CONTENTS

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Child Conduct Problem, Executive Functions and Treatment: The Role of Executive Functions in Treatment of Children with Conduct Disorders

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Abstract--*The present review addresses conduct problem, executive functions, and cognitive behavioral therapy and attempts to link them. Conduct problem refers to repeated norm violating behavior and impulsiveness. Executive functions are a cognitive control system used for higher order thought processes. Cognitive behavioral therapy is a form of treatment that seeks to eliminate unwanted behavior. Conduct problem, executive functions, and cognitive behavioral therapy are each examined in depth and then linked. Executive functions have been extensively examined in conjunction with other behavioral disorders, such as attention deficit hyperactivity disorder. The treatments for behavioral disorders and executive functions have also been examined. However, there is a paucity of literature examining conduct problem and executive functions. The present review argues that this gap should be addressed because of the difficulty conduct problem causes and conduct problem's similarity to other behavioral disorders. Furthermore, an examination of executive functions before treatment would lead to a valid assessment measure for treatment outcome.*

This paper will address conduct problems (CP), executive function (EF), and cognitive behavioral therapy (CBT) and link them. Conduct problems refers to repeated norm and rule breaking and impulsiveness (DSM-IV-TR, 2000). Executive functions refers to the cognitive capacity to hold information in memory, perform operations on this information, self-monitor one's cognition and behavior and to inhibit one's behavior (Brown, 2004). CBT refers to treatment aimed at eliminating unwanted behaviors (Kazdin, 2004). Due to the wealth of past and present literature on EF and its role in other behavioral disorders, it seems that CP and the role of EF and treatment may have some causal link that has yet to be explored. Investigation into EF and its role in CP and the treatment of CP could provide insight into a disorder that affects not only the afflicted individual but also the family of the individual and society at large. This paper will demonstrate that in order to fully understand CP, investigators must consider which EFs are affected and how EFs mediate treatment outcome.

There are clearly links between CP and other behavioral disorders. These behavioral disorders, such as ADHD, tourette's syndrome, Tic disorder, depressive disorder, and Oppositional Defiant Disorder (ODD) (Rothenberger, Banaschewski, Henirich, Moll, Schmidt, & Klooster, 2000) have been researched regarding their connection with executive control functions. Since CP and many of these disorders are comorbid (Joyce & Oakland, 2005), it follows that EF mediates the course of CP. In order to better assess treatment outcome of CP, there should be an examination of the executive control functions and how they mediate the outcome of CP in therapy. This is because executive functions are drawn upon in learning cognitive behavioral therapy and because EF may set boundary conditions on how well a child can use these skills. This paper also examines EFs and their role in CBT, the main form of treatment for CP. An examination of the EFs of individuals with CP will lead to more accurate treatment expectations, a heightened understanding of the disorder, and more reliable treatment. First this paper presents an overview of conduct problem in children, its effect on the individual, families, and society, and the possible EF deficits one sees within the disorder. Then the paper discusses EFs broadly and how they can be linked with treatment. Lastly, CBT is described and each step of treatment is analyzed and discussed as treatment pertains to EFs. This paper will demonstrate that, although the prognosis for conduct problems is poor, there are treatments that work. Through studying the mechanisms of therapy investigators will determine what

works well for whom, based on what we learn of the interactions between EF, treatment, and CP.

Conduct Problem

Conduct problems are characterized by repeated norm and rule breaking and impulsiveness. CP has a high prevalence rate, affecting approximately 2% to 6% of children in the United States. Untreated individuals have a very poor long term prognosis. There is also a negative prospect for future diagnosis of a psychiatric disorder in adulthood. 80% of children with CP are diagnosed with a disorder in the future (Singh et al., 2007). Individuals with conduct problems pose a consistent threat to others and violate age appropriate norms or rules (DSM-IV-TR, 2000). There are two types of CP, childhood and adolescent onset type. They are defined by the presence of CP criteria either before or after ten years of age, respectively. There are four categories into which conduct behaviors fall: 1) aggressive conduct that causes or threatens harm to other people or animals; 2) Nonaggressive conduct that harms or causes damage to property; 3) Deceitfulness or theft; and 4) serious violations of rules. Conduct disorder is associated with behaviors such as stealing, lying, coercive behavior, and a general disregard for rules and the rights of others (Dougherty, Mathias, Liguori, Marsh, Dawes, & Moeller, 2007).

