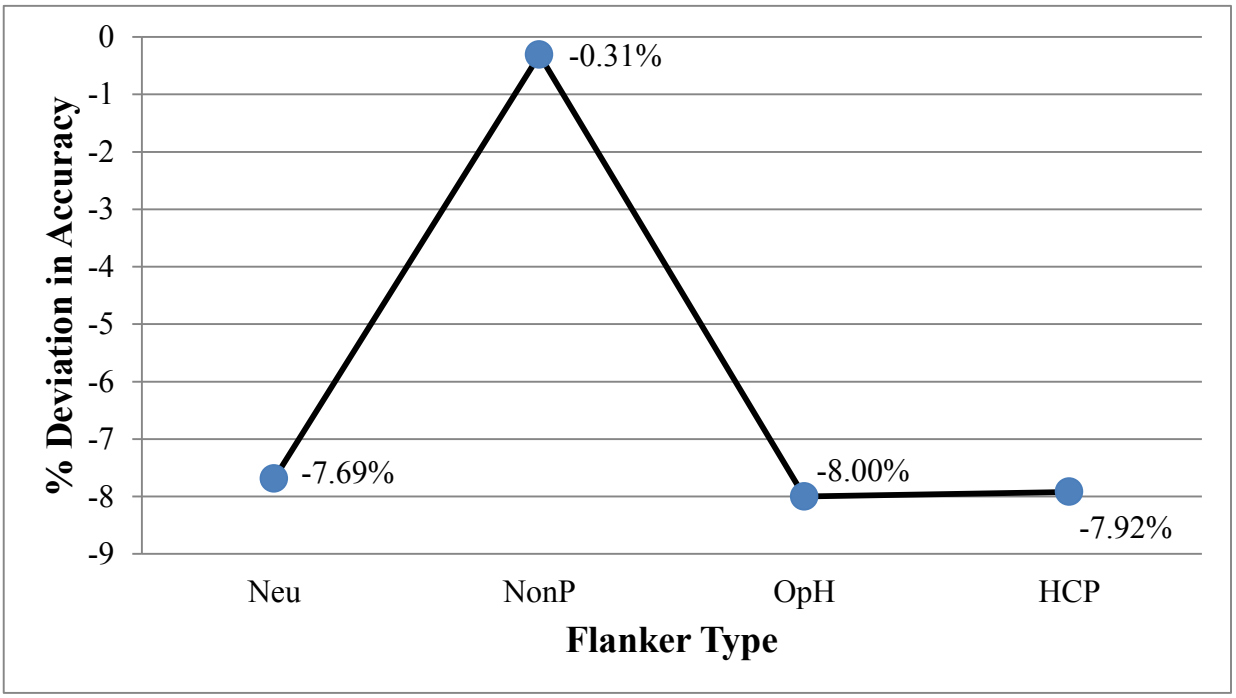

Figure 2. *Deviation in Response Accuracy from Baseline Accuracy '0' for Each Flanker Type.*
Note. Neutral, Nonphysical Punishment, Open-hand Spanking, and Harsh Corporal Punishment photo types are abbreviated to Neu, NonP, OpH, and HCP, respectively.

Table 3

Pairwise Comparisons of Participants' Response Accuracy to Corresponding Flanker Types.

Flanker Type					95% CI	
I	J	Mean Difference (I-J)	*SE*	*p*[a]	LL	UL
Neu	NonP	-.074**	.01	< .001	-.107	-.040
	OpH	.003	.01	>.999	-.033	.040
	HCP	.002	.02	>.999	-.043	.047
NonP	OpH	.077**	.01	< .001	.042	.112
	HCP	.076**	.02	< .001	.033	.119
OpH	HCP	-.001	.02	>.999	-.041	.039

Note. CI = confidence interval; LL = lower limit; UL = upper limit. Neutral, Nonphysical Punishment, Open-hand Spanking, and Harsh Corporal Punishment photo types are abbreviated to Neu, NonP, OpH, and HCP, respectively.
*$p < .05$ **$p < .01$
[a]Significance calculated using Bonferroni adjustment for multiple comparisons.

according to each photo (flanker) type, Neu (M = -.08, SD = .11), NonP (M = -.00, SD = .11), OpH (M = -.08, SD = .11), and HCP (M = -.08, SD = .14).

A one-way repeated measures ANCOVA was also conducted in order to examine the effect of photo (flanker) type on average deviation in response reaction time (RT; in milliseconds) while covarying out the effects of ISI and CPE. (Delta (Δ) scores reflecting the deviation from 2-Back Task (baseline) RT to RT within each of the four Flanker Embedded 2-Back Task blocks, were derived using the formula $\Delta RT_{FlankerType} = RT_{FlankerBlock} - RT_{Baseline}$.) The main effect for photo (flanker) type was not significantly related to reaction time, ($F(3,135) = .73$, $p > .05$). Likewise, neither covariate was significantly related to reaction time ($F_{PhotoTypexISI}(3,135) = .19$, $p > .05$; $F_{PhotoTypexCPE}(3,135) = 1.25$, $p > .05$). These results indicate that participants did not perform significantly faster or slower during any flanker blocks—Neu (M = 109.09, SD = 237.21), NonP (M = 8.84, SD = 291.87), OpH (M = 118.51, SD = 218.08), and HCP (M = 134.32, SD = 212.31)—in comparison to others.

Based on the lack of significant interactions for the covariates ISI and CPE in the initial analyses above, further multiple regression analyses were not warranted. Participants' SCR, ACC, and RT across photo types, were not impacted by tendency to internalize shame or by history of corporal punishment exposure. Thus, the hypothesis that individuals who were exposed to more severe levels of corporal punishment (higher CPE) would show different working memory performance, depending on intensity of punishment situation, was not supported.

The fourth and final hypothesis predicted that participants with a stronger history of corporal punishment exposure would more accurately recall depictions of corporal

punishment in relation to intensity. This hypothesis was tested using a one-way repeated measures ANCOVA examining accuracy of participants' photo recognition in each of the four photo types during the Image Recognition Task, covarying out CPE. CPE was not significantly related to accuracy score ($F(3,153) = .92$, $p > .05$). The main effect for photo type, however, was significant ($F(3,153) = 3.02$, $p < .05$, $\eta^2_p = .06$; see Figure 3). Per these results, the hypothesis was not supported in that as a group trend overall, regardless of history, recognized HCP ($M = .84$, $SD = .11$) and OpH ($M = .80$, $SD = .14$) photo types significantly better than Neu ($M = .64$, $SD = .12$) and NonP ($M = .69$, $SD = .13$) photo types. Table 4 contains further details in pairwise comparisons between photo types.

