THE SIBLING RELATIONSHIP AS A REPRESENTATIVE CONTEXT FOR THE ACTIVATION OF UNDERLYING PSYCHOLOGICAL MECHANISMS ASSOCIATED WITH AGGRESSION: AN EVOLUTIONARY PERSPECTIVE

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In this study I examined sibling aggression from an evolutionary perspective. College students were primed for either a sibling or best friend relationship. The presence of underlying mechanisms associated with aggression were assessed through a computer-mediated administration of a modified Stroop task, in which participants were asked to correctly identify the color of 20 aggressive and 20 non-aggressive words. Further assessment of underlying mechanisms associated with aggression was conducted through utilization of the Aggression Questionnaire (AQ) and the Positive and Negative Affect Scale (PANAS). Results indicate that being primed with a sibling or best friend relationship had no effect regarding the activation of underlying psychological mechanisms associated with aggression. Further findings indicate that exploratory variables such as sex of the participant and of the sibling, age-gap between siblings, and sibling status did not appear to influence mechanism activation. Discussion focuses on possible explanations regarding why expected results were not obtained.
I dedicate this work to my parents, supportive friends, Sigmund Freud, Charles Darwin, and my younger brother who was the inspiration for the topic.
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INTRODUCTION

Sibling aggression refers to behaviors intended to physically harm a brother or sister who is motivated to avoid such harm (see Baron & Richardson, 1994). In the United States, 85% of adults have at least one sibling (Stocker, Lanthier, & Furman, 1997), and very few children do not fight with their siblings (Dunn, Slomkowski, & Beardsall, 1994; McGuire, Manke, Eftekhari & Dunn, 2000). In fact, sibling aggression is the most common form of intra-family aggression and abuse (Epkins & Dedmon, 1999; Herzberger & Hall, 1993; Hoffman & Edwards, 2004). Additionally, family members view sibling aggression as a serious problem (Dunn, Slomkowski, & Beardsall, 1994; McGuire et al., 2000). Concern over sibling aggression is warranted because fights among siblings are more frequent and more intense than conflicts in other family relationship types (e.g., marital conflict; McGuire et al., 2000). Moreover, there are long-term negative effects of sibling aggression. These include a stronger likelihood of employing violence in adulthood (Mangold & Koski, 1990), as well as reduced psychological well-being (Graham-Bermann, Cutler, Litzenberger, & Schwartz, 1994). Due to these reasons, sibling aggression is considered to be a serious issue in the United States (Graham-Bermann et al., 1994).

Most sibling aggression research is descriptive in nature and focuses on prevalence rates (Hoffman & Edwards, 2004). The few theoretical explanations for sibling aggression that have been offered are mainly from clinical-developmental psychology. In the current research, I will examine sibling aggression from an evolutionary psychology perspective. Previously offered theories have been useful in terms of understanding sibling aggression, but they do not take into account the evolutionary origins or ultimate function(s) of sibling aggression. The evolutionary

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1 In empirical research, the distinction between conflict, characterized by opposition, and fighting, characterized by aggression, is rarely made (Raffaelli, 1997). Terms such as sibling aggression, rivalry, conflict, or disputes are often used interchangeably. This thesis will also use these terms interchangeably, although there will be a focus on physical aggression.
perspective on sibling aggression, while incorporating previously noted points, offers a more comprehensive explanation of sibling conflict by highlighting topics not addressed by other theories (e.g., domain-specific psychological mechanisms).

In the current research, we tested predictions gleaned from evolutionary theory regarding the cognitive-affective underpinnings of sibling aggression. In my review of the literature, I examine how underlying psychological mechanisms for aggression that have developed over evolutionary history, may be activated by the sibling relationship. Additionally, I describe how the evolutionary benefits of aggression relate to the sibling experience. Prior to describing these benefits, I report the prevalence of sibling aggression, examine the most common sources of sibling aggression, as well as review the findings on the roles that sibling age and sex have regarding sibling aggression.

*Prevalence of Sibling Aggression*

After reviewing the literature on prevalence rates, Newman (1994) noted that, “Sibling aggression is so common that its occurrence is taken for granted” (p. 123). For both males and females, aggression towards a sibling occurs more often than aggression towards all other peers combined (Felson, 1983). McGuire et al. (2000) reported that only 2% of the 108 school-aged sibling dyads they interviewed never fought. Moreover, results from a national survey of 2,143 families suggested that 80% of children with a sibling(s) committed at least one act of physical aggression against a sibling in a given year (Straus, Gelles, & Steinmetz, 1980). Steinmetz reported that 78% of sibling pairs that involved children who were eight years old or younger, 68% of sibling pairs that involved children who were ages 9-14, and 63% of sibling pairs that involved children who were ages 15 and over, engaged in physical aggression against one another.
Although these statistics demonstrate that sibling aggression is quite common, they may underestimate its true prevalence due to how the prevalence rates were obtained. Each study relied on parental report. Parental reports may not reveal the true prevalence of sibling aggression for several reasons. Aggression among children may be so common that parents overlook much of it and only report the more serious aggressive acts (Herzberger & Hall, 1993). Straus et al. (1980) examined only two-parent households and only violence associated with one child was studied. It is quite possible that in examining single-parents households, as well as accounting for all children, the prevalence rate of sibling violence would be higher. Additionally, much aggression between siblings is likely to occur when the parents are not present and, therefore, cannot be reported by the parents.

Studies utilizing methodologies other than parental report may more clearly report the prevalence of sibling aggression. Junior high school male students reported sibling aggression prevalence rates of 88%, and junior high school females reported prevalence rates of 94% (Roscoe, Goodwin, & Kennedy, 1987). An observational study conducted at the homes of preschool aged siblings revealed an average of eight aggressive interactions between siblings in an hour-long period (Berndt & Bulleit, 1985). Similar findings were reported in another study that utilized observation (Ross, Filyer, Lollis, Perlman, & Martin, 1994). These findings indicate that sibling aggression may be more prevalent than what parental reports suggest. In summary, sibling aggression is very common and most likely, underreported. Next, I examine the severity of sibling aggression.

*Forms of Sibling Aggression*

Sibling aggression ranges from relatively mild forms of rivalry (e.g., competition) to more serious forms including punching, hitting with an object, weapon use, and murder (Roscoe,
Goodwin & Kennedy, 1987). One longitudinal study found that 62% of high school seniors reported striking a sibling that year (Patterson, 1984). Another study that was conducted over a year-long time span and that relied on parental report found that 80% of children committed at least one act of physical aggression against a sibling. Primary types of physical aggression included pushing/shoving (74%), slapping (48%), throwing things (43%), kicking/biting (42%), and hitting with an object (40%) (Straus et al., 1980). Homicide data reveal that approximately 10% of family homicides are sibling murders (Hoffman & Edwards, 2004). Therefore, not only is sibling aggression common, it is often a very serious and potentially deadly problem.

Proximate Causes of Sibling Aggression

To date, research on sibling aggression focuses on the proximate or immediate causes of the aggression. Typically, studies employ either an observational, interview, or survey format in order to identify the causes of sibling aggression. Parents or children are asked questions surrounding how fights between siblings start. Studies have demonstrated that conflict over possessions is the most commonly reported source of sibling aggression (Deater-Deckard, Dunn, & Lussier, 2002; Howe, Fiorentino, & Gariepy, 2003; Howe, Rinaldi, Jennings, & Petrakos, 2002; Ross, 1996). For example, children fight over toys even when duplicates are readily available and over toys that had previously been ignored. Once the toy has been successfully retrieved from a sibling, it is often ignored again (Caplan, Vespo, Pederson, & Hay, 1991). Ross (1996) observed sources of sibling conflict in 40 families. She recorded an average of 33 conflicts between siblings over possessions during the 9-hour observation period. McGuire et al. (2000) asked children about their fights with their sibling(s). In a sample of nearly 200 children, 94% of children ages 7 to 13, with an average age difference between the siblings of 33 months, reported disputes over the sharing of personal possessions (e.g., bicycles, baseball cards). This
was by far the most common source of conflict between siblings in this study. Thus, it appears that acquiring, maintaining, and controlling resources is of primary importance to siblings, and that children often resort to physical aggression to achieve these goals (Howe, Rinaldi, Jennings, & Petrakos, 2002).

Sibling conflict over parental attention is another theme noted in the literature (McGuire et al., 2000). Early in the history of psychology, Sigmund Freud (1916/1917) posited that a rivalry develops between siblings over parental love. Alfred Adler (1931) believed that rivalry for parental affection was greater than any affiliation felt between siblings. However, contemporary literature often does not support this rivalry theory (McGuire et al., 2000; Prochaska & Prochaska, 1985). For example, McGuire et al. (2000) studied the content of sibling conflict utilizing a semi-structured interview. They interviewed 108 school-aged sibling pairs whose average ages were 11.1 for the older siblings and 8.2 years for the younger sibling. They found that only 9% of older and younger siblings reported perceived parental preferential treatment as a source of conflict.

The absence of support for the parental rivalry hypothesis may be due in part to an individual’s unwillingness to admit feelings of envy and jealousy as well as by children’s limited insight regarding the motivational forces behind their behavior. Children and adolescents may not be aware of or able to report all causes of their sibling conflicts (McGuire, Manke, Eftekhari, & Dunn, 2000). They may describe only immediate conflict causes and not recognize the underlying psychological issues such as a general struggle for attention or love within the family (Bank & Kahn, 1982). Conflict over toys is a salient, observable issue, whereas conflict over parental attention is less tangible and therefore may be less likely to be reported. Numerous studies in social psychology have shown that even adults are largely unaware of the factors that
affect their behavior. Often, adult reporters are unable to identify the higher-order cognitive processes used in their decision-making (Nisbett & Wilson, 1977). One can assume that in children, these abilities are even more limited as their brains are less developed than in adults. Therefore, it is not surprising that children fail to report seeking parental attention as a source of conflict. However, studies that rely on methods other than child self-report demonstrate that parental attention may become a source of conflict amongst siblings.

Research examining jealousy in infants using observational measures indicates that children appear to compete for parental attention (Hart, Carrington, Tronick, & Carroll, 2004; Teti & Ablard, 1989). In the Hart et al. (2004) study, mothers were instructed to simulate parent-child interactions with a lifelike doll while in the presence of their 6-month-old infant. Results noted that infants demonstrated greater durations of negative affect in this condition as opposed to when the mother was involved with a play book. Negative affect included angry or sad facial expressions, furled eyebrows, and downturned or squared lips. Therefore, it appears that studies that do not rely on verbal report, obtain results that suggest that desire and competition for parental attention exists in children. Although this finding does not demonstrate that sibling aggression occurs due to concern over parental attention, it does indicate that a child’s concern over parental attention can elicit a strong and negative emotional reaction in the child. Furthermore, evidence of this negative reaction in children less than one year in age demonstrates that this behavioral response results from psychological mechanisms that are present at birth. Further studies are necessary to determine whether aggressive behavior may result from competition for parental attention and love. Having noted the proximal causes of sibling conflict, I now examine the roles of age and sex of siblings in sibling aggression.
Role of Birth Order in Sibling Aggression

In general, older siblings are more aggressive than younger siblings (Corter, Pepler, & Abramovitch, 1983; Dunn & Munn, 1986; Kendrick & Dunn, 1983; Vuchinich, Emery, & Cassidy, 1988). Older siblings are often the initiators of sibling disputes, and they generally win these conflicts (Graham-Bermann, Cutler, Litzenberger, & Schwartz; McGuire et al., 2000). Wiehe (1997) found that in families with more than two children, a cascading sibling aggression effect occurred. The oldest child targeted the second-oldest child who targeted the next-youngest child. Furman, Jones, Buhrmester, and Adler (1989) also noted that children reported a feeling of greater status/power and increased rivalry when they had a younger sibling. It appears that younger siblings are viewed as threats, and children may utilize aggression in order to maintain their position within the dominance hierarchy.

Moreover, aggressive behavior is more evident between siblings who are within a few years of age of each other (Dunn & McGuire, 1992; Felson, 1983; Felson & Russo, 1988; Furman & Buhrmester, 1985; Minnett, Vandell, & Santrock, 1983; Newman, 1996; Stocker, Dunn, & Plomin, 1989). Siblings with age gaps of three years or less display more sibling conflict and possess a more well-defined status hierarchy than do siblings who are farther apart in age (Furman & Buhrmester, 1985). It is likely that siblings who are close in age with each other are competing for similar resources and possessions. In addition to competing over similar resources, comparable body sizes and physical strength may contribute to the increased rate of sibling aggression. Younger siblings probably recognize that they do not yet possess the physical strength to fight a sibling who is ten years their elder. However, this exaggerated difference in physical strength usually does not exist between a seven year old and an eight year old. Additionally, research suggests that as the age gap between siblings increases, older siblings
are more likely to develop a protective, rather than aggressive stance, towards their younger sibling (Epkins & Dedmon, 1999).