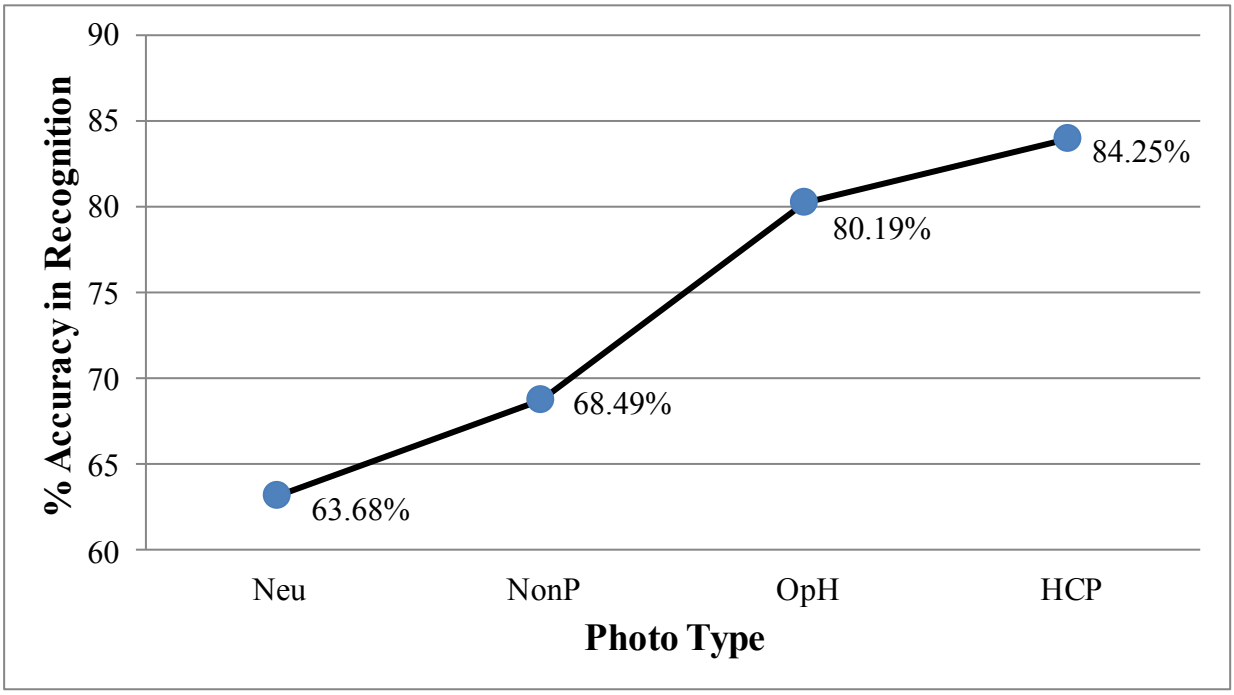

Figure 3. *Mean Accuracy (%) of Photo Recognition within Image Recognition Task.*.
Note. Neutral, Nonphysical Punishment, Open-hand Spanking, and Harsh Corporal Punishment photo types are abbreviated to Neu, NonP, OpH, and HCP, respectively.

Table 4

Pairwise Comparisons of Participants' Response Accuracy to Image Recognition Task.

Flanker Type					95% CI	
I	J	Mean Difference (I-J)	*SE*	*p*[a]	LL	UL
Neu	NonP	-.048	.020	.11	-.102	.006
	OpH	-.165**	.020	< .001	-.219	-.111
	HCP	-.206**	.016	< .001	-.250	-.161
NonP	Oph	-.117**	.021	< .001	-.174	-.060
	HCP	-.158**	.017	< .001	-.205	-.110
OpH	HCP	-.041	.018	.15	-.089	.008

Note. CI = confidence interval; LL = lower limit; UL = upper limit. Neutral, Nonphysical Punishment, Open-hand Spanking, and Harsh Corporal Punishment photo types are abbreviated to Neu, NonP, OpH, and HCP, respectively.
**$p < .001$
[a]Significance calculated using Bonferroni adjustment for multiple comparisons.

Subsequent Analyses

A breadth of data was collected in the process of this study although only certain variables were necessary to test the hypotheses specifically. Many demographic and personal variables were recorded due to possible links with spanking frequency suggested by previous research (see Garbarino, 2013; MacKenzie et al., 2011; Boutwell et al., 2011; Ellison & Bradshaw, 2009; Gershoff, 2002; Graziano & Namaste, 1990). For this reason, these demographic and personal variables from the Demographic Questionnaire were examined in relation to participants' reported frequency of having been physically punished.

Spearman rho rank-order correlations were conducted between frequency of physical (corporal) punishment and ordinally measured questionnaire items. While no associations emerged between frequency of reported corporal punishment and gender ($\rho = -.00$, $p > .05$), birth order ($\rho = -.11$, $p > .05$), family structure ($\rho = .03$, $p > .05$), family income ($\rho = -.09$, $p > .05$), highest level of education for self ($\rho = .05$, $p > .05$), highest level of education for disciplinarian ($\rho = -.09$, $p > .05$), or amount of time spent in childcare before the age of 5 ($\rho = -.10$, $p > .05$), a significant relationship did emerge. Participants who were spanked more frequently were significantly more likely to rate their current relationship with primary disciplinarian worse ($\rho = -.20$, $p = .01$). Furthermore, a t-test comparing frequency with which participants were spanked to whether or not their disciplinarian was spanked showed marginally significant results ($t(122) = 1.75$, $p = .08$) with participants whose disciplinarians *were* spanked ($M = 4.39$, $SD = 3.29$) having a higher spanking frequency themselves than those whose disciplinarians were not spanked ($M = 2.69$, $SD = 3.42$).

Also, because the Corporal Punishment Survey has yet to be subject to construct validation procedures or peer-review whereas the ISS is widely recognized and supported, items from the survey were analyzed individually alongside the internalized shame construct. Using Spearman rank-order correlations, internalized shame index (ISI) correlated positively with participant responses to "Looking back, I feel as though I deserved the majority of spankings I received (rev)" ($\rho = .21$, $p = .02$). ISI was also related to the item "The thought of spankings I received as a child is distressing for me to remember" ($\rho = .19$, $p = .02$). ISI correlated positively to "Most of the times I was spanked, I remember it hurting a lot" ($\rho = .20$, $p = .02$). ISI was positive associated with "I was spanked less than once per year when I would get in trouble as a child (rev)" ($\rho = .18$, $p = .03$). Lastly, ISI correlated significantly with the item "The times I got spanked, I usually felt resentful about the punishment" ($\rho = .20$, $p = .01$). No other significant associations resulted between ISI and remaining Corporal Punishment Survey items.

Based on these findings, an individual's tendency to internalize shame was related to having experienced painful corporal exposure occurring more than once per year, especially when the individual felt it was not deserved. The association with experiencing distress at the memory of corporal punishment events suggests that some variance in how easily one internalizes shame is accounted for by how negatively the individual feels in relation to having received corporal punishment.

To further inspect individual Corporal Punishment Survey items, the dependent variables examined in this study were reanalyzed using the individual items as covariates rather than a cumulative coefficient. Similar to analyses of covariance used to calculate results for the hypotheses, separate one-way ANCOVAs were performed while

maintaining photo type as the independent variable. Of course results remained consistent for the main effect of Photo Type throughout these analyses but responses for several items from the scale interacted significantly with photo type to impact SCR, Flanker Embedded 2-Back Task accuracy, and Flanker Embedded 2-Back Task reaction time. Table 5 contains a summary excerpt of this data.

With a significant interaction found in the ANCOVA, a follow-up multiple regression analysis was conducted using accuracy for each of the four photos types (i.e., Neu, NonP, OpH, and HCP) as predictor variables and responses to item 16 in the Corporal Punishment Survey, "I usually felt ashamed of myself when I would get spanked" as the outcome variable. The simultaneous linear regression analysis yielded significant results for accuracy scores in both the neutral condition ($\beta = -.41$, $p = .04$) and in the HCP condition ($\beta = .47$, $p = .01$) This finding suggests that for people who felt more ashamed, accuracy was higher in the HCP condition than in the neutral condition of photo types. Overall, neutral and HCP conditions explained about 18% of the variance in accuracy scores ($R^2 = .18$).

Table 5

Significant and Marginally Significant Covariate Interactions between Corporal Punishment Survey Items and Photo Type for SCR, Task Performance Accuracy (ACC), and Task Performance Reaction Time (RT).

	Variable	Df	*F*	*P*
SCR	Photo Type X CP13rev	(3,147)	3.29*	.035
	Photo Type X CP16	(3,168)	2.50	.076
	Photo Type X CP18	(3,168)	3.00*	.044
ACC	Photo Type X CP2	(3,165)	2.47	.064
	Photo Type X CP7	(3,165)	2.88*	.037
	Photo Type X CP13rev	(3,144)	3.70*	.013
	Photo Type X CP15	(3,165)	2.63	.052
	Photo Type X CP16	(3,165)	4.63**	.004
RT	Photo Type X CP6rev	(3,147)	3.33*	.021
	Photo Type X CP15	(3,165)	2.94*	.035
	Photo Type X CP17rev	(3,144)	2.94*	.042

Note. Items from Corporal Punishment Survey are indicated with "CP" and their corresponding scale number, as listed in Appendix A.
*$p < .05$ **$p < .01$

CHAPTER IV

Discussion

Interpretations

In terms of the content in the different photo types, participants' autonomic reactions were greater for corporal punishment photos than for non-corporal punishment photos. Participants also achieved better accuracy during the Flanker Embedded 2-Back Task only when responding amidst nonphysical punishment flankers. Participants showed no difference in reaction time among photo conditions. Results from this study also revealed that neither tendency to internalize shame nor the CPE coefficient, derived for the purpose of this study, impacted participants' autonomic reactions to photos. Furthermore, these covariates did not impact cognitive performance (i.e., accuracy, reaction time) when the same photos were used as flankers.

The first hypothesis proposed that individuals who tended to internalize shame would react more strongly to physical punishment photos than others. Results showed that participants overall reacted more strongly to corporal punishment photos than to non-corporal punishment photos, regardless of tendency to internalize shame. While prior research suggests personal factors that predispose an individual to experience harm due to corporal punishment in the long term, the current results indicate that shame internalization is not one of these associations.

The second hypothesis incorporated not only a shame factor but also the potential moderator of corporal punishment exposure (CPE). Noting that CPE was derived from a

new scale, this coefficient should be considered as more a culmination of several *possible* items that could influence an individual's experience and perspective on issues relating to corporal punishment. In other words, there is not yet scientific evidence to suggest that the items in this scale sufficiently measure all crucial aspects of corporal punishment influences or associations. The ANCOVA performed yielded no support for confirming that CPE or shame (once again) was related to SCR differences between photo types.

This analysis did, however, outline significant distinctions between the effect of photo type on SCR, revealing that both non-corporal punishment conditions (neutral and nonphysical) contributed to significantly lower SCR than did corporal punishment conditions (open-hand spanking and harsh corporal punishment). The fact that reactions to open-hand spanking were not significantly different from reactions to harsh corporal punishment is noteworthy considering previous research (see Tomoda et al., 2009) has suggested substantial neural deficits in people who were subject to harsh corporal punishment, specifically. Harsh corporal punishment (HCP) as operationalized from earlier studies to include frequent spanking and being struck with objects, showed distinct differences in gray matter formation in comparison to other spanking. It is possible, though, that restriction of range in corporal punishment experiences on the part of the participant sample is also responsible for this finding, or lack thereof. Furthermore, the difference between non-corporal punishment conditions versus corporal punishment conditions, while being significant, is perhaps not very special. With a η_p^2 of .10, the effect of photo type as administered by this type of design was moderate to large.

Hypothesis 3 was tested to measure the potential impact of CPE and shame internalization tendency on executive working memory. The covariates of CPE and

participants' shame internalization index (ISI) did not significantly interact with response accuracy for flanker types in the first ANCOVA conducted for Hypothesis 3. Considering this outcome, a participant's tendency toward internalizing shame does not appear to have any impact on how accurately s/he performs a working memory task such as a 2-Back paradigm with flankers embedded as distractors. Corporal punishment exposure overall did not significantly interact with response accuracy for flanker types, either, suggesting that exposure is unrelated. At the very least, this finding suggests that a more specialized component of exposure rather than exposure overall, could be a factor in impacting this type of cognitive performance in individuals who have experienced corporal punishment.

Reflecting on pairwise comparisons, however, accuracy differences for nonphysical punishment photos were significantly different from all other photo type flankers. There are two major interpretations of this result: 1) barring any hidden confounds in design, the nonphysical punishment flanker condition resulted in a true anomaly, separate from the other three conditions, or 2) barring any hidden confounds in design, the *neutral* flanker condition resulted in an anomaly. If characteristics of the nonphysical punishment flankers were so that they truly were not nearly as distracting as flankers in the other three conditions, this would justify viewing the condition as being significantly different from the other three. If, however, some characteristic of the *neutral* flankers caused them to be more distracting than the non-punishment flankers—assuming a true difference between non-punishment flankers and physical punishment flankers—this would suggest a lack of actual neutrality in the neutral flankers.

In the latter case, results would suggest that both neutral and nonphysical punishment flanker conditions would differ significantly from physical punishment flanker conditions had the neutral flankers been truly neutral. If the former possibility is true, with nonphysical punishment flankers differing due to some confound, this would suggest that none of the flanker conditions really made a difference in accuracy or distractibility for participants. More puzzling is the fact that SCR increased as a function of depiction intensity while accuracy showed a different trend using the same photos. This cannot, however, be ascertained simply from data within this study singly.

While these results are difficult to discern, perhaps people *are* more comfortable witnessing nonphysical punishment photos than other photo types, even neutral ones. For example, perhaps participants found nonphysical punishment less disturbing than physical punishment but more realistic than believing in a Utopian society where children are always happy and never receive punishment. With SCR fluctuations showing a climb from neutral to HCP conditions, though, it is not a sufficient interpretation to assert that the level of arousal induced by photo types is correlated to the distractibility of those same photos when used as flankers. Noting this discrepancy, hypotheses predicting autonomic response trends versus hypotheses predicting cognitive performance may not be as parallel as expected. At best, this pattern of SCR in conjunction with accuracy performance may reflect a curvilinear relationship corresponding to the Yerkes-Dodson Law (Yerkes & Dodson, 1908) where as autonomic stress increased, performance increased then declined. Also, with corporal punishment photo conditions having elicited the highest level of stress, the Easterbrook (1959) hypothesis would suggest that accuracy

should be lowest for these conditions; however, this was not the case. These findings and associations should be explored much more fully in future research.

The analysis of covariance examining reaction time showed no relation between flanker type, tendency to internalize shame, or history of corporal punishment exposure. Because flankers by nature are expected to retain a degree of distractibility, it was unexpected that distinct flanker types would make no difference in how quickly participants responded to trials. Specifically, according to the Easterbrook (1959) hypothesis, reaction time was expected to decrease as autonomic arousal increased which would have resulted in slower times for corporal punishment photos.

Similar to the concept of distractibility of the photos utilized as flankers, the fourth hypothesis was tested to determine whether differences in CPE were related to participant accuracy for recognizing photos of higher intensity punishment, i.e., corporal punishment. Again, CPE was not found to be related to recognition between photo types although photo type itself did impact participant's ability to recognize corporal punishment depictions with better success than non-corporal punishment depictions. With a partial eta-squared of .06, photo type can be said to have had a moderate effect on recognition accuracy for participants overall. In addition, though, with percent accuracy of non-corporal punishment conditions residing in the 60s range while recognition accuracy for corporal punishment conditions rose to the 80s range, the meaningfulness of this difference may be greater in practicality than the mere statistical effect size.

After exploring further into the details of individual items and survey coefficients, results emerged that suggested relationships between frequency of physical punishment and certain personal variables. While these relationships were expected based on prior

research (Garbarino, 2013; MacKenzie et al., 2011; Boutwell et al., 2011; Ellison & Bradshaw, 2009; Gershoff, 2002; Graziano & Namaste, 1990), most of these associations were not significant.

Of some practical importance, however, is the finding that as frequency of reported physical punishment increased, the quality of relationship with said disciplinarian was rated significantly worse, or less "close" according to the wording in the Likert scale. With a Spearman coefficient of -.20, however, this relationship is not especially strong. Although nonsignificant, a t-test showed marginal significance in corporal punishment frequency between children of people who were physically punished versus not. Previous research has found evidence pinpointing the likelihood that individuals who experienced corporal punishment are more likely, themselves, to use the same punishment methods (Graziano & Namaste, 1990). Considering again the lack of diversity in multiple personal and family demographic variables, having an unrepresentative sample could have led to a Type II error.

Some results also indicated that an overall CPE coefficient could have been too diluted to adequately reflect the associations between certain types of corporal punishment exposure, psychophysiology, and cognitive performance. Because the Corporal Punishment Survey lacks peer-reviewed validation, individual items from the survey were more closely examined alongside ISI. With similar strengths to the aforementioned relationship between corporal punishment frequency and quality of relationship, ISI was significantly associated with multiple survey items.

These items concerned participants' assessment of how deserved the corporal punishment was deserved, recalling how distressing the punishment was, if the

punishment "hurt a lot," corporal punishment frequency (i.e., spanked less than once per year, reverse coded), and feeling resentful at the time(s) of incident. All were positive associations, indicating that the more negative the participants rated their experiences; the more likely they were to have a higher tendency toward shame internalization. Considering this finding, professionals may not need to be asking *if* corporal punishment is inherently harmful but rather *for whom* can it be harmful. Answering this question could be key in determining, and consequently mitigating, harm induced on some by corporal punishment. If this answer cannot be sufficiently determined, cautionary abstinence from using corporal punishment may in fact, as suggested by the majority of corporal punishment researchers, be the optimal strategy.

Corporal Punishment Survey Results. Closer inspection of trends in SCR based on individual Corporal Punishment Survey items yielded several significant and marginally significant results. SCR was significantly related to items concerning spanking frequency (i.e., spanked less than once per year, reverse coded) and feeling resentful about the punishment. Marginally significant and possibly indicative of a Type II error was the relationship between SCR and the item "I usually felt ashamed of myself when I would get spanked."