**Sex Differences in Sibling Aggression**

Research has shown that males from age two onward employ physical aggression more so than females (Buhrmester & Furman, 1990; Campbell, 1999; Goodwin & Roscoe, 1990; Hetherington, 1988; Hyde, 1986; Mangold & Koski, 1990; Roscoe, Goodwin, & Kennedy, 1987; Straus & Gelles, 1990; Straus, Gelles, & Steinmetz, 1980). This appears to be true regarding sibling aggression as well (Hetherington, 1988). However, the role that gender composition of the sibling group plays regarding aggression is not clear. Some studies indicate that mixed-gender pairs engage in more conflict than same-sex pairs (Abramovitch, Corter, & Pepler, 1986; Dunn & Kendrick, 1981). Other studies indicate that brothers engage in the most aggression, followed by mixed-sex sibling pairs, and that sisters engage in the least amount of physical aggression with each other (Buhrmester & Furman, 1990; Goodwin & Roscoe, 1990; Hetherington, 1988; Mangold & Koski, 1990; Roscoe, Goodwin, & Kennedy, 1987; Straus & Gelles, 1990; Straus, Gelles, & Steinmetz, 1980). One study reported no relationship between the gender composition of the sibling dyad and aggression (McGuire et al., 2000).

Closer examination of the types of aggression being measured in studies, however, appears to demonstrate that male dyads engage in more serious forms of sibling aggression. Goodwin and Roscoe (1990) found that hitting with either a fist or object and being physically thrown occurred most often in male dyads, whereas scratching occurred most often in female dyads. It appears that although both males and females engage in sibling aggression at similar rates, males engage in more serious forms of aggression, particularly towards one another. I now turn to the leading theories that have been developed to help explain sibling aggression.
Clinical and Developmental Theories of Sibling Aggression

Feminist theory, conflict theory, and social learning theory have been applied to understand sibling aggression (Hoffman & Edwards, 2004). Feminist theory postulates that the patriarchal arrangement of families, ideals of masculinity, and a cultural acceptance of using force to gain control over others or to resolve conflict, fosters a social environment conducive to family violence. This theory emphasizes power differentials generated and perpetuated by culture as the source of all family violence. The focus of this perspective regarding sibling aggression is that older children, particularly older male siblings, generally possess more physical strength than younger siblings. This difference in physical strength is then used to obtain and maintain power over others.

Conflict theory (Sprey, 1969) states that aggression may result when family members have divergent interests. These diverging interests lead to conflict, and aggression is an option utilized to resolve the situation. Conflict theory notes that aggression is a fundamental instrument for siblings. Proponents of this theory posit that conflict is fostered in the sibling relationship as this relationship context places individuals in an environment where frequent interactions occur and a number of resources are shared. These elements produce situations where diverging interests may arise, and that siblings may implement aggression to resolve a conflict to their advantage (Sprey, 1969).

Social learning theory states that behavior, including aggression, is learned largely through imitation and reinforcement. One’s behavioral choices are influenced by direct and observational experience. Aggressive experiences serve as models for children. This phenomenon, where the family is viewed as a “training ground” for violence, is known as the intergenerational transmission of violence (Patterson, 1984). Positive reinforcement further
explains why children adopt aggressive behavior. Physical force against siblings is positively reinforced when it results in the aggressor obtaining a desired object. Aggressive behavior is adopted because desired rewards are the expected outcome. It has been noted that positive reinforcement, compared to punishment, has a greater impact on future actions (Bandura, 1973). This helps to explain why sibling aggression continues by children even after they have been punished by parents.

Each of these theories makes significant contributions in understanding and explaining sibling aggression; however, any one theory does not offer a fully comprehensive understanding of sibling aggression. Feminist theory focuses on male-female violence and offers little explanation beyond societal acceptance regarding aggressive motives. Conflict theory notes that aggression occurs due to differing individual interests, but it fails to explain why certain differing interests appear to more often lead to aggression than others. Social learning theory offers a more thorough explanation of sibling aggression than both feminist and conflict theory, but it does not offer a complete explanation as it fails to explain the ultimate origins of aggressive behavior. Evolutionary psychology complements previous theories as well as offers a more thorough explanation for sibling aggression with its recognition of underlying psychological mechanisms. Furthermore, evolutionary psychology provides a theoretical foundation that allows for specific and testable hypotheses.

*An Evolutionary Perspective on Sibling Aggression*

Evolutionary psychologists (e.g., Buss, 2004) postulate that aggressive behavior has played a significant role in the survival and reproductive success of individuals, especially males, over history. Arguments posed by evolutionary psychologists are not in direct competition with the other perspectives. Rather, many points from the other theories are incorporated into the
evolutionary explanation of aggression. Incorporated points include recognizing the positive effects of aggression and that diverging interests amongst individuals may lead to aggressive behavior. However, the evolutionary perspective addresses unique topics (e.g., the evolution of underlying psychological mechanisms) that are not discussed by other theories. Examination of these topics may make valuable contributions to the sibling aggression literature.

Natural selection. Humans, like all other animals, are products of evolution by natural selection (Darwin, 1859). Natural selection dictates that any physical characteristic (e.g., canines) or psychological mechanism (e.g., anger, envy) that helps ensure survival or enhance reproductive success will be passed on to future generations. For example, males with greater resources and higher status levels are considered by females to be desirable mates. Women across all continents, political systems, and religious groups place more value than men on good financial prospects as an appealing characteristic in a long-term mate (Buss, Abbott, Angleitner, Asherian, & Biaggio, 1990). Males with greater resources are considered to be attractive mates, because greater resources have led, over evolutionary history, to increased health as well as a greater ability to provide for one’s mate and offspring. Aggression against rival males is one method that may be used by males to obtain resources. Therefore, males who possessed psychological mechanisms associated with the use of aggression in order to solve resource problems were more likely to attract desirable mates, and, relatively speaking, be reproductively successful. The characteristics and mechanisms possessed by these individuals were then passed on to future generations.

Evolved psychological mechanisms. Evolutionary psychologists theorize that the human mind is comprised of a large number of domain-specific psychological mechanisms (e.g., envy). Evolved psychological mechanisms are a set of internal processes based in neural structures that
exist because they helped solve specific and recurring problems of survival or reproduction over evolutionary history (Buss, 2004). They are triggered by environmental inputs, and the input to the psychological mechanism informs the organism of the specific adaptive problem that is being faced (e.g., resource threat; Buss & Shackelford, 1997). The processed input leads to an effect that is “intended” to solve the specific problem being faced. Input is transformed into output in the form of physiological activity, information to other psychological mechanisms, or behavioral manifestation (Buss, 2004). For example, witnessing a sibling receive a piece of desired food may trigger the psychological mechanism of envy, which guides attention to the specific adaptive threat of resource competition. Effects from this activation include arousal (physiological), activation of other psychological mechanisms (e.g., anger), and an evaluation of behavioral options. Depending on a number of contextual factors (e.g., whether parents are around, the age and sex of the children, previous exposure to aggression), the child may “decide” to physically aggress against the sibling.

Adaptations. Adaptations are features of the body or mind that evolved because they helped solve specific adaptive problems. They may contribute either directly or indirectly to reproductive and/or survival success (Buss, 2004). Characteristics of adaptations include reliability, functional efficiency, and economy (Williams, 1966). Reliability refers to whether an adaptation regularly develops in all or most members of the species and if it performs dependably when in a context where it may be effectively utilized (Williams, 1966). The recorded history of mankind is filled with violence. Acts of violence are found in all racial, ethnic, religious, and socioeconomic groups. Therefore, it appears that mechanisms underlying

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2 Envy occurs when a person lacks another’s possession and either desire it or wishes that the other lacked it (Parrott & Smith, 1993).
aggressive behavior have been developed by all members of the human species, thus fulfilling
the first component of the reliability criterion.

During ancestral times, individuals who failed to act aggressively when attacked by rivals
experienced an increased risk of serious physical harm and possible death. Evidence of this
assertion can be found in the bullying literature which notes that, even today, individuals who
cannot or will not retaliate are repeatedly victimized (Olweus, 1978). Individuals who utilized
physical aggression to successfully defeat rival males survived, thereby increasing their chances
for reproductive success. Additionally, successfully aggressive individuals garnered reputations
that dissuaded others from attacking. Furthermore, examination of human warfare reveals the
effectiveness and dependability of aggression in achieving means such as independence or
resource gain (e.g., land). Thus, the second component of the reliability criterion (performance
dependability) has been fulfilled (Buss, 2004).

Functional efficiency refers to how well an adaptation helps solve a particular problem
related to survival or reproduction (Buss, 2004). One particular survival problem involves
obtaining resources. Resources such as food and land are necessary for survival. Aggression
can be a means of obtaining these and other resources. During ancestral times, a successful
attack against another may have resulted in obtaining fertile land and food. Current research has
shown that childhood aggression against other children results in the obtainment of toys (Ross,
1996). Aggression for the purpose of obtaining resources is also evident in mugging and robbery
cases. Therefore, aggression can be utilized to solve particular adaptive problems (e.g., resource
threat), thus fulfilling the functional efficiency criterion.

Adaptations must also demonstrate economy in that they solve specific adaptive
problems in a cost-effective manner. No adaptation is 100% effective, and every adaptation
carries costs as well as benefits. Williams (1966) noted that reproduction and survival requires both resource sacrifices and jeopardy of psychological well-being. For example, aggressive behavior may result in positive effects such as obtaining resources, but it also comes at a cost to the individual (e.g., possible physical harm, energy expenditure). If, on average, the costs associated with a behavior outweighed the benefits, then the mechanisms behind the behavior would not have passed on to future generations. However, this is not the case with aggression, as aggression continues to persist throughout all cultures. This leads one to conclude that aggression employed in specific conditions (e.g., resource threat) has, over evolutionary history, resulted, on average, in benefits that outweighed its costs. Therefore, aggressive behavior demonstrates economy. Aggression now has been shown to fulfill the criteria for an adaptation (reliability, functional efficiency, economy).

In sum, our ancestors recurrently encountered specific adaptive problems. Underlying psychological mechanisms evolved based upon their success in solving these specific adaptive problems. One may note though that recent societal and technological advances, such as the advent of the legal system and the development of cities, have produced current environments that on the surface appear to be quite different from those our ancestors experienced. This may leave one doubting whether these ancestral mechanisms currently exist and are activated in individuals today. Two points address this doubt. First, it is important to note that evolution is a very slow process. The evolution of underlying psychological mechanisms has not occurred at nearly the same pace as societal advancements. Therefore, in the modern environment, individuals continue to carry mechanisms that developed during the ancestral period. Secondly, on the surface level current environmental conditions appear different from those experienced by our ancestors. However, closer examination of the environment reveals that the recurrent
adaptive threats experienced by our ancestors are still encountered by individuals today (e.g., resource threat, loss of a mate). Thus, the mechanisms that evolved to help resolve these specific threats may currently be activated under conditions that are often very similar to the adaptive problems encountered by our ancestors.

The sibling relationship provides one context wherein adaptive problems similarly experienced by one’s ancestors (e.g., resource threat) are currently still experienced, thus leading to the activation of the underlying mechanisms for aggressive behavior. In the sibling relationship, two or more individuals may find themselves competing for similar resources. Evolutionary psychologists argue that aggression may be an evolved solution for defending against attack, negotiating status and power hierarchies, and deterring rivals from future aggression (Buss, 2004). Many of these specific problems are evident in the sibling relationship as well. Therefore, the sibling relationship is one context where underlying psychological mechanisms (e.g., anger, envy) for aggression may be triggered. I will now examine the activation of mechanisms associated with aggression in sibling relationships.

Mechanisms underlying sibling aggression. Siblings will compete with one another due to their mutual interest in and desire for resources (Daly & Wilson, 1994). A first-born child monopolizes parental investment. However, the first-born experiences competition and resource threat with the birth of a sibling. Now there are two individuals seeking parental investment. Assuming that the parents are not displaying favoritism towards one of the children, resources that once were obtained solely by the first-born now are halved (Buss, 2004). Under this specific condition of resource competition, the psychological mechanisms underlying aggressive behavior (e.g., anger, envy) may be activated.
Should children fail to receive a desired resource from the parent, they may use force to obtain it from a sibling. Here, aggressive behavior will be utilized in order to co-opt another’s resources. Additionally, should the older sibling continue to dominate and win the majority of conflicts, the younger sibling will likely recognize that he/she is subordinate. In this case, aggression will lessen the likelihood of future attacks by the younger sibling and the older sibling will achieve a position of dominance. Upon continual losses, the younger sibling will recognize that the benefits from physically fighting the older sibling do not outweigh its costs. Additionally, the dominant status will afford greater resource access for the older sibling, as the younger sibling knows what will occur (e.g., aggression) should he/she choose to obtain a resource sought after or possessed by the older sibling. Thus, the mechanisms associated with aggression become activated in the sibling context as this relationship presents siblings with adaptive problems similar to those faced by ancestors as both children and adults.

**Overview.** To summarize, sibling aggression is a common and serious problem. Fighting over resources is a commonly cited source of the aggression, and seems to occur more frequently between siblings who are close to each other in age. Older siblings, particularly males, appear to utilize aggression more than younger siblings. Aggression by the older sibling towards a younger sibling(s) may be used to obtain resources as well as to establish a dominance hierarchy.