Closer inspection for trends in Flanker Embedded 2-Back accuracy yielded significant relationships between accuracy and items concerning distress at recalling corporal punishment as well as the same aforementioned spanking frequency item, "I was spanked less than once per year when I would get in trouble as a child" (reverse coded). The item "I usually felt ashamed of myself when I would get spanked" was highly significant in relation to accuracy. A follow-up regression analysis indicated a positive

relationship between the item rating and accuracy for HCP photos and a negative relationship between the item and accuracy for neutral photos. This trend suggests that more negative experiences and feeling ashamed could have contributed to stronger activation of memory systems during the task due to a higher stress situation. Marginally significant results which may indicate a need for a more representative sample included relationships between accuracy and 1) spanking frequency (i.e., how many times total the participant recalled being physically punished), and 2) believing that experiences being spanked were harmful to oneself.

Upon examining survey items individually, reaction times from the Flanker Embedded 2-Back Task emerged in significant relationships. Reaction time was significantly related to feeling that the punishment was deserved, feeling that it was harmful, and the participant knowing why s/he was
"in trouble" at the time. Based on these findings, it appears that an individual's tendency to internalize shame could itself be related to having experienced painful corporal exposure occurring more than once per year, especially when the individual felt it was not deserved. The association with experiencing distress at the memory of corporal punishment events could also suggest that some variance in how easily one internalizes shame could be accounted for by how negatively the individual feels in relation to having received corporal punishment.

Limitations, Considerations, and Future Directions

Due to several characteristics of the current study design, certain considerations should be made. The demographic information of the participants was not representative

of a diverse population. With 58 of 60 participants identifying as European American (Caucasian) and most reporting a religious background in Christianity, the sample is much more representative of the area of convenience from which it was selected. Furthermore, nearly every participant reported a history of exposure to corporal punishment, rendering the analyses incapable of detecting potential differences between a widely represented sample of individuals who had never been exposed to corporal punishment alongside individuals who were subject to these methods.

As previously mentioned, a sample lacking in demographic diversity may have confounded the results of the analyses. For example, it is possible that individuals who have been spanked might have a different predisposition to developing favorable perspectives of corporal punishment than their non-spanked peers, or vice versa. This cannot be known, however, without examining a non-spanked population without equal or adequate representation. Also, variability in religious affiliation for participants and participant family history would be ideal in future research on this topic.

Reflecting upon these results, especially the Flanker Embedded 2-Back Task results, one possible limitation that could explain the lack of significance for several analyses lies within the flanker (photo) content. It is certainly possible that, with the design of this study being the first attempt of its kind, the photos themselves may not have been emotionally provocative enough to elicit the physiological responses expected from encountering scenarios of punishment. Furthermore, it is possible that some individuals were able to ignore the presence of flankers while focusing on the target, despite directions to watch the entire screen.

Another potential limitation in the current design is that within the photos, the disciplinarian, or at least a part of him/her, is always present in corporal punishment photos, even if the disciplinarian's face (and facial expression) were not visible. For nonphysical punishment photos, the disciplinarian was present in some while absent in others. In neutral photos, only children were present. The question becomes, what difference(s) might there be if a parent was present in all photos? This was difficult to control when some forms of punishment, by nature, do not include another's presence, e.g., time outs.

Future examination would likely benefit more by staging the photos rather than utilizing photos that have already been taken for different purposes. Another benefit to this strategy includes that ability to control facial expressions and body language more effectively. The designer should beware, though, that in doing so, the photos do not appear contrived or inauthentic. Upon reviewing notes during experimentation, some participants had commented that the spanking photos looked too staged and therefore were not very distressing. It is possible, then, that the photos utilized in the current study simply were not provocative enough to cause the intended effect. In addition to more highly controlled photo content, future studies should incorporate extra psychophysiological measures, especially when SCR can be highly prone to artifact. Heart rate and perhaps electroencephalography (EEG) could be included to examine potential fluctuation and localization of brain activity rhythms when certain types of punishment situations are depicted.

Another possibility for future study might include utilizing neutral photos that are not child related. For the current study, photos of children were utilized in order to keep

the basic content (i.e., children in situations) consistent across conditions while manipulating only the punishment situation. Neutral photos depicting children might have been distracting, however, if the photos were difficult for participants to discern whether the photo was a neutral or simply a non-punishment scenario. For example, some neutral photos depicted children who were sitting alone while a time out photo depicting non-physical punishment could have portrayed a somewhat similar scene of a lone child. Time out photos with a lone child did portray him or her in a corner, though, while neutrals did not.

One consideration for future research is to explore participant reactions to punishment while priming the reaction with a reason the punishment was implemented. It could be useful to know what, if any, distinctions there are in reactions to individuals who were subject to corporal punishment for differing reasons. Varying reasons might include disobedience, thwarting danger, parent's frustration, etc.

One more consideration relevant to the current design is that *children,* who would be closer to spanking age than adults and thus might have more accurate memory of their reactions to various forms of punishment, were not used as participants in this study. One value of using adults instead of children, though, is that adults have had much more time in conjunction with development of higher critical thinking ability that comes with age, to reflect on the process and make a decision about what they think is acceptable in terms of disciplinary methods. Thus, adult participants' responses and automatic reactions are being measured within the context of more established beliefs. Furthermore, utilizing younger participants would not guarantee that those who were spanked had been spanked recently. Measuring results of child participants would indeed

be beneficial but would simply answer a *different* facet of the proposed hypotheses rather than answer these research questions *better* than would adult participants.

Lastly, the first and foremost limitation of any study utilizing personal variables is that these differences are quasi-experimental in nature and thus predispose any study examining them to confounds. The uniqueness of the current design, however, which utilized true experimental manipulation (differing form of punishment) controlled for many aspects of personal reaction and response that might otherwise have remained speculative.

Given these results and possible interpretations, it is important to state that there is not sufficient evidence to assert that a history of corporal punishment innately causes harm or is detrimental to executive working memory processes. Furthermore, while shame may be linked to corporal punishment experience, a validated scale should be used in these examinations.

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Appendix A

Appendix A

Corporal Punishment Survey

Listed below are 22 items for this section of the survey. Please provide a response for every item. Please choose your responses carefully as there is no option to return to previous sections to change your responses later. This section may take up to 10 minutes to complete.

1. Were you spanked as a child as a means of discipline? (Select one)

- Yes
- No

2. How many times in your childhood were you physically punished (e.g., spanked, struck with hand or object)? (Estimate.)

- less than 5
- 6-10
- 11-15
- 16-20
- 21-25
- 26-30
- 31-35
- 36-40
- 41-100
- over 100 times
- I was never spanked or struck as punishment.

3. How frequently were you spanked? (Estimate.) Examples: "once per week," "once per month," "10 times per day," "twice per year," "never," etc.

4. How old were you the first time you were spanked or struck as punishment? (Type "N/A" if not applicable.)

5. How old were you the last time you were spanked or struck as punishment? (Type "N/A" if not applicable.)

6. To what extent do you agree with the following statement? "Looking back, I feel as though I deserved the majority of spankings that I received."

- 1 - Strongly Disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly Agree
- I was never spanked.

7. To what extent do you agree with the following statement? "The thought of spankings I received as a child is distressing for me to remember."

- 1 - Strongly Disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly Agree
- I was never spanked.

8. To what extent do you agree with the following statement? "Overall, I was spanked as a child more than once per month."

- 1 - Strongly Disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly Agree
- I was never spanked.

9. To what extent do you agree with the following statement? "I was spanked with objects other than a hand when I got in trouble as a child."

- 1 - Strongly Disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly Agree
- I was never spanked.

10. To what extent do you agree with the following statement? "Most of the times I was spanked, I remember it hurting a lot."

- 1 - Strongly Disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly Agree
- I was never spanked.

11. To what extent do you agree with the following statement? "I have been spanked hard enough that it left welts or bruises on my body."

- 1 - Strongly Disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly Agree
- I was never spanked.

12. To what extent do you agree with the following statement? "There is nothing wrong with spanking children to keep them in line."