A number of clinical and developmental theories help explain sibling aggression, but their explanations are not comprehensive. Evolutionary psychology potentially offers valuable contributions to the sibling aggression literature by noting that over evolutionary history aggressive behavior, activated by underlying mechanisms, has been a reliable and effective method for solving specific problems involving survival and reproduction. Evolutionary psychology posits that the pursuit of resources and status are specific situations where the
underlying psychological mechanisms for aggressive behavior may be activated, especially for males. These two features are prominent in the sibling relationship and may help explain why sibling aggression is so prevalent. In the current study, I intended to contribute to the literature regarding sibling aggression by empirically investigating hypotheses gleaned from evolutionary psychology regarding sibling aggression. In this study I assessed whether the sibling relationship is a context that automatically activates the mechanisms underlying aggressive behavior.

_Cognitive-Affective Measurement of Underlying Psychological Mechanisms: A Priming Approach_

In the present study, I argued that aggression is an example of a human behavior that results from the activation of evolved psychological mechanisms triggered under specific conditions (e.g., resource threat; Buss, 2004). Underlying psychological mechanisms are triggered rapidly and this internal process often occurs outside of one’s awareness. For example, upon seeing a sibling with a desired object, the older sibling may immediately experience feelings of envy and then physically hit the sibling. These feelings do not occur after a long and thoughtful internal examination by the child of the situation. Because this process often occurs outside of one’s awareness, measures that utilize self-report may not be sufficient to record this experience. A measure that can assess thoughts outside of one’s awareness is needed. Priming is one technique that is commonly used to study processes that may not be effectively accessed through self-report.

Priming is an experimental technique designed to study automatic processes of unconscious or implicit determinants of social behavior (Todorov & Bargh, 2002). Typically, priming studies involve two phases. The first part consists of the priming phase, wherein participants are subtly exposed to stimuli related to the mental concept under study (e.g.,
aggression; Todorov & Bargh, 2002). In the second phase, participants, presumably unaware of the potential effect and influence of the priming stimuli\(^3\), are then asked to make a judgment or perform a behavior related to the primed concept (Todorov & Bargh, 2002). For example, in a study examining stereotypes, individuals were exposed to certain words that were part of the African-American stereotype (e.g., lazy, ghetto, jazz) but not to other words that comprise this stereotype (e.g., aggressive). The logic was that activating certain features of the stereotype (e.g., lazy) would activate the entire stereotype. Next, participants judged a person who performed a number of ambiguously aggressive behaviors. Results showed that participants primed with the stereotypes associated with African-Americans, judged the individuals as being more aggressive than those who were not primed (Devine, 1989). The prime appeared to influence one’s cognitions. However, if asked, participants show no knowledge or awareness of priming effects (Fitzsimmons & Bargh, 2003). The priming effects occur outside of one’s awareness and therefore are not accessible through self-report.

**Priming methods.** Priming methodologies may employ either subliminal or supraliminal primes. In subliminal priming, participants are exposed to trait primes below the threshold of awareness (DeCoster & Claypool, 2004). For example, Bargh and Pietromonaco (1982) asked participants to detect flashes that appeared on a computer screen by pressing a button as quickly as possible. The words (e.g., hostile, rude) were presented outside of the participants’ foveal visual field and their position and timing was random. Upon completing this task, participants read stories consisting of people engaging in ambiguous behavior. It was found that participants who were subliminally exposed to aggressive words rated the character’s behavior as more aggressive than did individuals exposed to the control words (e.g., water, number). Exposure to

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\(^3\)Priming studies attempt to ensure that participants do not become aware of the priming effects because it has been demonstrated that people who become consciously aware of the prime attempt to override the priming effects often times in an exaggerated manner (Martin, 1986).
the aggressive words activated cognitions that guided participants’ information processing and event interpretation.

The second method is supraliminal priming. In this method, participants are consciously exposed to trait primes in one task and then are asked to complete a second, ostensibly unrelated, task. The assumption is that the prime introduced in the first task will affect performance in the second task. For example, Fitzsimons and Bargh (2003) asked participants to complete a questionnaire entitled either “Friend Study” or “Coworker Study.” Participants assigned to the coworker group were asked to think of a coworker they knew well, but whom they would not consider to be a friend. Those assigned to the friend group were asked to think about one friend. Individuals answered a number of questions that allegedly measured how well the participant knew the specific friend or coworker. Following questionnaire completion, participants were thanked, informed that the experimenter may wish to seek their opinions in future studies, and then asked to respond to two questions. The first question asked participants if they were willing to participate in another study that would be longer in duration than the current study. The second question asked if they were willing to participate in the second study immediately following completion of the current study. Consistent with predictions, results indicated that participants who completed the friend questionnaire were more likely than those who completed the coworker questionnaire to volunteer for future studies. The logic behind the study was that friendships are characterized by qualities such as support and helping and are egalitarian in nature. It was assumed that these traits would be primed as the individual completed the friend questionnaire. These activated traits would then carry over into the second portion of the study; willingness to participate in future studies, which is what occurred. In the current study, I used supraliminal priming.
**Priming assumptions.** Priming research is based on the assumption that a stimulus activates mental concepts relevant to the stimulus, and this activation triggers the activation of related mental concepts (Todorov & Bargh, 2002). The activation of one element tends to increase, automatically, the accessibility of associated elements (Anderson, Anderson, & Deusser, 1996). For example, research has demonstrated that when an individual is exposed to a gun, aggressive mental concepts are triggered as well as hostile attribution biases (Bushman, 1998). For this study, I argued that one of the concepts that would be triggered by the activation of the concept “sibling” was aggression. I expected that aggression would be triggered indirectly by priming the sibling relationship. Indirect activation of aggression would occur through the association process. A sibling may activate feelings of anger, envy, and competitiveness in an individual; emotions that are associated with aggression. Activation of these emotions may ultimately result in the activation of aggression. Therefore, the priming of a sibling relationship was expected to indirectly lead to the activation of aggressive thoughts, feelings, and behavior. The notion that a sibling activates the underlying mechanisms for aggression may help to explain why sibling aggression is so prevalent and continues to occur despite individuals being punished by their caretakers for this behavior.

It is important to note that aggression is not the only concept that may be activated by priming the concept of sibling. Other activated concepts include, but are not limited, to love, protectiveness, and care. Studies have demonstrated that older siblings often engage in a number of roles and responsibilities when interacting with their younger sibling(s). Roles include teacher, caretaker, playmate, and provider of emotional and physical support (Howe & Recchia, 2005; Kosonen, 1996; Mendelson, de Villa, Fitch, & Goodman, 1997). Context is an important factor regarding which concepts may be activated. For example, should a strange individual
make threatening gestures or comments to a younger sibling, it is quite likely that protective qualities will be invoked in the older sibling. However, at home and due to activities such as competition for resources, aggression will be activated. Thus, in the current study, it was expected that a number of concepts associated with the sibling relationship would be activated. However, I only examined the activation of aggression.

Several studies have shown that priming can influence behavior (Bargh, Chen, & Burrows, 1996; Carver, Ganellen, Froming, & Chambers, 1983). Bargh et al. (1996) primed participants with either the concept of rudeness or politeness. Results showed that 67% of the participants who were primed for rudeness interrupted the conversation between the researcher and a confederate and only 16% of those primed for politeness interrupted the conversation. In another study, Carver et al. (1983) asked participants to make sentences from scrambled words that possibly described a violent behavior (e.g., leg break his), whereas others made sentences from words without any possible aggressive themes. Next, participants engaged in a learning task. Individuals who had been exposed to aggressive concepts administered stronger shocks to a confederate during the learning task than did the control participants. Extrapolating these findings towards sibling aggression, as the aggressive mental concept becomes continually activated due to the presence of a sibling, the more likely it becomes that aggressive behavior will be implemented in this context. I now examine the relationship between prime frequency and behavioral initiation.

The priming literature notes that frequent prime presentation and cognitive-affective mechanism(s) activation results in stronger priming effects (Todorov & Bargh, 2002). For example, individuals repeatedly exposed to stimuli related to aggression may develop chronically accessible knowledge structures of this concept (Todorov & Bargh, 2002). Chronically
accessible mental representations may be activated by the presence of relevant environmental information even if intentional thought and attention are directed elsewhere (Bargh, Chaiken, Raymond, & Hymes, 1996). Stimulus appraisal is conducted spontaneously, automatically, and rapidly (Anderson, Anderson, & Deusser, 1996). Research findings indicate that chronically accessible attitudes are automatically activated by the mere presence of the stimulus (Bargh, Chaiken, Raymond, & Hymes, 1996). Furthermore, repeated or frequent activation of a construct (mental concept) can result in a lower activation threshold (Bushman, 1998).

Relating these findings to the present study, I assumed that siblings frequently interacted with one another, often on a daily basis. As college students were the participants for this study, I assumed that they have interacted daily and regularly with siblings in their past. Initially the underlying mechanisms for aggressive behavior are activated when resource threat or another specific adaptive problem is evident. However, due to a history of daily sibling exposure, the underlying mechanisms may be repeatedly activated. This repeated activation leads to a lower threshold as access to aggressive concepts are more readily accessible. As a result, the mechanisms may be activated by the mere sight or recollection of a sibling. In sum, it appears that primes can influence cognitions, and that these cognitions may become chronically accessible and occur at a lower threshold due to repeated exposure of the prime (Bargh & Pietromonaco, 1982; Devine, 1989; Todorov & Bargh, 2002).

The Present Study

Evolutionary psychology theory may offer a unique and valuable perspective on the causes of sibling aggression by discussing underlying psychological mechanisms, something not included in other theories. Evolutionary psychology theory notes that physical characteristics, as well as psychological mechanisms underlying behavior(s), that helped ensure survival and
reproductive success have been passed on to future generations. These underlying mechanisms, activated outside of one’s awareness, are triggered by specific survival and reproductive problems (e.g., resource threat; Buss, 2004).

In the current study, we assumed that the sibling relationship provided a context wherein adaptive problems similar to those experienced by our ancestors are encountered. Therefore, we hypothesized that the psychological mechanisms (e.g., anger, envy) associated with behavior(s) that have been effective in resolving these adaptive problems (e.g., aggression) would be activated by priming the concept of sibling. Adopting the priming technique utilized by Fitzsimons and Bargh (2003) in their study, relationship contexts (sibling versus best friend) were primed for participants through their completion of a questionnaire. Participants in both conditions completed a questionnaire requiring them to visualize the target individual (sibling or best friend) as well as to reflect on their relationship with the target individual. We believed that as participants answered questions about their sibling or best friend, the concepts associated with this relationship type would become activated.

The best friend relationship was selected as a control group because this relationship type offers many similarities to the sibling relationship in that both relationships often involve frequent and emotional interactions. Thus, the relationships among best friends and siblings are similar in many ways but they were expected to differ in terms of aggression. This difference may occur because the sibling, as oppose to the best friend context, exposes individuals to adaptive problems (e.g., resource threat) wherein aggression may be an effective solution.

Measurement of the underlying mechanisms for aggression were assessed by examining participants’ reaction times in identifying the color of aggressive words, as well as in completion
of two questionnaires designed to assess one’s current thoughts about aggression and one’s current affective state.

_Hypotheses._ 1a.) We hypothesized that priming the sibling relationship would activate underlying psychological mechanisms associated with aggression. We did not believe that priming the best friend relationship would activate underlying mechanisms associated with aggression. As a result of activation, participants primed with a sibling relationship, as oppose to those primed with a best friend relationship, were expected to spend more time reading aggressive words rather than only noting their color, as research has demonstrated that the automatic tendency to read a primed word interferes with noting its color (Dyer, 1973; Higgins, Van Hook, & Dorfman, 1988; Warren, 1977). Thus, participants primed with a sibling relationship were expected to display slower response time regarding color identification of the aggressive words than those primed with a best friend relationship. Therefore, we expected a significant interaction between relationship prime (sibling and best friend) and target word (aggressive and nonaggressive) with participants in the sibling-prime condition to respond more slowly than participants in the best-friend-prime condition when asked to strike the correct key regarding identifying the color of aggressive words. No differences were expected between the groups regarding correctly identifying the color of nonaggressive words.

1b.) A second, related hypothesis was that participants assigned to the sibling-prime condition would more strongly endorse items on the Aggression Questionnaire (AQ) (Buss & Perry, 1992) than individuals assigned to the best-friend-prime condition. It was believed that priming one’s aggressive schemata would increase an individual’s accessibility of past aggressive behaviors, thus, increasing the likelihood of endorsement of aggressive behaviors items (Anderson, Deuser, & Deneve, 1995).
1c.) The third, related hypothesis was that individuals in the sibling-prime condition would endorse a greater number of negative affect items on the Positive Affect and Negative Affect Scale (PANAS) (Watson, Clark, & Tellegen, 1988) than those in the best-friend-prime condition. It was believed that aggression and associated schemas would be activated by the sibling condition and this would be demonstrated by participant endorsement of negative affect items.

Potential moderating variables. If our hypotheses are supported, we planned to examine some potential moderating variables. For example, sex of the participant may moderate the relationship between the priming condition and the aggressive responses (reaction time, item endorsement). As noted, numerous studies have demonstrated that males are more aggressive than females (Buhrmester & Furman, 1990; Campbell, 1999; Hoffman & Edwards, 2004; Goodwin & Roscoe, 1990; Hetherington, 1988; Mangold & Koski, 1990; Roscoe, Goodwin, & Kennedy, 1987; Straus & Gelles, 1990; Straus, Gelles, & Steinmetz, 1980). Thus, aggressive mechanisms may be more readily accessible to males than females. As a result, we expected males in both groups (sibling, best friend) to respond slower in correctly identifying the color of aggressive words than females, to more strongly endorse items on the Aggression Questionnaire than females, and to endorse more negative affect items on the PANAS than females. We expected males in the sibling-prime condition to display the slowest reaction time for aggressive words and the strongest endorsement of aggressive items and negative affect items because the sibling questionnaire would prime them for aggression, thus increasing the accessibility of aggressive concepts that are already present.

Sex of the sibling was another potential moderator of the relationship between priming condition and aggression responses. More severe forms of physical aggression are found
between brothers (Goodwin & Roscoe, 1990). Therefore, we believed that aggression would be more readily primed for male participants with a brother and that these individuals would respond slower in correctly identifying the color of aggressive words, more strongly endorse items on the Aggression Questionnaire, and more strongly endorse negative affect items on the PANAS than participants who form either a sister or mixed sex sibling dyad.

Age gap between participants and their sibling was another potential moderator of the relationship between priming condition and aggression responses. Sibling aggression is most common amongst siblings who are closely-spaced in age, primarily within three years of one another (Furman & Buhrmester, 1985). As aggression is more common amongst siblings closely-spaced in age, the underlying psychological mechanisms for this behavior have been accessed more often (chronically accessible) than for siblings with age gaps greater than three years. Thus, the underlying mechanisms for aggressions in participants placed in the sibling condition who are close in age to their siblings may be more easily accessed by the priming technique than for siblings who are not close in age to their sibling. Therefore, we expected that participants who are within three years of age to their sibling would respond slower in correctly identifying the color of the aggressive words, more strongly endorse aggressive items on the Aggression Questionnaire, and more strongly endorse negative affect items on the PANAS than individuals who are not close in age to their sibling.

Status (older or younger) of the participant was another potential moderating variable of the relationship between the priming condition and aggression responses. Research has shown that older siblings are more aggressive than younger siblings (Corter, Pepler, & Abramovitch, 1983; Dunn & Munn, 1986; Kendrick & Dunn, 1983; Vuchinich, Emery, & Cassidy, 1988). The activation of the underlying mechanisms for aggression appears to occur more frequently in
older siblings than younger siblings. Therefore, we believed that aggression would be more readily primed for older siblings placed in the sibling condition and that these individuals would respond slower in correctly identifying the color of aggressive words, would more strongly endorse items on the Aggression Questionnaire, and would more strongly endorse negative affect items on the PANAS than younger siblings placed in the sibling condition.
METHOD

Participants and Design

Participants were undergraduate students from a university in Northwest Ohio (N=113). They registered online for participation through Experimetrix, a website where students can select from a number of experiments currently being conducted. The site informed potential participants that the study examined family and friendship relationships. Students were also informed that to be eligible for participation they must have at least one sibling and not be colorblind. Five students’ data were not analyzed because they a) did not have a sibling, b) did not follow directions on the Stroop task, or c) identified their sibling as their best friend, thus confounding condition assignment. Thus, my working sample was comprised of 108 participants.

Students were recruited from psychology classes. All students received course credit for their participation. Seventy-nine percent of participants were Caucasian; 12% were African-American; 2% were Hispanic; 2% were Asian-American; and 5% indicated “Other” for race. There were slightly more female (59%) than male (41%) participants. The mean age for students was 21.2 years old, $SD = 4.6$. Sixty-five percent of participants had parents who were currently married, 31% had parents who were divorced, and 4% had parents who were separated. The mean number of siblings reported by students was 2.51, $SD = 1.98$ (range 1 - 13).

This experiment utilized a 2 (relationship prime: sibling or best friend) X 2 (target word: aggressive or non-aggressive) mixed-factorial design. Relationship prime was a between-subjects variable; target word presented in the cognitive task was a within-subjects variable. Exploratory variables included the sex of the participant, sibling sex, age gap between siblings (less than or equal to three years, greater than three years), and sibling rank (younger, older, or same-aged sibling). Approximately half of the participants were randomly assigned to the
sibling condition (52%), and approximately half were randomly assigned to the best friend condition (48%). The sex composition of both the sibling and best friend conditions was 59% female and 41% male.

**Materials and Measures**

*Informed consent.* The informed consent sheet described the tasks that participants would be asked to complete for the study, as well as noted that there were no foreseeable risks associated with study participation. The informed consent sheet instructed students that participation was voluntary and that they could withdraw at any time without penalty. Participants were informed of study length and how to request and obtain results should they be desired. The contact information of the primary researcher and his faculty advisor was provided to participants. Participants were instructed that signing and printing their name, circling their sex, and recording their age and date indicated participation consent (See Appendix A).

*Relationship priming questionnaire.* Depending on their condition assignment, participants completed either a “Sibling Questionnaire” or “Best Friend Questionnaire” (see Appendix B). The purpose of the questionnaire was to prime cognitions and feelings associated with a particular relationship context. I designed my questionnaire in a fashion similar to that utilized by Fitzsimons and Bargh (2003) in their study on the priming effects of varying social relationships (friends vs. co-worker) on helping behavior. The eight questions used in their study were designed to be easy to answer but also require either visualization or deliberate thought. For example, Fitzsimons and Bargh (2003) had their participants provide a vivid description of the target person’s appearance, note how long they had known the target person, and identify the target person’s hobbies. Similarly, it was important that my questions evoked visualization and deliberate thought, as it was my working assumption that when participants reflected upon their
sibling relationship, other concepts related to the sibling relationship, including aggression, would be activated.

My relationship prime consisted of eleven items. Two items were identical to one’s utilized by Fitzsimons and Bargh (2003). These items asked participants to record the initials of the target person and to record the target individual’s age. Four items on my questionnaire required participants to indicate the correct choice for the target individual’s physical description (e.g., My sibling’s/best friend’s eye color is: brown, blue, green, other). Other items asked participants to indicate the target individual’s hair color, physical build (e.g., slender, athletic, overweight), and sex. Three other items asked participants to fill in the blank (e.g., In feet and inches, approximately how tall is your sibling/friend ______). Other items asked participants to record how long they had known and lived with the target individual. One item required participants to rate the overall quality of their relationship with the target individual (e.g., excellent, good, okay, bad, other). The last item required participants to write three statements about the target person that had not been addressed by previous items.

The sibling and best friend questionnaires were very similar to each other, with the only difference between them being the target of the questionnaire items. All participants noted the sex, age, height, physical build, hair color, eye color, length of relationship, time spent living together, three additional items about individual, and rating of overall relationship of the target person. Participants in the sibling prime condition who had more than one sibling were asked to complete the questionnaire in reference to the sibling that was closest to them in age. Responses to the prime items were not of particular interest regarding this study’s intended purpose; however, examination of certain items (e.g., overall relationship of friend/sibling) may help us further understand the data.
Computer stroop task. Reaction time, as measured within a Stroop paradigm, served as my primary dependent measure of the activation of underlying cognitive-affective mechanisms associated with aggression. In the “traditional” Stroop task, words (e.g., yellow) are presented in varying colors and individuals are asked to identify the color of the word. The Stroop task is based on the premise that the automatic tendency to read a primed word interferes with noting its color (Dyer, 1973; Higgins, Van Hook, & Dorfman, 1988; Warren, 1977). Reading is a more automatic process for individuals than is naming colors. For example, individuals asked to identify word color who are presented with the word “blue” written in green type, will read the word (blue) automatically and will be slower in detecting the word’s color (green).

Relating this automatic tendency to my study, participants in the sibling prime condition were expected to have slower reaction times in identifying the color of the aggressive words than for the nonaggressive words due to the belief that they were being indirectly primed for aggression. The automatic tendency to read the primed aggressive word (e.g., strike) was expected to lead to a delay in identifying the word’s color. Participants were expected to read the non-primed (non-aggressive) words as well. However, it is believed that the tendency to read these words will not be as strong as the tendency to read primed words because the non-primed words should not be related to chronically accessible social constructs (Bargh & Pratto, 1986). Thus, the stronger desire to read primed words was expected to lead to a slower reaction time in identifying the color of the word than for the non-primed words.

The cognitive task was conducted on a desktop computer, running the Microsoft Windows XP Professional operating system. E-prime, a software program utilized in computer-controlled experiments, measured participants’ reaction times to the target words. E-prime displayed in random order 20 aggressive words and 20 nonaggressive words. Words from each
group were selected from a prior study, in which they had been equated for word length and
demed familiar based upon the Thorndike-Luge Inventory (Anderson, Anderson, & Deuser,
1996). Aggressive words included: assault, attack, butcher, choke, destroy, harm, hurt, injure,
murder, punch, shatter, shoot, slaughter, smother, strike, torment, torture, violate, wound, and
wreck. Control words included: absorb, access, behold, bloom, button, chant, discover, imagine,
improve, listen, mellow, read, recruit, relate, relax, rent, revolve, suggest, transfer, and watch.
The E-prime program recorded participants’ response time in milliseconds, stimulus
configuration (word and color) and whether the participant’s correctly identified the word color.
Data were merged into an SPSS file for analysis purposes.

Aggression questionnaire (AQ). The AQ served as my second measure of the activation
of underlying cognitive-affective mechanisms associated with aggression. The AQ (Buss &
Perry, 1992) is a 29-item self-report measure consisting of four scales: physical aggression,
verbal aggression, anger, and hostility (See Appendix C). The physical aggression subscale
consists of nine items (e.g., If somebody hits me, I hit back); the verbal aggression subscale
consists of five items (e.g., I often find myself disagreeing with people); the anger subscale
consists of seven items (e.g., I have trouble controlling my temper); and the hostility subscale
consists of eight items (e.g., At times I feel I have gotten a raw deal out of life). Participants
rated each item on a 5-point Likert-type scale (1 = very untrue of me, 5 = very true of me). Two
items were reverse-coded: “I can think of no good reason for ever hitting a person” and “I am an
even-tempered person.” The test-retest correlations, as reported by Buss and Perry (1992), were
.80 for physical aggression, .76 for verbal aggression, .72 for anger, and .72 for hostility. The
four scales as reported by Harris (1997) have moderate to high internal consistency estimates.
**Positive and negative affect scale (PANAS).** Negative affect, as measured by the PANAS, served as my final measure of the activation of underlying cognitive-affective mechanisms associated with aggression. The PANAS (Watson, Clark, & Tellegen, 1988) consists of 10 positive and 10 negative affect adjectives (See Appendix D). Example items include “Right now I feel excited” (positive affect) and “Right now I feel scared” (negative affect). Each item is rated on a 5-point Likert-type scale (1 = very slightly, 5 = extremely). Participants can be instructed to complete the scale based on their feelings at the present moment, today, past few days, week, past few weeks, year, or in general. In the present study, participants were instructed to note their feelings at the present moment. This option was selected, as the purpose of the scale for my study was to measure affect following the prime, not to measure more trait-like characteristics of the participants. Reliabilities for the PANAS, as reported by Watson, Clark, and Tellegen, (1988) when the instructions are “for the moment” are .89 for the positive affect (PA) items and .85 for the negative affect (NA) items. The correlation between these two scales is -.15.

I added additional negative affect items to the PANAS in order to assess affective states that may be particularly relevant to sibling relationships but are not included in the PANAS. The additional negative affect items were: bitter, resentful, envious, competitive, and spiteful. Additional positive affect items were also added in order to maintain an equal number of negative and positive affective adjectives. The additional positive affect items were: content, satisfied, peaceful, happy, and generous.

**Demographics.** Participants completed a demographics form (See Appendix E) on which they provided information regarding their ethnicity, age, number of siblings, and parents’ marital status.
Post-experimental questionnaire. The post-experimental questionnaire consisted of two items. The first item asked participants to write in their own words what they believed the study’s purpose was. The second item asked participants to provide any comments/feedback they may have regarding the study (See Appendix F).

Debriefing form. The debriefing form informed participants that the study investigated sibling aggression from an evolutionary perspective and that they had been assigned to one of two relationship prime conditions: sibling or best friend. The debriefing sheet described our hypotheses regarding activation of aggressive concepts for those in the sibling prime condition. The sheet also included a reference related to my study’s topic as well as contact information of the primary researcher should they have any questions (See Appendix G).

Procedure

Students arrived at the assigned room and were greeted by either a male or female researcher. Students read the informed consent sheet that informed them of the tasks they would perform for the study should they choose to participate. After reading this document, they were asked to sign the consent sheet prior to participation. All students agreed to participate and were provided with a take-home copy of the informed consent sheet.

After completing the informed consent sheet, they were randomly assigned to one of two Relationship Prime conditions: Best friend or Sibling. These conditions differed only in terms of which questionnaire participants received. Otherwise, participants were treated similarly across both conditions. Random assignment occurred through the process of the experimenter selecting a packet from a pile of randomly ordered forms. Experimenters were unaware of the condition assignment of participants, as page one of all the packets included only a blank sheet.
with a line at the top for the participant’s subject number. Participants then completed the remainder of the packet (best friend or sibling questionnaire).

After completing the sibling or best friend questionnaire, participants were informed that the next step of the study involved a computer task. No further information was provided about the purpose of this task. The computer task was selected to be the primary and first measure for all participants in assessing the presence of underlying psychological mechanisms associated with aggression for a number of reasons. The computer task served as my primary measure as it was our working assumption that the priming effects, due to their automatic and implicit nature, may occur outside of participants’ awareness, and therefore may not be susceptible to concerns regarding social desirability. However, self-report measures were included as additional measures in order to explore the construct as fully as possible. The computer task served as the first dependent measure because we assumed that the priming effects would be short-lived.