- 1 - Strongly Disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly Agree

13. To what extent do you agree with the following statement? "I was spanked less than once per year when I would get in trouble as a child."

- 1 - Strongly Disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly Agree
- I was never spanked.

14. To what extent do you agree with the following statement? "When I was spanked, it was often directly on my bare skin."

- 1 - Strongly Disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly Agree
- I was never spanked.

15. To what extent do you agree with the following statement? "I believe that the amount of spanking I received was harmful to me."

- 1 - Strongly Disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly Agree
- I was never spanked.

16. To what extent do you agree with the following statement? "I usually felt ashamed of myself when I would get spanked."

- 1 - Strongly Disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly Agree
- I was never spanked.

17. To what extent do you agree with the following statement? "I usually knew why I was in trouble when I got spanked."

- 1 - Strongly Disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly Agree
- I was never spanked.

18. To what extent do you agree with the following statement? "The times I got spanked, I usually felt resentful about the punishment."

- 1 - Strongly Disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly Agree
- I was never spanked.

19. To what extent do you agree with the following statement? "There is always an alternative to spanking when punishing children."

- 1 - Strongly Disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly Agree

20. To what extent do you agree with the following statement? "Sometimes, spanking is the only practical solution for a child's behavior."

- 1 - Strongly Disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly Agree

21. To what extent do you agree with the following statement? "Children who are being disobedient deserve to get spanked."

- 1 - Strongly Disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly Agree

22. To what extent do you agree with the following statement? "Spanking is too harmful a consequence to use in correcting a child's behavior."

- 1 - Strongly Disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly Agree

Record Responses

Note: This is the participants' view of these items via SONA Only items and response options were visible to participants while completing this online survey. The title of this survey did not appear on screen. Items 6, 12, 13, 17, 20, and 21 were reverse coded prior to analyses.

Appendix B

Appendix B

Corporal Punishment Survey: Factor Analyses with Supplementary Tables

In order to assess the factor structure of the Corporal Punishment Survey, a confirmatory factor analysis with varimax rotation was conducted, extracting four factors (see Table A-1). Results were not fully confirmed for the scale; items loaded onto five separate components with corresponding eigenvalues greater than 1.00. As predicted, Factor 1 contained items relating to *attitudes* toward the use of corporal punishment whereas Factor 2 contained items relating to *frequency* with which participants experienced corporal punishment. Slightly inconsistent with the remaining two anticipated subcomponents, Factors 3 and 4 contained items relating to memories of distress and injustice when exposed to corporal punishment, and experiencing pain along with feeling ashamed or resentful, respectively. These four factors cumulatively explained 65% of the variance in the Corporal Punishment Survey items while accounting for a fifth factor explained 71% of the variance. To further clarify the factor structure then, a non-extracted factor analysis allowing for representation of factor loadings onto all five possible components was conducted (see Table A-2); these values can be referenced in Appendix B. Factor 1 loadings corresponded to attitudes. Factor 2 items corresponded to feelings of deservedness and distress. Factor 3 items corresponded to physical intensity of received corporal punishment. Factor 4 loadings corresponded to frequency of received corporal punishment. Lastly, Factor 5 was characterized by items concerning participants' recalled emotional reaction during corporal punishment.

The factor analysis offered sufficient evidence to eliminate *attitude* items (i.e., 12, 19, 20, 21, and 22) in calculating an overall exposure coefficient in that these items

consistently loaded onto the same factor, separate from all other items. In order to most accurately represent the impact of corporal punishment on participants, only items that loaded onto factors relating to personal experience receiving corporal punishment were used to calculate the *Corporal Punishment Exposure (CPE)* variable used in statistical analyses. CPE, then, was calculated by averaging the responses (reverse-coded where appropriate) of all remaining items (i.e., 2, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, and 18). Based on this operationalization, CPE remains consistent throughout the sample in that higher scores reflect more negative memories of childhood experiences due to corporal punishment than do low scores. The following visuals represent the factor analyses conducted.

Table A-1

Confirmatory Factor Analysis with Varimax Rotation on the Corporal Punishment Survey.

Items	Factor 1 Attitudes	Factor 2 Frequency/ Intensity	Factor 3 Harmful	Factor 4 Intensity
2. How many times in your childhood were you physically punished (e.g., spanked, struck with hand or object)? (standardized to scale)	-.008	**.871**	.135	.159
6. Looking back, I feel as though I deserved the majority of the spankings that I received. (rev)	.353	.152	**.725**	.161
7. The thought of spankings I received as a child is distressing for me to remember.	.213	.170	**.559**	.464
8. Overall, I was spanked as a child more than once per month.	.072	**.864**	.174	.122
9. I was spanked with objects other than a hand when I got in trouble as a child.	-.193	**.492**	.244	.392
10. Most of the times I was spanked, I remember it hurting a lot.	-.095	.430	.139	**.590**
11. I have been spanked hard enough that it left welts or bruises on my body.	-.107	.439	**.553**	.353
12. There is nothing wrong with spanking children to keep them in line. (rev)	**.780**	.018	.420	-.053
13. I was spanked less than once per year when I would get in trouble as a child. (rev)	.039	**.818**	.060	.060
14. When I was spanked, it was often directly on my bare skin.	.047	.325	.284	**.604**
15. I believe that the amount of spanking I received was harmful to me.	.203	.310	**.742**	.273
16. I usually felt ashamed of myself when I would get spanked.	-.067	.034	.173	**.703**
17. I usually knew why I was in trouble when I got spanked. (rev)	.163	.082	**.793**	-.141
18. The times I got spanked, I usually felt resentful about the punishment.	.272	.041	.224	**.624**
19. There is always an alternative to spanking when punishing children.	**.762**	.036	-.140	.252
20. Sometimes, spanking is the only practical solution for a child's behavior. (rev)	**.836**	.011	.041	-.073
21. Children who are being disobedient deserve to get spanked. (rev)	**.815**	-.069	.250	-.020
22. Spanking is too harmful a consequence to use in correcting a child's behavior.	**.644**	-.024	.392	.023

Table A-2

Factor Analysis with Varimax Rotation on the Corporal Punishment Survey.

Items	Factor 1 Attitudes	Factor 2 Deserve	Factor 3 Intensity	Factor 4 Frequency	Factor 5 Shame
2. How many times in your childhood were you physically punished (e.g., spanked, struck with hand or object)? (standardized to scale)	-.051	.169	.253	**.860**	.130
6. Looking back, I feel as though I deserved the majority of the spankings that I received. (rev)	.302	**.782**	.091	.175	.186
7. The thought of spankings I received as a child is distressing for me to remember.	.194	**.564**	.342	.125	.365
8. Overall, I was spanked as a child more than once per month.	.042	.191	.272	**.839**	.067
9. I was spanked with objects other than a hand when I got in trouble as a child.	-.093	.068	**.749**	.273	-.019
10. Most of the times I was spanked, I remember it hurting a lot.	-.008	-.015	**.766**	.224	.203
11. I have been spanked hard enough that it left welts or bruises on my body.	-.083	.393	**.726**	.230	-.043
12. There is nothing wrong with spanking children to keep them in line. (rev)	**.789**	.408	.020	.016	.072
13. I was spanked less than once per year when I would get in trouble as a child. (rev)	.012	.075	.215	**.801**	.021
14. When I was spanked, it was often directly on my bare skin.	.125	.143	**.732**	.134	.240
15. I believe that the amount of spanking I received was harmful to me.	.197	**.725**	.357	.247	.140
16. I usually felt ashamed of myself when I would get spanked.	-.158	-.050	.083	.104	**.827**
17. I usually knew why I was in trouble when I got spanked. (rev)	.137	**.816**	.011	.090	-.139
18. The times I got spanked, I usually felt resentful about the punishment.	.230	.272	.246	.042	**.612**
19. There is always an alternative to spanking when punishing children.	**.736**	-.094	-.027	.083	.330
20. Sometimes, spanking is the only practical solution for a child's behavior. (rev)	**.852**	.029	-.053	.023	-.060
21. Children who are being disobedient deserve to get spanked. (rev)	**.830**	.237	-.010	-.067	-.027
22. Spanking is too harmful a consequence to use in correcting a child's behavior.	**.663**	.365	.083	-.046	-.031

Appendix C

Appendix C

Demographic Questionnaire

Listed below are 14 items for this section of the survey. Please provide a response for every item. Please choose your responses carefully as there is no option to return to previous sections to change your responses later. This section may take up to 10 minutes to complete.