Participants were seated in front of a computer containing the E-prime software where they were then instructed by the experimenter(s) to read and follow the instructions that appeared on the computer screen: “You will be asked to identify the color of words. A word will be presented in one of four colors and you are to hit the key that belongs to the color as quickly as possible. If the word is in red, you will hit the “R” key. If the word is in blue, you will hit the “B” key. If the word is in green, you will hit the “G” key. If the word is in yellow, you will hit the “Y” key.” Students were then instructed to hit the “X” key to read the next screen: “You now have an opportunity to practice before the experiment begins. You will be shown five words and you are to identify each word’s color. Remember, blue = b key, red = r key, yellow = y key, green = g key. Please press “X” key to begin.” The five practice words were broom, light, toy, pencil, and free. The practice items were presented in random order of varying colors
to each participant. The purpose of the practice items was to familiarize students with the keys necessary to complete the task. After completing the practice trials, the following instructions appeared on the screen: “The practice session is over. If you have any questions, please ask them now. If not, the experiment will begin. Remember, you are to identify the color of the word as quickly as possible without making mistakes. Press “X” to begin.”

The computer then presented 40 words (20 aggressive, 20 nonaggressive) in one of four colors against a white background. The order of presentation of these words was random and varied for each participant. Words remained on the computer screen until the student pressed one of four possible keys. A corresponding correct key was assigned for each color. Participant reaction time was measured in milliseconds by the computer and placed in a spreadsheet that is part of the E-prime program. Upon completing the task, an instruction screen appeared directing participants to inform the experimenter or research assistant that they have finished the computer task.

Next, participants were informed by the experimenter or research assistant that they were to complete two short questionnaires. As noted, the two questionnaires served as secondary measures for the presence of underlying cognitive-affective mechanisms associated with aggression. Participants were administered the Aggression Questionnaire (AQ) (Buss & Perry, 1992) and the PANAS (Watson, Clark, & Tellegen, 1988), in counter-balanced order. The order of questionnaire administration was determined by the participant’s subject number (e.g., even numbered participants-AQ first, odd numbered participants-PANAS first). In order to prevent participants from concluding that the study involved aggression, the Aggression Questionnaire was titled “Current Thoughts” and the PANAS was titled “Current Feelings.” Following completion of both questionnaires, participants completed a demographic sheet and a post-
experiment questionnaire regarding their beliefs as to the purpose of the study. On average, the experiment lasted for 15 minutes. Following study completion, the participants were debriefed about the study and any questions they had were answered.
RESULTS

Overview

We were interested in examining whether merely priming the sibling relationship would activate underlying cognitive-affective mechanisms associated with aggression. Measures included reaction time to a Stroop task of 20 aggressive words compared to reaction time for the 20 nonaggressive words, the endorsement of items on the AQ, and the endorsement of negative affect items on the PANAS. The results section is organized as follows. First, I report descriptive statistics for the study measures. Second, I report preliminary analyses examining overall sex differences. Next, I report my primary results in the context of my study’s three hypotheses. Last, I describe some relevant characteristics of the participants who were in the sibling prime condition, with a focus on the exploratory variables (e.g., age gap between siblings) that characterize this subset of participants.

Descriptive statistics

Descriptive statistics on study measures for the entire sample are reported in Table 1. Participants’ reaction time mean scores were obtained regarding the 20 aggressive words and the 20 nonaggressive words. Following standard procedure (see Blair, Richell, Mitchell, Leonard, Morton, & Blair, 2006), only the reaction times of correct responses (correctly identifying word color) were analyzed. Additionally, reaction time scores that were more than three standard deviations from the mean of the individual were considered outliers. Once identified, these outliers were removed from the data set (N = 28\(^4\)), and then mean scores were calculated. Regarding accuracy of correctly identifying word color, the percent correct was calculated for each participant for both aggressive words and nonaggressive words. Results indicated a main effect for target word with participants being more accurate in the color identification of the

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\(^4\) Outliers represented less than 1% of all responses.
aggressive words ($M = 99.49, SD = 1.67$) than for the nonaggressive words ($M = 98.97, SD = 2.35$), $F(1, 105) = 4.64, p < .05$. There was not a significant interaction between relationship prime and target word on accuracy, $F(1,105) = .09, p > .05$.

In order to more fully assess whether any irregularities arose during the Stroop task utilized in my study, I compared my participants’ reaction times to the reaction times obtained in the priming study from which I obtained the 20 aggressive and 20 nonaggressive words (Anderson et al., 1996). In the comparison study, participants’ reaction time towards both aggressive and nonaggressive averaged to approximately 700 milliseconds. My participants’ reaction times towards both aggressive and nonaggressive words averaged approximately one second; a meaningful difference. However, this difference may best be explained by actions required of participants in each study rather than by anything unusual regarding my study. Reaction times in my study were based on how long it took participants to select from one of four designated keys (y, r, g, b) regarding color identification. In the comparison study (Anderson et al., 1996), reaction times were based on how long it took participants to simply verbalize the color of the word shown. It seems reasonable to assume that verbalization of a color would occur more quickly than needing to select from one of four computer keys.

For the AQ, participants rated 29 items on a 5-point Likert scale (1 = very untrue of me, 5 = very true of me). Internal consistency for the four subscales and overall scale of the AQ were acceptable: physical aggression coefficient alpha = .84, verbal aggression coefficient alpha = .80, anger coefficient alpha = .79, hostility coefficient alpha = .84, and overall coefficient alpha = .91. Composite scores for overall aggression and the four subscales were obtained by averaging responses. Overall, participants reported low levels of aggression and this same pattern was consistent when examining the four subscales on the AQ. A series of t-tests were conducted to
examine differences between aggression levels on the four subscales. To reduce Type 1 error, a Bonferroni adjustment was conducted with alpha being recalculated to .008. Results indicate that participants reported more verbal aggression than physical aggression, anger, and hostility: all $p$’s < .008.

Regarding the PANAS, participants rated 30 items on a 5-point Likert scale with higher scores indicating item agreement (1 = very slightly or not at all, 5 = extremely). I added five positive and five negative affect items that I believed were relevant to the sibling relationship. The reliabilities for both the positive and negative affect items were acceptable. The coefficient alpha for the positive affect items was .91 (.85 for the original 10 items) and the coefficient alpha for the negative affect items was .86 (.83 for the original items). The reliabilities for the added positive affect and added negative affect items were acceptable. The coefficient alpha for the added positive affect items was .90 and the coefficient alpha for the added negative affect items was .70. In my sample, the correlation between the positive affect items and the negative affect items was -.06. Composite scores for negative and positive affect were obtained by averaging responses. Overall, participants reported more positive than negative affect, $t(106) = -16.35, p < .05$.

**Sex differences.** The literature suggests that in general males are more aggressive than females, particularly in terms of physical aggression (Goodwin & Roscoe, 1990). Thus, although it was not central to my study’s hypotheses, we did expect sex differences on the measures used in my study. My sample’s results appear to be consistent with previous aggression research as males in the sample reported more physical, $t(105) = 3.21, p < .05$, and verbal aggression than females, $t(103) = 2.39, p < .05$ (See Table 1). However, these sex differences were not consistent across all measures of the psychological mechanisms underlying
aggression. There was no sex difference regarding reaction time to aggressive words, \( t(105) = -1.65, p > .05 \), overall AQ score, \( t(106) = .95, p > .05 \), anger, \( t(102) = -.66, p > .05 \), hostility, \( t(105) = -1.70, p > .05 \), and negative affect, \( t(105) = -.94, p > .05 \). Additionally, males and females did not differ regarding positive affect, \( t(105) = 1.46, p > .05 \).

One unexpected finding was that females were significantly slower than males regarding reaction time to nonaggressive words, \( t(106) = -2.08, p < .05 \). A priori, I did not expect this finding believing that there would be no difference between males and females on reaction time to the nonaggressive words.

**Primary Analyses: Main Dependent Measures**

We hypothesized that the sibling relationship represents a context wherein adaptive problems, similarly experienced by our ancestors (e.g., resource threat) that may have been solved through aggression, are present. Thus, the mere activation of the sibling concept was expected to activate underlying psychological mechanisms associated with aggression because of the deep structure of the mechanisms associated with sibling aggression. My study included three measures for the activation of the underlying psychological mechanisms associated with aggression: reaction time to aggressive words compared to reaction time to nonaggressive words, the AQ, and negative affect, as measured by the PANAS.

*Computer stroop task.* These data were analyzed using a 2 (relationship prime: sibling or best friend) \( \times \) 2 (target word: aggressive or non-aggressive) repeated measures analysis of variance (ANOVA), with the relationship prime serving as the between-participants variable and the target word serving as the within-participants variable. Overall, a significant main effect was found for target word, with participants displaying slower reaction times for the aggressive words \( (M = 1079.55, SD = 237.99) \) than for the nonaggressive words \( (M = 1051.45, SD = \)
214.85), $F(1, 106) = 5.47, p < .05$. As seen in Table 2, both relationship prime groups reacted slower to the aggressive words than to the nonaggressive words. Contrary to expectations, there was not a significant interaction between relationship prime and target word on reaction time, $F(1, 106) = .05, p > .05$.

**AQ and PANAS.** The AQ and the PANAS were counterbalanced with 54 participants completing the AQ first and 57 participants completing the PANAS first. Possible order effects were examined. No significant effects for order on these measures were obtained, all $p$’s > .05. We hypothesized that participants in the sibling prime condition would have higher overall scores on the AQ than participants in the best friend prime condition. Results did not support this hypothesis, as there were no significant effects for relationship prime on overall AQ score, $t(106) = .37, p > .05$, and the subscales of the AQ: physical aggression, $t(105) = -.76, p > .05$, verbal aggression, $t(103) = .24, p > .05$, anger, $t(102) = .34, p > .05$, and hostility, $t(105) = 1.49, p > .05$.

Participant endorsement of negative affect items on the PANAS was the third measure for the activation of the underlying psychological mechanisms associated with aggression. We hypothesized that individuals in the sibling condition would report more negative affect than participants in the best friend condition. The findings did not support this hypothesis, as there were no significant effects of relationship prime on negative affect, $t(105) = 1.37, p > .05$ or positive affect, $t(105) = .61, p > .05$.

**Summary**

In general, the findings did not support our hypotheses. Underlying psychological mechanisms associated with aggression did not appear to have been activated in participants primed with a sibling relationship versus a best friend relationship. There were no significant
effects of relationship prime on any of the primary measures of the activation of underlying psychological mechanisms associated with aggression: reaction time to aggressive words, overall AQ score, and negative affect endorsement on the PANAS.

**Exploratory Analyses**

Despite not obtaining the predicted interaction effects, I conducted a series of exploratory analyses in order to more fully understand the data. Exploratory analyses consisted of examining an item not included in the original dependent measures, but one that appears to demonstrate differences between sibships and friendships, as well as examining variables (e.g., sibling composition) that initially were believed to potentially influence measure outcomes.

**Relationship quality.** One item on the priming questionnaire involved participants reporting the quality of the overall relationship between themselves and the target individual. I assumed that relationships wherein there is more versus less conflict would be viewed less positively. Thus, I interpreted the single item of relationship quality as a general indicator of the presence of conflict in the relationship.

Participants rated their perceived quality of their relationship to the target person on a five-point Likert-type scale (0 = excellent, 1 = good, 2 = okay, 3 = bad, 4 = other). The ratings were reverse-coded (1 = bad, 2 = okay, 3 = good, 4 = excellent) so that higher scores indicated a more positive relationship view (no participants indicated “other” to describe the relationship quality). Results indicated that friendships ($M = 3.87, SD = .40$) were rated more positively than sibships ($M = 3.20, SD = .70$), $t(106) = -6.05, p < .01$. Recognizing the potential limitations of this interpretation, this finding is consistent with the belief that sibships are potentially more conflictual than friendships. Now, I review the variables I believed to potentially influence measure outcomes.
Sex composition of the sibling dyad. There are four possible combinations of participant sex and sibling sex: male participant-male sibling (brothers), female participant-female sibling (sisters), male participant-female sibling (mixed), and female participant-male sibling (mixed). Research has indicated that brothers engage in the most severe forms of physical sibling aggression (Buhrmester & Furman, 1990; Campbell, 1999). Therefore, I believed that male participants with a male sibling (brothers) might be more susceptible to priming effects due to more frequent activation of aggressive mechanisms compared to other sibling dyads, and therefore would score highest on the dependent measures.

In general, the findings were not consistent with the belief that brothers would score highest on the measures. The sex composition of the sibling dyad appeared to be unrelated to the activation of underlying mechanisms associated with aggression. As seen in Table 3, brothers, sisters, and mixed pairs did not differ regarding mechanism activation as measured by reaction time to aggressive words, $F(3, 50) = 1.18, p > .05$ and nonaggressive words, $F(3, 50) = 2.21, p > .05$, overall AQ score, $F(3, 50) = 2.03, p > .05$, verbal aggression, $F(3, 50) = 1.38, p > .05$, anger, $F(3, 50) = 1.35, p > .05$, and hostility, $F(3, 50) = 1.07, p > .05$ as measured by the AQ, and negative, $F(3, 50) = .36, p > .05$ and positive affect, $F(3, 50) = 1.72, p > .05$, as measured by the PANAS. However, there was a significant effect for sibling dyad sex composition regarding the physical aggression subscale on the AQ, $F(3, 50) = 2.92, p < .05$. Post-hoc analyses (Tukey) were conducted indicating that sisters (f-f) reported less physical aggression than male participants-male siblings (m-m) and male participants-female siblings (m-f), with this difference approaching levels of significance, $p < .10$. The conservative nature of the Tukey test may explain why no significant effects were found despite significance according to the ANOVA.
**Age gap between siblings.** As stated in the introduction, aggressive behavior is more evident between siblings who are within three years of age of each other compared to those with age-gaps greater than three years (Dunn & McGuire, 1992; Felson, 1983; Felson & Russo, 1988; Furman & Buhrmester, 1985; Minnett, Vandell, & Santrock, 1983; Newman, 1996; Stocker, Dunn, & Plomin, 1989). Thus, I believed that activation of underlying psychological mechanisms associated with aggression might be more likely to occur in participants who had a sibling within three years of age, rather than in siblings with age gaps greater than three years, due to the greater likelihood that siblings closer in age have experienced more conflict.

As seen in Table 4, the findings did not support the notion that the activation of underlying psychological mechanisms would be stronger for siblings within three years of age. The findings indicate that there was no difference on mechanism activation between siblings within three years of age versus those with age gaps greater than three years as measured by reaction time to aggressive words, $t(53) = 1.0, p > .05$ and to nonaggressive words, $t(53) = 1.68$, overall AQ score, $t(53) = -1.01, p > .05$, physical aggression, $t(53) = -75, p > .05$, verbal aggression, $t(53) = -1.14, p > .05$, anger, $t(53) = -1.12, p > .05$, and hostility, $t(53) = -1.78, p > .05$ as measured by the AQ, and negative, $t(53) = -1.54, p > .05$ and positive affect, $t(53) = 1.62, p > .05$, as measured by the PANAS.

**Sibling status.** Research has demonstrated that older siblings are more aggressive than younger siblings (Corter, Pepler, & Abramovitch, 1983; Dunn & Munn, 1986; Kendrick & Dunn, 1983; Vuchinich, Emery, & Cassidy, 1988). Therefore, I believed that the activation of the underlying psychological mechanisms associated with aggression might be more likely in older sibling participants than in younger sibling participants because older siblings’ greater...
tendency to engage in aggressive behavior indicates that the psychological mechanisms underlying this behavior are more frequently activated.

As there were only two participants who were the same age as their sibling, their data were not included in the analyses. In general, the findings were not consistent with the belief that older siblings would score higher on the measures than younger siblings. As seen in Table 4, whether the participant was an older or younger sibling had no influence regarding mechanism activation as measured by reaction time to aggressive words, $t(51) = .63, p > .05$ and to nonaggressive words, $t(51) = .20, p > .05$, overall AQ score, $F(2, 52) = .35, p > .05$, and on three subscales of the AQ: verbal aggression, $t(51) = .01, p > .05$, anger, $t(51) = -.22, p > .05$, and hostility, $t(51) = .02, p > .05$. Additionally, sibling status had no influence regarding affect: negative affect, $t(51) = -1.60, p > .05$ and positive affect, $t(51) = .88, p > .05$. However, there was a significant difference regarding physical aggression with older siblings reporting more physical aggression than younger siblings, $t(51) = -2.00, p < .05$.

Summary and Conclusions

Primary analyses indicated that relationship prime had no effect on the activation of underlying psychological mechanisms associated with aggression. Explored variables including sex of the participant and of the sibling, age-gap between siblings, and sibling status (older, same, younger), in general did not appear to influence mechanism activation as measured by reaction time, the AQ, and the PANAS. However, males in the entire sample did report more physical aggression than females, and male participants who had female siblings along with brothers reported more physical aggression than sisters. Additionally, older siblings reported more physical aggression than younger siblings. These findings are consistent with the literature
(Dunn & Kendrick, 1981; Goodwin & Roscoe, 1990). Possible explanations regarding why expected results were not obtained will now be reviewed and discussed.
DISCUSSION

Sibling aggression ranges from mild forms of rivalry to murder (Roscoe, Goodwin & Kennedy, 1987) and is the most common form of intra-family aggression (Epkins & Dedmon, 1999). Previous studies have demonstrated that children often resort to physical aggression towards a sibling in order to acquire, maintain, and control resources (Howe, Rinaldi, Jennings, & Petrakos, 2002). In this study, working from an evolutionary perspective, we examined how the sibling context might influence the activation of underlying psychological mechanisms associated with aggression. Due to factors such as resource competition, it was believed that the modern sibling relationship provides a context wherein adaptive problems similar to those experienced by our ancestors are encountered. Therefore, the underlying psychological mechanisms associated with behavior(s) that have been effective in resolving these adaptive problems (e.g., aggression), were expected to be activated by merely priming the concept of sibling. However, the data did not support this hypothesis.

According to the data, there was no significant difference between the sibling prime and best friend prime conditions on any of the measures that were utilized to assess the presence of underlying mechanisms associated with aggression. Specifically, participants in the best friend and sibling conditions did not differ on their reaction times to aggressive words, and participants in both groups reported similarly low levels of aggressive thoughts and feelings as measured by the AQ and the PANAS. Due to no significant differences between the two groups on these measures, it would appear that priming the sibling relationship, compared to priming the best friend relationship, did not result in greater activation of the underlying psychological mechanisms associated with aggression.
A number of factors may have contributed to the lack of significant findings. First, I address possible limitations of the priming technique I utilized. Next, I examine the Stoop task, which served as my primary measure for the presence of the underlying mechanisms, focusing on possible limitations with this dependent measure. Throughout the discussion, I identify possible steps that can be taken in future studies, such as my preliminary research, to address the noted limitations of the current study. Finally, I note a few unique strengths of our study.

**Limitations of the Sibling Relationship Prime**

One of the major assumptions in the priming literature is that the activation of one element tends to automatically increase the accessibility of associated elements (Anderson, Anderson, & Deuser, 1996). We hypothesized that aggression was an element associated with the sibling relationship and, therefore, would become activated when the sibling relationship was primed. However, we recognized a priori that a number of positive concepts that are related to the sibling relationship, most notably love and affection, would also potentially be activated by my relationship prime. Concepts such as love and affection, in comparison to aggression, may represent stronger constituents of the sibling relationship. Fitzsimons and Bargh (2003) note that multiple concepts conflict and compete regarding behavioral influence. Therefore, it is possible that the activation of concepts such as love and affection competed with the activation of aggression, thus potentially limiting and reducing the effects produced by any underlying mechanisms of aggression.

An additional possible explanation for why the sibling relationship prime failed to influence participants’ cognitions and affect in the expected manner may be that the prime was not tightly controlled, and created significant amounts of error variance within conditions. Priming the sibling or best friend relationship in a general manner as we did, may have activated
neutral concepts (e.g., He is married), as well as a number of positive concepts (e.g., He is trustworthy). A majority of the initial items on my sibling relationship prime asked participants to note the physical characteristics of their sibling. Therefore, it may be assumed that concepts associated with physical appearance (neutral), rather than those related to the sibling relationship itself, specifically aggression, were activated. My intent was for participants to focus on their relationship with their sibling, not superficial characteristics of their sibling. Items regarding physical appearance do not speak to the sibling relationship itself. In hindsight, items on the relationship prime that specifically spoke to the relationship itself may have been more appropriate. My relationship prime appears to consist of two items that fit this criterion, however, I now examine their possible limitations.

Activation of neutral concepts regarding the sibling relationship may have occurred even for the few items on my prime I believed more strongly activated concepts associated with the sibling relationship. Two items on the sibling relationship prime potentially tapped into participants’ thoughts regarding their sibling relationship. The first item asked participants to write down three things about their sibling that were not previously addressed by the other items. There were no instructions limiting participant’s responses. Due to this latitude regarding statement options, a copious number of associations, many of which may be unrelated to the dynamics of the sibling relationship specifically, may have been activated. Thus, my ability to assess the presence of any underlying mechanisms associated with aggression that were believed to be a component of the sibling relationship may have been limited.

The second item on my sibling relationship prime I believed would be more effective in activating potentially negative affective concepts associated with the sibling relationship, simply asked participants to rate the overall perceived quality of the relationship (e.g., excellent, good,
okay, bad, other). Thus, it appears that my prime consisted of only one item where participants were specifically asked to focus on their sibling relationship. It seems reasonable to assume that this one item was unable to override the activation effects of the potentially large number of neutral and positive associations that were elicited by previous items on my sibling relationship prime. As a result, the effects of the negative affective associations were probably highly diluted, which may explain why my measures failed to detect their presence. If there is some truth to my current speculation that my prime was inadequate in activating concepts associated with the sibling relationship, let alone the negative affective dynamics of this relationship, then our insignificant findings are not surprising. Competing neutral or positive associations generated by items on my sibling relationship prime, may have reduced my ability to assess the negative affective mechanisms as measured by reaction time, the AQ, and the PANAS.

A number of steps could have been taken to avoid the noted problems. First, items that at face value may have appeared to activate competing associations irrelevant to the study at hand could have been removed or limited to a minimum. Items pertaining to the target individual’s physical appearance could have been limited to one item or simply removed, as opposed to comprising a majority of items on my priming questionnaire. Second, I could have added items that required participants to reflect on the dynamics of the relationship, as Bargh and Chartrand (2000) note that primes with higher concentrations of relevant items produce stronger priming effects. Participants could have been instructed to write a brief paragraph describing their relationship with the target individual (sibling or best friend), could have been asked to visualize a number of interactions with the target individual, and/or to record the events of the interactions, as well as asked to write down the feelings they have experienced when interacting with the target individual. In order to activate the negative affective dynamics of the relationship,
participants could have been asked to record aspects of their relationship with the target individual they would like to see changed/improved or asked specifically to record episodes of conflict they may have experienced with the target individual.

Potential Limitations of the Stroop Task

Primary measure. I selected the Stroop task to serve as my primary measure in assessing the presence of underlying mechanisms associated with aggression. The words used in the Stroop task were obtained from a previous study that also used a modified Stroop color-naming task to measure the accessibility of aggressive cognitions. We hypothesized that participants in the sibling condition, where we expected that underlying mechanisms associated with aggression would be activated, would then display slower reaction times to aggressive words because the automatic tendency to read a primed word interferes with identifying the color of the word (Dyer, 1973; Higgins, Van Hook, & Dorfman, 1988; Warren, 1977). The tendency to read a non-primed word is not as strong as the tendency to read a primed word, thus the interference in identifying the color of the word is not as severe. As a result, reaction time means for aggressive words should be higher than reaction time means for nonaggressive words. The data did not support this hypothesis. Not only was there no significant interaction of relationship prime (sibling or best friend) by target word (aggressive or nonaggressive), but the means were not in the expected direction (see Table 2). It is possible that the Stroop task was not an optimal measure for my purpose and that other measures may have been more sensitive in assessing any underlying psychological mechanisms associated with aggression.

A number of successful priming studies have utilized measures such as word stem-completion, free association, free recall, word reading speed, or an evaluation task such as reading a paragraph where a target individual performs a number of ambiguous behaviors and
then participants evaluate the target individuals behavior (e.g., aggressive, honest) (Bargh & Chartrand, 2000). Each measure offers unique advantages as well as disadvantages. For example, evaluation tasks in sequential priming paradigms are particularly appealing for studies involving socially undesirable views because participants are unable to conceal their honest evaluations due to the evaluations occurring in an automatic nature without conscious intention. However, researchers possess a number of concerns for studies relying on an evaluation task when examining their activation influence (see Bargh & Chartrand, 2000). Overall, a number of methodological approaches and measures exist for priming researchers. Depending on the topic under investigation one measure may be more appropriate than another.

We believed that any underlying mechanisms associated with aggression activated by a sibling relationship prime would occur outside of participants’ awareness, and therefore it was imperative that the most sensitive measure be selected. Although I believed that the Stroop task would be an effective, sensitive measure regarding my study’s purpose, I was uncertain as to whether its usage was optimal in comparison to other measures. Due to my uncertainty regarding measure selection, it may have been beneficial for us to engage in a pilot study where we utilized more than one priming measure (e.g., Stroop task and evaluation task). By utilizing more than one measure, a comparison between measures could have then been conducted to possibly assess measurement sensitivity. For example, after completing the sibling relationship prime, half of participants could have completed the Stroop task and half could have completed an evaluation task. The evaluation task would have consisted of participants reading a paragraph where a character engages in ambiguous behaviors. Participants would then be asked to evaluate whether the ambiguous behaviors were aggressive (evaluation task). Preliminary analyses could then be conducted to assist us in determining which measure appeared to be most appropriate.
Debriefing

Priming researchers have discovered that it is possible for participants to counteract priming effects (Bargh & Chartrand, 2000). It has been demonstrated that participants are more likely to attempt to counteract priming effects, often in an exaggerated manner, if they become consciously aware of the prime (Martin, 1986). In order to assess the validity of concerns such as prime awareness, priming researchers typically engage in a thorough debriefing with study participants prior to any data analysis. A focus of the debriefing is whether participants became consciously aware of certain facets that would reduce the priming effect (Chartrand & Bargh, 2000). An example of systematic debriefing provided by Chartrand and Bargh (2000) consists of asking participants the following questions: (a) What do you think the purpose of this experiment was? (b) What do you think this experiment was trying to study? (c) Did you think that any of the tasks you did were related in any way? If yes, in what way were they related? (d) Did anything you did on one task affect what you did on any other tasks? If yes, how exactly did it affect you? These authors advise researchers to discard data where there is evidence that participants had awareness of the connection between the prime and experimental tasks. They further advise researchers to be highly skeptical of all experimental data if 5% or greater of participants demonstrated some form of awareness.