1. What is your age?

2. What is your gender?

- Female
- Male

3. Please select the ethnicity to which you most closely identify:

- African American
- European American (Caucasian)
- Asian American
- Native American
- Other

4. Please select the response that best describes your position of birth order in your family:

- First-born
- Middle child
- Last-born
- ONLY CHILD

5. Please select the response which most closely describes your family during childhood:

- Single mother household
- Single father household
- Both parents present in household
- Mother and partner present in household
- Father and partner present in household
- Grandparent or other family member as caregiver
- Other

6. Please indicate what income level your family held while you were a child: (Income figures are based on 4-5 person family size in 1990.)

- Low (under $15,000/yr)
- Lower Middle ($15,000-$35,000/yr)
- Middle ($35,000-$55,000/yr)
- Upper Middle ($55,000-$75,000/yr)
- High (above $75,000/yr)

7. Please list any religious affiliations to which your family subscribed when you were a child (e.g., Catholic, Buddhist, Muslim, etc.)

8. Please list any religious affiliations to which you subscribe (e.g., Catholic, Buddhist, Muslim, etc.)

9. Was your caregiver who disciplined you most often, spanked during childhood?

- Yes
- No
- Don't know

10. What is your highest COMPLETED level of education?

- High School/GED
- College/Vocational School
- Graduate/Professional School

11. What was the highest level of COMPLETED education of your caregiver who disciplined you most often?

- High School/GED
- College/Vocational School
- Graduate/Professional School

12. Please briefly describe your view of your childhood experience in adjectives. You might use, but are not limited to, some of the following: stable, stressful, happy, sad, loving, scary, supportive, safe, boring, etc.

13. Did you spend the majority of your days before age 5 in childcare outside home?

- Yes
- No

14. Please rate the quality of relationship you CURRENTLY have with your childhood caregiver who disciplined you most often (e.g., parent, etc.)

- 1 - Not close at all
- 2 - Not very close
- 3 - Neutral
- 4 - Close
- 5 - Extremely close

Record Responses

Note: This was the participants' view of these items via SONA Only items and response options were visible to participants while completing this online survey. The title of this survey did not appear on screen.

Appendix D

Appendix D

Participant Demographic Information

Demographic Item		Frequency	Percent
Gender	Female	48	80.0%
	Male	12	20.0%
Ethnicity	African American	0	0.0%
	European American	58	96.7%
	Asian American	0	0.0%
	Native American	1	1.7%
	Other	1	1.7%
Birth Order Position	First-born	21	35.0%
	Middle child	10	16.7%
	Last-born	25	41.7%
	ONLY CHILD	4	6.7%
Family Structure	Single mother household	7	11.7%
	Single father household	0	0.0%
	Both parents present in household	40	66.7%
	Mother and partner present in household	5	8.3%
	Father and partner present in household	0	0.0%
	Grandparents or other family member caregiver	2	3.3%
	Other	6	10.0%
Family Income in Childhood	Low (under $15,000/yr)	5	8.3%
	Lower Middle ($15,000-$35,000/yr)	14	23.3%
	Middle ($35,000-$55,000/yr)	18	30.0%
	Upper Middle ($55,000-$75,000/yr)	16	26.7%
	High (above $70,000/yr)	7	11.7%
Participant's Disciplinarian Spanked	Yes	47	78.3%
	No	3	5.0%
	Unknown	10	16.7%
Participant's Highest Completed of Education	High School/GED	42	70.0%
	College/Vocational School	18	30.0%
	Graduate/Professional School	0	0.0%
Disciplinarian's Highest Completed Education	High School/GED	33	55.0%
	College/Vocational School	11	18.3%
	Graduate/Professional School	16	26.7%
In Childcare Prior to Age 5	Yes	16	26.7%
	No	44	73.3%
Current Quality of Relationship with Disciplinarian	Not Close at All	4	6.7%
	Not Very Close	1	1.7%
	Neutral	9	15.0%
	Close	18	30.0%
	Extremely Close	28	46.7%

Figure A-1. *Demographic Frequencies and Percentages.*

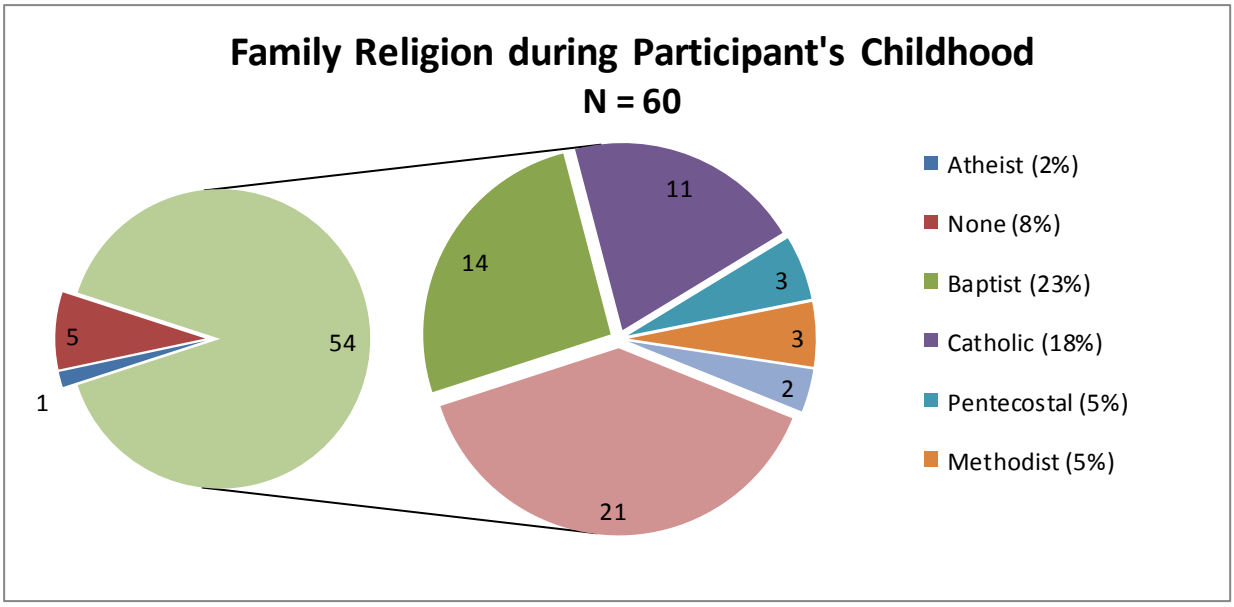


Figure A-2. *Participants' Reported Religious Affiliation for Family during Childhood.*
Note. Percent values are rounded to the nearest whole percent.