Our debriefing contained elements of the format suggested by Chartrand and Bargh (2000), and therefore we were able to gain some knowledge regarding participant’s beliefs towards the experiment’s purpose. Our debriefing consisted of the first two questions recommended by Chartrand and Bargh (2000). In reviewing participant’s responses to the debriefing questions, it would appear that they saw no relationship between the priming questionnaire and the experimental tasks. Evidence of this includes the fact that a number of
participants indicated “No idea” when asked for the study’s purpose and many believed that the purpose was to see whether the words from the Stroop task altered their emotions.

However, as our debriefing was not as systematic as the format recommended by Chartrand and Bargh (2000), it is possible that we missed valuable information that would help us ascertain whether participants became aware of any relationship between the prime and the experimental tasks. For example one participant thought that the study’s purpose was to “see if I am a candidate for sibling rivalry” and another thought that the study investigated “feelings and thoughts associated with siblings.” It is difficult to fully decipher from these responses whether participants became aware of a relationship between the prime and the experimental tasks. Our limited debriefing procedure may have lessened our ability to identify and then eliminate any participant whose datum was suspect due to prime awareness or awareness of task relationships. A more thorough debriefing may elucidate the degree to which individuals were aware of the true purpose of the study as well as help to determine whether their data should be excluded.

I recommend that for future studies, a more extensive debriefing be conducted. Debriefing would consist of all the recommended questions as well as questions particularly relevant to the study. For example in retrospect, the following questions should have been asked to my study’s participants: (a) When you were identifying the color of the words, did you notice anything unusual about the words? (b) What do you believe was the purpose of the color identification task? (c) What expectations did you have for the study? (d) How may have your expectations impacted your performance during the experiment? I believe that asking these questions would allow researchers to more fully assess participants’ data validity, thus producing a more sound study. Lastly, I note the strengths of our study.
Strengths of Our Study

Despite the data not supporting our hypotheses, our study possessed a number of strengths. Most notably, this study is one of the first to examine the very common and serious phenomenon of sibling aggression through an evolutionary psychology framework. As research supporting evolutionary psychology increases, it is expected that this theory will be considered in more studies. My failure to obtain significant findings at this time should not dismiss the contributions that may be gleaned when investigating phenomenon through an evolutionary lens. A final strength of the study was our novel approach in attempting to further understand sibling aggression. A majority of the research on sibling aggression relies on parental report, self-report, or observation. This study introduced a new methodological approach to the investigation of sibling aggression. Utilization of the priming technique for sibling aggression studies may allow researchers to examine areas that were previously inaccessible or not conducive to self-report measures. For example, parental attention is widely theorized to be a cause of sibling aggression, yet research findings supporting this theory are not overwhelming (McGuire et al., 2000). Failure for siblings to report this source of aggression may be due to lack of a conscious awareness of this component or due to social desirability concerns. Utilization of priming techniques such as the one found in my study makes it possible to assess concepts and features that may be outside of one’s awareness or concepts participants may be reluctant to admit through self-report. As a result of gaining access to these previously untapped concepts in a manner less susceptible to social desirability concerns, significant contributions may be made in further understanding sibling aggression.
REFERENCES


*Developmental Psychology, 19*, 39-47.


Table 1.

*Means and Standard Deviations on Dependent Measures as a Function of Participant Sex*

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Males</th>
<th>Females</th>
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<tbody>
<tr>
<td>RT-Aggressive Words</td>
<td>1079.55</td>
<td>1035.20</td>
<td>1111.22</td>
</tr>
<tr>
<td></td>
<td>(237.99)</td>
<td>(220.75)</td>
<td>(246.40)</td>
</tr>
<tr>
<td>RT-Nonaggressive Words</td>
<td>1051.45</td>
<td>1001.24</td>
<td>1087.32</td>
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<tr>
<td></td>
<td>(214.85)</td>
<td>(203.77)</td>
<td>(216.93)</td>
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<tr>
<td>AQ-Overall</td>
<td>2.30</td>
<td>2.36</td>
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</tr>
<tr>
<td></td>
<td>(.56)</td>
<td>(.52)</td>
<td>(.59)</td>
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<tr>
<td>AQ-Physical Aggression</td>
<td>2.16</td>
<td>2.41</td>
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<td></td>
<td>(.73)</td>
<td>(.67)</td>
<td>(.73)</td>
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<tr>
<td>AQ-Verbal Aggression</td>
<td>2.77</td>
<td>2.98</td>
<td>2.61</td>
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<td></td>
<td>(.80)</td>
<td>(.85)</td>
<td>(.73)</td>
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<td>AQ-Anger</td>
<td>2.17</td>
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<td></td>
<td>(.66)</td>
<td>(.65)</td>
<td>(.68)</td>
</tr>
<tr>
<td>AQ-Hostility</td>
<td>2.27</td>
<td>2.13</td>
<td>2.38</td>
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<tr>
<td></td>
<td>(.78)</td>
<td>(.75)</td>
<td>(.78)</td>
</tr>
<tr>
<td>PANAS-Negative Affect</td>
<td>1.43</td>
<td>1.38</td>
<td>1.46</td>
</tr>
<tr>
<td></td>
<td>(.49)</td>
<td>(.36)</td>
<td>(.56)</td>
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<tr>
<td>PANAS-Positive Affect</td>
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<td>2.79</td>
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<tr>
<td></td>
<td>(.75)</td>
<td>(.71)</td>
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</table>

*Note.* Standard deviations are shown in parentheses. AQ and PANAS scores range from 1 (low) to 5 (high). RT = reaction time as measured in milliseconds. Means in the same row with different letter subscript indicates significant difference $p < .05$. 
Table 2.

*Means and Standard Deviations on Dependent Measures as a Function of Relationship Prime Condition*

<table>
<thead>
<tr>
<th>Condition</th>
<th>Sibling Prime</th>
<th>Best Friend Prime</th>
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<tbody>
<tr>
<td>RT-Aggressive Words</td>
<td>1072.48</td>
<td>1087.15</td>
</tr>
<tr>
<td></td>
<td>(238.52)</td>
<td>(239.50)</td>
</tr>
<tr>
<td>RT-Nonaggressive Words</td>
<td>1046.96</td>
<td>1056.29</td>
</tr>
<tr>
<td></td>
<td>(213.68)</td>
<td>(218.07)</td>
</tr>
<tr>
<td>AQ-Overall</td>
<td>2.32</td>
<td>2.28</td>
</tr>
<tr>
<td></td>
<td>(.61)</td>
<td>(.52)</td>
</tr>
<tr>
<td>AQ-Physical Aggression</td>
<td>2.11</td>
<td>2.22</td>
</tr>
<tr>
<td></td>
<td>(.77)</td>
<td>(.70)</td>
</tr>
<tr>
<td>AQ-Verbal Aggression</td>
<td>2.79</td>
<td>2.75</td>
</tr>
<tr>
<td></td>
<td>(.77)</td>
<td>(.85)</td>
</tr>
<tr>
<td>AQ-Anger</td>
<td>2.19</td>
<td>2.15</td>
</tr>
<tr>
<td></td>
<td>(.69)</td>
<td>(.64)</td>
</tr>
<tr>
<td>AQ-Hostility</td>
<td>2.38</td>
<td>2.16</td>
</tr>
<tr>
<td></td>
<td>(.81)</td>
<td>(.72)</td>
</tr>
<tr>
<td>PANAS-Negative Affect</td>
<td>1.49</td>
<td>1.36</td>
</tr>
<tr>
<td></td>
<td>(.55)</td>
<td>(.41)</td>
</tr>
<tr>
<td>PANAS-Positive Affect</td>
<td>2.92</td>
<td>2.83</td>
</tr>
<tr>
<td></td>
<td>(.68)</td>
<td>(.82)</td>
</tr>
</tbody>
</table>

*Note.* Standard deviations are shown in parentheses. AQ and PANAS scores range from 1 (low) - 5 (high). RT = reaction time as measured in milliseconds.
Table 3.

*Means and Standard Deviations on Dependent Measures as a Function of Sibling Dyad*

<table>
<thead>
<tr>
<th>Sibling Dyad</th>
<th>m-m (N = 10)</th>
<th>m-f (N = 13)</th>
<th>f-f (N = 16)</th>
<th>f-m (N = 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT-Aggressive Words</td>
<td>1064.90</td>
<td>1008.38</td>
<td>1052.88</td>
<td>1170.73</td>
</tr>
<tr>
<td></td>
<td>(353.99)</td>
<td>(206.98)</td>
<td>(173.18)</td>
<td>(236.01)</td>
</tr>
<tr>
<td>RT-Nonaggressive Words</td>
<td>1016.00</td>
<td>957.77</td>
<td>1069.38</td>
<td>1151.07</td>
</tr>
<tr>
<td></td>
<td>(313.94)</td>
<td>(155.55)</td>
<td>(198.32)</td>
<td>(155.95)</td>
</tr>
<tr>
<td>AQ-Overall</td>
<td>2.34</td>
<td>2.52</td>
<td>2.04</td>
<td>2.47</td>
</tr>
<tr>
<td></td>
<td>(.48)</td>
<td>(.51)</td>
<td>(.51)</td>
<td>(.78)</td>
</tr>
<tr>
<td>AQ-Physical Aggression</td>
<td>2.40\text{a}</td>
<td>2.43\text{a}</td>
<td>1.71\text{b}</td>
<td>2.11</td>
</tr>
<tr>
<td></td>
<td>(.75)</td>
<td>(.70)</td>
<td>(.52)</td>
<td>(.93)</td>
</tr>
<tr>
<td>AQ-Verbal Aggression</td>
<td>2.86</td>
<td>3.02</td>
<td>2.50</td>
<td>2.95</td>
</tr>
<tr>
<td></td>
<td>(.77)</td>
<td>(.85)</td>
<td>(.72)</td>
<td>(.72)</td>
</tr>
<tr>
<td>AQ-Anger</td>
<td>2.11</td>
<td>2.27</td>
<td>2.00</td>
<td>2.47</td>
</tr>
<tr>
<td></td>
<td>(.46)</td>
<td>(.72)</td>
<td>(.55)</td>
<td>(.88)</td>
</tr>
<tr>
<td>AQ-Hostility</td>
<td>2.15</td>
<td>2.53</td>
<td>2.16</td>
<td>2.57</td>
</tr>
<tr>
<td></td>
<td>(.68)</td>
<td>(.78)</td>
<td>(.79)</td>
<td>(.93)</td>
</tr>
<tr>
<td>PANAS-Negative Affect</td>
<td>1.49</td>
<td>1.37</td>
<td>1.58</td>
<td>1.54</td>
</tr>
<tr>
<td></td>
<td>(.46)</td>
<td>(.33)</td>
<td>(.49)</td>
<td>(.81)</td>
</tr>
<tr>
<td>PANAS-Positive Affect</td>
<td>3.17</td>
<td>2.74</td>
<td>3.12</td>
<td>2.74</td>
</tr>
<tr>
<td></td>
<td>(.61)</td>
<td>(.57)</td>
<td>(.78)</td>
<td>(.60)</td>
</tr>
</tbody>
</table>

*Note.* Standard deviations are shown in parentheses. AQ and PANAS scores range from 1 (low) - 5 (high). RT = reaction time as measured in milliseconds, m = male f = female. First letter = sex of the participant, second letter = sex of the sibling. Means in the same row with different subscript indicates approached significance, $p < .10$. 
Table 4.

Means and Standard Deviations on Dependent Measures as a Function of Sibling Age Gap and Sibling Status

<table>
<thead>
<tr>
<th>Age Gap</th>
<th>Status</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;= 3 (N = 33)</td>
<td>&gt;3  (N = 22)</td>
<td>Older (N = 23)</td>
<td>Younger (N = 30)</td>
</tr>
<tr>
<td>RT-Aggressive Words</td>
<td>1099.45 (278.19)</td>
<td>1033.05 (168.18)</td>
<td>1095.70 (257.66)</td>
<td>1052.87 (236.41)</td>
</tr>
<tr>
<td>RT-Nonaggressive Words</td>
<td>1088.39 (230.30)</td>
<td>990.73 (178.75)</td>
<td>1053.04 (231.03)</td>
<td>1040.83 (211.31)</td>
</tr>
<tr>
<td>AQ-Overall</td>
<td>2.25 (.63)</td>
<td>2.42 (.57)</td>
<td>2.40 (.70)</td>
<td>2.26 (.55)</td>
</tr>
<tr>
<td>AQ-Physical Aggression</td>
<td>2.04 (.74)</td>
<td>2.20 (.84)</td>
<td>2.36a (.97)</td>
<td>1.93b (.56)</td>
</tr>
<tr>
<td>AQ-Verbal Aggression</td>
<td>2.79 (.80)</td>
<td>2.82 (.73)</td>
<td>2.79 (.81)</td>
<td>2.79 (.76)</td>
</tr>
<tr>
<td>AQ-Anger</td>
<td>2.19 (.77)</td>
<td>2.21 (.58)</td>
<td>2.22 (.82)</td>
<td>2.18 (.62)</td>
</tr>
<tr>
<td>AQ-Hostility</td>
<td>2.20 (.83)</td>
<td>2.59 (.71)</td>
<td>2.35 (.75)</td>
<td>2.36 (.88)</td>
</tr>
<tr>
<td>PANAS-Negative Affect</td>
<td>1.40 (.39)</td>
<td>1.63 (.72)</td>
<td>1.33 (.26)</td>
<td>1.56 (.67)</td>
</tr>
<tr>
<td>PANAS-Positive Affect</td>
<td>3.06 (.70)</td>
<td>2.77 (.58)</td>
<td>3.06 (.67)</td>
<td>2.90 (.66)</td>
</tr>
</tbody>
</table>

Note. Standard deviations are shown in parentheses. AQ and PANAS scores range from 1 (low) -5 (high). Age-gap measured by years. RT = reaction time as measured in milliseconds. Means in the same row with different letter subscript indicates significant difference p < .05.
You are invited to be in a research study on relationships. You must be at least 18 years old to participate in this study. This study is my Master’s Thesis for the Psychology department. In this study, I am interested in better understanding the different types of relationships people form.

You will also be asked to provide some demographic (e.g., age, sex) information about yourself, complete a task conducted on a computer, and answer some questionnaires.

- Before the study begins, there are several things for you to note:

1. There are no right or wrong answers for the questionnaires used in this study. I am interested solely in your personal opinions. The information you provide will remain anonymous and others will not know of the answers you provided.

2. There are no known risks associated with participating in this study.

3. Your participation in this study is expected to take about 25 minutes. Taking part in this study is your choice. If at any time during the study you would like to quit for any reason please tell the experimenter.

4. You will receive .5 research credits for participating in this study. You will receive a purple credit receipt which you can provide to your instructor. Additionally, credit will
be noted on the experimetrix website which you can access at http://www.experimetrix.com/bgsu/.

5. At the end of the study you will be given information about what I am trying to learn by conducting this study. You will also receive information about how you may obtain the results of this study when they are available.

6. I hope that by participating in this research you are able to gain an increased understanding of psychological theory and how theory testing is conducted.

7. If you have any questions or comments concerning this research you should contact Anthony Lauricella at 419-372-4597 or alauric@bgnet.bgsu.edu, or my advisor Dr. Anne Gordon at 419-372-8161 or akg@bgsu.edu. Additionally, if you have any questions about the conduct of this study or any concerns about your rights as a research participant, you may contact the Chair of the Human Subjects Review Board at 419-372-7716 or hsrb@bgnet.bgsu.edu.

If what is going to be asked of you is clear and you agree to voluntarily participate in this study please indicate your informed consent in the section below.

- If you wish to decline from participating in this study please let the experimenter know now.
Family and Friendship Relationships

INFORMED CONSENT SHEET

By completing the following demographic information you are indicating that you have received enough information about this study to give your informed consent and that you voluntarily agree to participate in this study.

1. Sex (circle one):  Male  Female

2. Age (in years, must be age 18 or older):  _______________

3. Signature  _____________________________________________

4. Date________________

5. Printed Name (write legibly so the experimenter can properly assign your credit)

_____________________________________

PLEASE HAND ONLY THIS PAGE TO THE EXPERIMENTER SO THAT YOU RECEIVE PROPER CREDIT. THE FIRST TWO PAGES ARE YOURS TO KEEP.

ONLY THE EXPERIMENTER WILL HAVE THIS SHEET AND IT WILL BE LOCKED IN A FILING CABINET SO THAT OTHERS CANNOT FIND OUT THAT YOU PARTICIPATED IN THIS STUDY.

YOU MAY ASK THE EXPERIMENTER FOR A COPY OF THIS PAGE AS WELL.
This questionnaire is designed to examine your relationship with your sibling. Should you have more than one sibling, please answer the questions for the sibling who is closest to you in age. Please answer each item to the best of your ability. If you are uncertain of an answer, spend time thinking the question over and then make your best guess.

1. Please write down the initials of the sibling who is closest to you in age__________.

2. My sibling is   Male_______   Female_______

3. My sibling is _________ years old.

4. In feet and inches, approximately how tall is your sibling? ______________

5. My sibling’s physical build is (Check one)

   Slender_____   Athletic_____    Average_____   Slightly overweight_____

   Overweight_____   Other_____

6. My sibling’s hair color is (Check one)

   Black_____   Brown_____    Blonde_____    Red_____    Other_____

7. My sibling’s eye color is (Check one)

   Brown______   Blue_______    Green_______    Other_____

8. I have known my sibling for _______ years.
9. I have lived in the same household (e.g., house, apartment, dorm room) as my sibling for ________ years.

10. Besides information already given, write three things about your sibling.

   a. _____________________________________________________________________

   b. _____________________________________________________________________

   c. _____________________________________________________________________

11. Overall, I would describe my relationship with my sibling as… (Check one)

    Excellent_____   Good_____   Okay_____   Bad_____   Other_____
Best Friend Questionnaire

This questionnaire is designed to examine your relationship with your best friend. Should you have more than one best friend, please select one to answer the questions for. Please answer each item to the best of your ability. If you are uncertain of an answer, spend time thinking the question over and then make your best guess.

1. Please write down the initials of your best friend. ____________.

2. My best friend is    Male________   Female________

3. My best friend is ________ years old.

4. In feet and inches, approximately how tall is your best friend? ______________

5. My best friend’s physical build is (Check one)

   Slender_____ Athletic_____ Average_____ Slightly overweight_____  
   Overweight____  Other_____  

6. My best friend’s hair color is (Check one)

   Black_____ Brown_____ Blonde_____ Red_____ Other_____  

7. My best friend’s eye color is (Check one)

   Brown_____ Blue_____ Green_____ Other_____  

8. I have known my best friend for _______ years.

9. I have lived in the same household (e.g., house, apartment, dorm room) as my best friend for ________ years.
10. Besides information already given, write three things about your best friend.

   a. ________________________________________________________

   b. ________________________________________________________

   c. ________________________________________________________

11. Overall, I would describe my relationship with my best friend as… (Check one)

    Excellent_____  Good_____  Okay_____  Bad_____  Other_____
APPENDIX C

“Current Thoughts”

Please read each item and circle the option that is most true for you.

<table>
<thead>
<tr>
<th></th>
<th>Very untrue of me</th>
<th>Mostly untrue of me</th>
<th>Somewhat true of me</th>
<th>Mostly true of me</th>
<th>Very true of me</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Once in a while I can’t control the urge to strike another person.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. I tell my friends openly when I disagree with them.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. Given enough provocation, I may hit another person.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. I flare up quickly but get over it quickly.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. If somebody hits me, I hit back.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. At times I feel I have gotten a raw deal out of life.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. I know that people talk about me behind my back.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8. I am sometimes eaten up with jealousy.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. I get into fights a little more than the average person.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10. When people are especially nice, I wonder what they want.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11. If I have to resort to violence to protect my rights, I will.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Very untrue of me</td>
<td>Mostly untrue of me</td>
<td>Somewhat true of me</td>
<td>Mostly true of me</td>
<td>Very true of me</td>
</tr>
<tr>
<td>---</td>
<td>-------------------</td>
<td>---------------------</td>
<td>---------------------</td>
<td>-------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>12.</td>
<td>When people annoy me, I may tell them what I think of them.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13.</td>
<td>When frustrated, I let my irritation show.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14.</td>
<td>I often find myself disagreeing with people.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15.</td>
<td>I have trouble controlling my temper.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16.</td>
<td>I am an even-tempered person.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17.</td>
<td>Some of my friends think I’m a hothead.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18.</td>
<td>I am suspicious of overly friendly strangers.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19.</td>
<td>I sometimes feel that people are laughing at me behind my back.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20.</td>
<td>I sometimes feel like a power keg ready to explode.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21.</td>
<td>There are people who pushed me so far that we came to blows.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22.</td>
<td>Sometimes I fly off the handle for no good reason.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23.</td>
<td>My friends say that I’m somewhat argumentative.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24.</td>
<td>I can’t help getting into arguments when people disagree with me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>25.</td>
<td>I can think of no good reason for ever hitting a person.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Very untrue of me</td>
<td>Mostly untrue of me</td>
<td>Somewhat true of me</td>
<td>Mostly true of me</td>
<td>Very true of me</td>
</tr>
<tr>
<td>---</td>
<td>------------------</td>
<td>---------------------</td>
<td>---------------------</td>
<td>------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>26. I wonder why sometimes I feel so bitter about things.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>27. Other people always seem to get the breaks.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>28. I have threatened people I know.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>29. I have become so mad that I have broken things.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
APPENDIX D

“Current Feelings”

This scale consists of a number of words that describe different feelings and emotions. Please read each item and circle the option that is most true for you.

<table>
<thead>
<tr>
<th></th>
<th>Very slightly or not at all</th>
<th>A little</th>
<th>Moderately</th>
<th>Quite a bit</th>
<th>Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Right now I feel interested</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>Right now I feel distressed</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>Right now I feel excited</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4.</td>
<td>Right now I feel upset</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>Right now I feel strong</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6.</td>
<td>Right now I feel guilty</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7.</td>
<td>Right now I feel scared</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8.</td>
<td>Right now I feel hostile</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9.</td>
<td>Right now I feel enthusiastic</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10.</td>
<td>Right now I feel proud</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11.</td>
<td>Right now I feel irritable</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12.</td>
<td>Right now I feel alert</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13.</td>
<td>Right now I feel ashamed</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14.</td>
<td>Right now I feel inspired</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15.</td>
<td>Right now I feel nervous</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16.</td>
<td>Right now I feel determined</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Very slightly or not at all</td>
<td>A little</td>
<td>Moderately</td>
<td>Quite a bit</td>
<td>Extremely</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------------------</td>
<td>---------</td>
<td>------------</td>
<td>-------------</td>
<td>-----------</td>
</tr>
<tr>
<td>17. Right now I feel attentive</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>18. Right now I feel jittery</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19. Right now I feel active</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>20. Right now I feel afraid</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>21. Right now I feel generous</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>22. Right now I feel happy</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>23. Right now I feel spiteful</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>24. Right now I feel peaceful</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>25. Right now I feel competitive</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>26. Right now I feel satisfied</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>27. Right now I feel envious</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>28. Right now I feel resentful</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>29. Right now I feel content</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>30. Right now I feel bitter</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
APPENDIX E

DEMOGRAPHICS

Ethnicity (circle all that apply):

- Caucasian/White
- Asian
- African American
- Native American
- Hispanic
- Pacific Islander
- Other: ______________________

Your age______

Please write down the number of siblings you have

Brother(s)______ Half-Brother(s)______ Step-Brother(s)______

Sister(s)______ Half-Sister(s)______ Step-Sister(s)______

My parents are currently (Check one)

- Married______
- Separated______
- Divorced______
APPENDIX F

PART V. Post-Experimental Questionnaire

On the following lines, please describe in your own words, what you believe to have been the purpose(s) of this study.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

Please describe any additional comments regarding anything that was asked of you during your participation in this study. Any feedback you provide may be very helpful in terms of how we design future experiments.

__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
APPENDIX G
Debriefing Form

Bowling Green State University

FAMILY AND FRIENDSHIP RELATIONSHIPS    Spring 2006

Thank you for participating in this study!

Research suggests that sibling aggression is a very common and serious problem in the United States. This study was designed to examine whether aggressive cognitions are automatically activated by the sibling relationship. This research is important in that the results may lead to further understanding of sibling aggression, particularly why it is so common.

Participants completed a questionnaire about either a sibling or best friend. The questionnaire was intended to activate cognitions related to this relationship. If you completed the sibling questionnaire, it was expected that aggressive concepts would be activated. If you completed the best friend questionnaire, you were in the comparison group which was used to note differences in aggressive cognitions and feelings with individuals who completed a questionnaire about their sibling. All participants then completed the computer word color identification task and the two questionnaires. The computer task and the questionnaires were designed to assess aggressive feelings and thoughts at both a conscious and unconscious level. You were not initially informed of this because doing so may have interfered with us getting valid results.

The theory behind this study is based on evolutionary psychology. Evolutionary psychologists believe that physical characteristics (e.g., canines) as well as underlying psychological mechanisms (e.g., anger) have been passed down to future generations as they were found to be effective solutions for recurrent adaptive problems (e.g., resource threat). They theorize that aggression is an effective solution for a number of adaptive problems. The researcher(s) for this study believed that the sibling relationship offers a context where adaptive problems, such as resource threat, are encountered, thus activating the underlying psychological mechanisms (e.g., aggression) that evolved to solve these problems.
If you are interested in learning more about this topic, you may wish to read:


If you are interested in learning the results of this study when they are available or have any questions about this research, please contact:

Anthony Lauricella  
alauric@bgnet.bgsu.edu  
119 Psychology  
(419) 372-4597