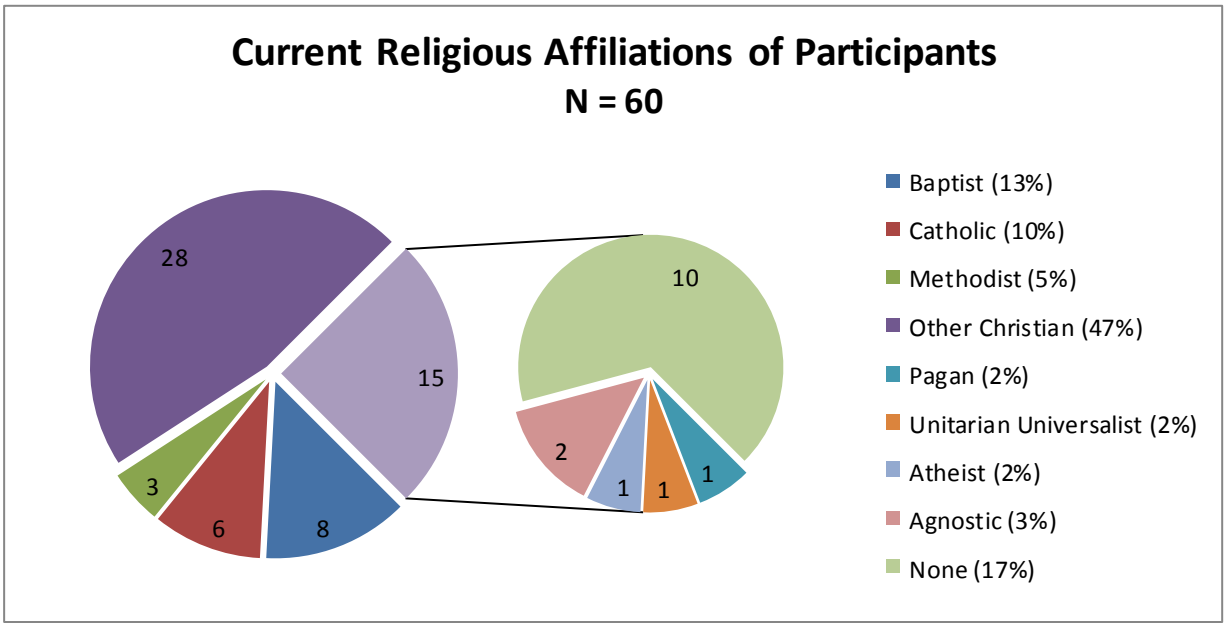


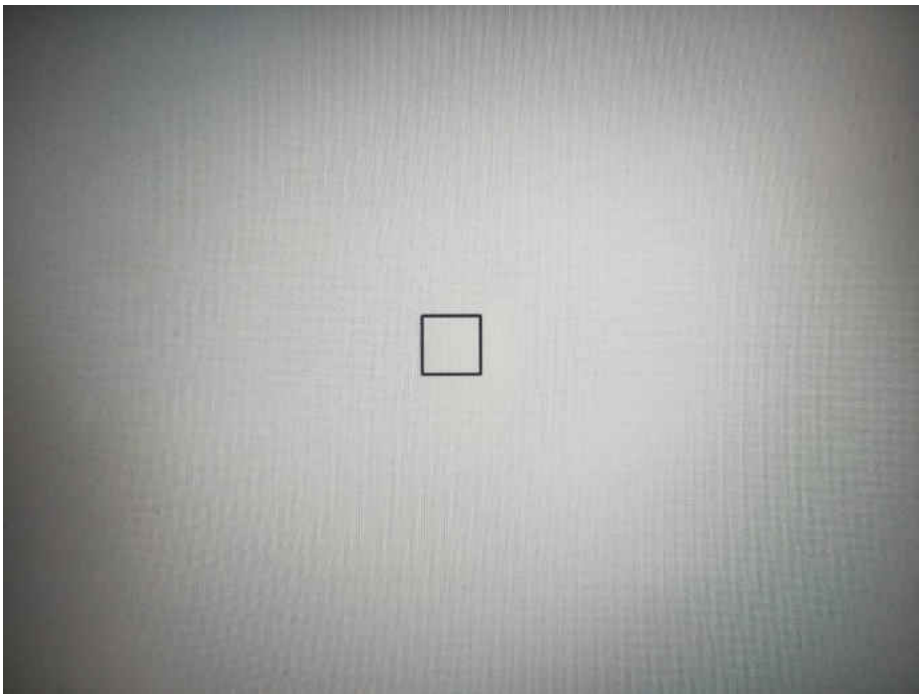
Figure A-3. *Participants' Reported Current Religious Affiliations for Self.*
Note. Percent values are rounded to the nearest whole percent.

Appendix E

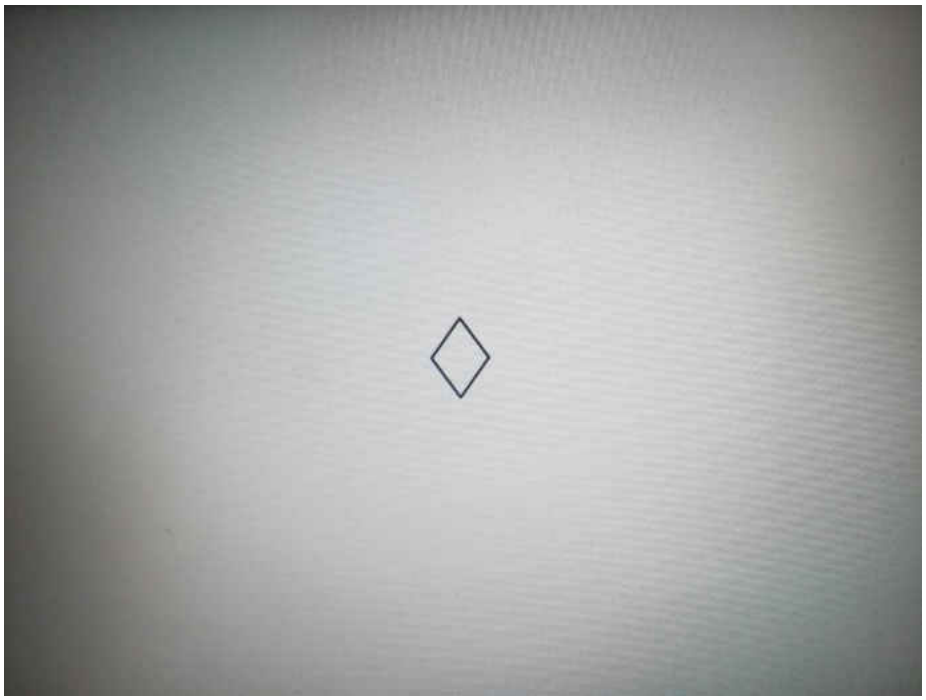
Appendix E

2-Back Task Sample Sequence

(Screen Presentation 1)



(Screen Presentation 2)



(Screen Presentation 3)

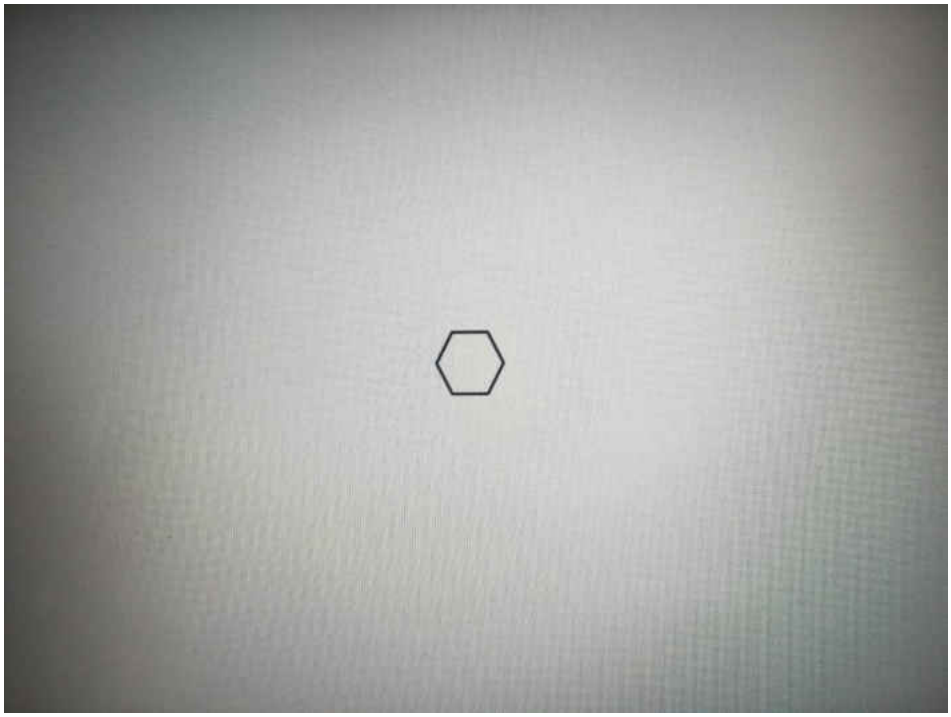


Figure A-4. *Sample Presentation Sequence in the 2-Back Task.*
Note. Screen Presentations 1-3 indicate a 'nonmatch' example sequence in which target shapes appeared to participant. The representation is decreased in size to accommodate this document.

Appendix F

Appendix F

Sample Photos

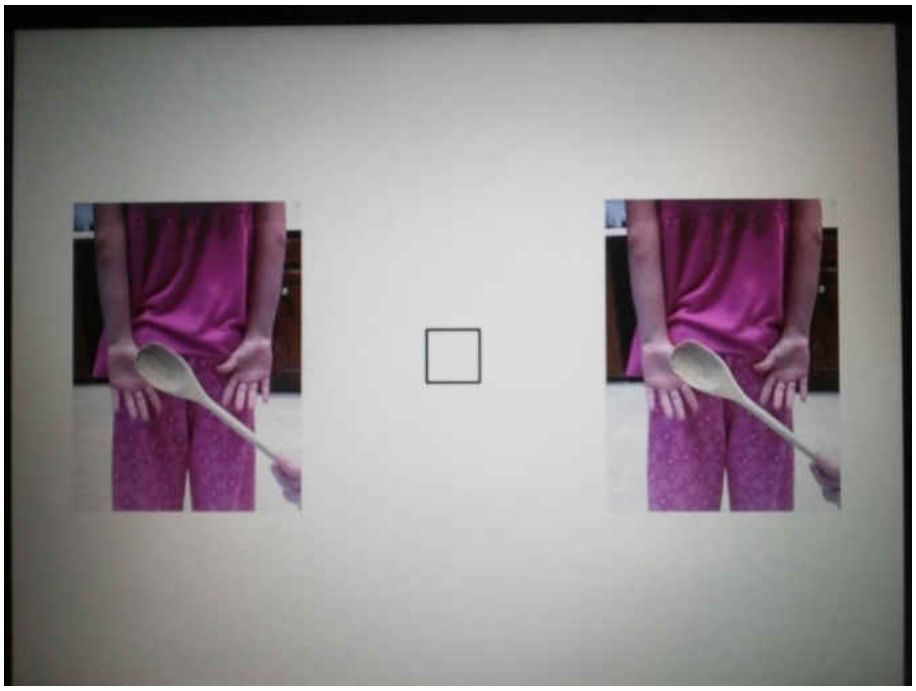
Figure A-5. *Samples for Each of Four Photo Conditions.*
Sources: **(A)** [Digital image: Corporal punishment with belt, child standing, white background]. Retrieved from URL (https://sites.psu.edu/siowfa14/2014/09/15/should-you-really-spank-your-kids/).; **(B)** Dazeley, P. (nd). [Digital image: Girl spanked with woman's open hand]. Retrieved from URL (http://content.time.com/time/magazine/article/0,9171,1983895,00.html).; **(C)**Wilcox, K. (2009). [Digital image: Child standing in corner]. Retrieved from URL (http://peaceinyourhome.com/self-calming-an-alternative-to-the-traditional-time-out/).; **(D)** [Digital image: Child eating apple, female]. Retrieved from URL (http://calmingcorners.com/2013/09/september-is-national-childhood-obesity-awareness-month/).

Appendix G

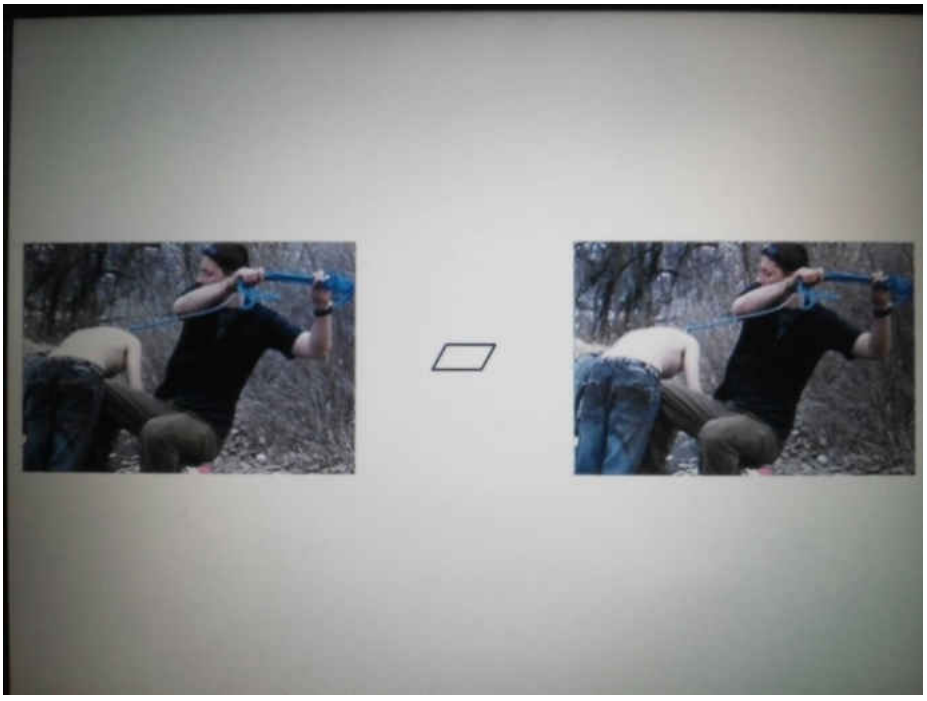
Appendix G

Flanker Embedded 2-Back Task Sample Sequence

(A; Screen Presentation 1)



(B; Screen Presentation 2)



(C; Screen Presentation 3)

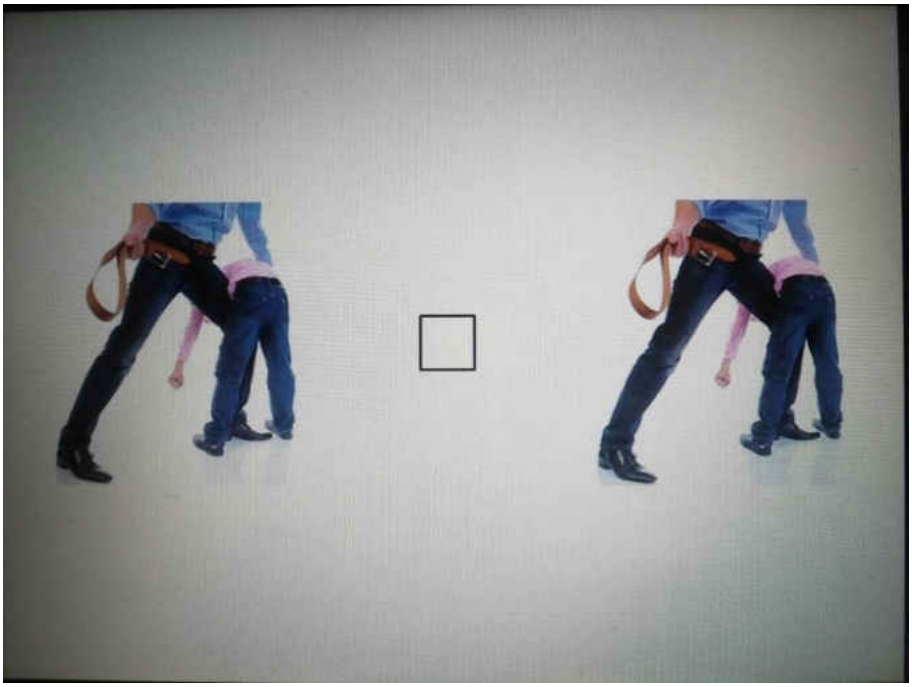


Figure A-6. *Sample Presentation Sequence in the Flanker Embedded 2-Back Task.* Note. Screen Presentations 1-3 indicate an example of a 'match' situation within the HCP block. The representation is decreased in size to accommodate this document. Sources: Photos adapted from **(A)** [Digital image: Corporal punishment with wooden spoon, child wearing pink clothes]. Retrieved from URL (http://childrensmd.org/browse-by-age-group/toddler-pre-school/to-spank-or-not-to-spank/).; **(B)** [Digital image: Corporal punishment with blue rope, child with no shirt]. Retrieved from URL (http://www.mydailyflog.com/justJirka/calendar /201104).; **(C)** [Digital image: Corporal punishment with belt, child standing, white background]. Retrieved from URL (https://sites.psu.edu/siowfa14/2014/09/15/should-you-really-spank-your-kids/)..

Appendix H

Appendix H

Image Recognition Task Sample with Mirror Image

(A) Original:

(B) Mirror:

Figure A-7. *Sample Pair of Original and Mirror Images Used in the Image Rating Task.*
Note: The mirror (B) is adapted from the original (A)
Source: [Digital image: Corporal punishment with belt, child wearing blue shorts]. Retrieved from URL (http://www.independent.com.mt/articles/2015-03-04/world-news/Human-rights-body-scolds-France-saying-spanking-kids-is-a-no-no-6736131629).