Due to the manner in which CP children conduct themselves, they oftentimes have difficulty in school, at home, and in many social situations (Joyce & Oakland, 2005). The individual with CP is alienated from peers and meaningful relationships because of their aggressive and antisocial behavior (ASB). Estimates place the prevalence of disruptive disorders, which are the same as CP, at 10.3% for US children ages 9-17 (Office of the Surgeon General, 1999). Furthermore, 50-60% of juvenile offenses are committed by serious repeat offenders with a history of early onset conduct disordered behavior (Office of the Juvenile Justice and Delinquency Prevention, 1999). This suggests that many CP individuals developed the dysfunction in childhood, were never treated effectively, and went on to become repeat offenders, further endangering society and harming themselves.

Due to the disruptive and potentially dangerous nature of aggressive and antisocial behaviors they are some of the most frequent causes for referring children to therapy (Gilbert, 1957; Kazdin, 1995; Kazdin, Siegel, & Bass, 1990). CP is not relegated to a singular sphere; rather it permeates all facets of life and affects the individual, their family, and society (Lewis & Yeager, 2003). Nelson, Hart, and Finch (2006) present a hypothetical case study of an archetypal conduct disordered individual. "Michael" presents troubled behavior at school with frequent truancy and arguing and fighting with classmates, at home defying his mother and arguing with his sisters, and in society; regularly smoking marijuana and shoplifting. Although "Michael" represents a fictitious portrayal of CP, he is quite representative of the majority of cases.

A non-hypothetical case, presented by Kazdin (2005), also demonstrates the multifaceted behavioral disturbances presented in CP. Cory, a 10 year old boy, was hospitalized to begin treatment for aggressive, antisocial, oppositional, and disruptive behavior (Kazdin, 2005). These behaviors were exhibited both at home and school. The following quote illustrates some specific behaviors of Cory's, "On three occasions he had been caught playing with matches and setting fires in his room. He had been suspended from school for assaulting and choking a classmate until the child almost passed out" (Kazdin, 2005, p507). Clearly, Cory is very disruptive and causes disturbances in a variety of situations. His behaviors cause himself, his classmates, and his family worry and potential danger.

As illustrated above, a family with a CP individual face stresses because the behavior affects the whole family (Kazdin & Whitley, 2003). The individuals' CP actions create stress and disruption in any situation. Society is affected by individuals with CP because of the damage their behavior causes to property or others. Damage from school vandalism caused by individuals with antisocial behavior are more than $.5 billion per year (Feldman, Caplinger, & Wodarski, 1981; Shinn, Ramsey, Walker, Stieber, & et al., 1987). This figure may in fact be even larger because of the time that has elapsed since it was recorded. Untreated CP causes an even bigger problem as these youths engage in risky activities such as drunk driving at greater rates when they reach adulthood (Fergusson, 2007; Kazdin, 2004). In the following quote and the remainder of the paragraph, the term "antisocial" is synonymous for the range of behaviors seen in CP. "Antisocial students are among the first to be referred for out-of-classroom services by regular teachers and, once removed, are among the last to be returned to mainstream settings" (Shinn, et al., 1987, p 69). Antisocial individuals also experience major isolation and difficulties in mainstream settings due to the nature of their disorder (Kazdin, 1985; Loebr, 1985; Shinn; 1987; Wahler & Dumas, 1986). Problems with interpersonal relationships, an inability to relate

meaningfully to peers, and aggression all make mainstream interactions problematic.

The great difficulty caused by individuals with antisocial behavior is compounded because of the disorders' comorbidity with many other dysfunctions (Joyce & Oakland, 2005; Rothenberger et al., 2000; Turgay, 2005). Aside from the problematic symptoms that occur with CP, it is also comorbid with a variety of behavioral dysfunctions: oppositional defiant disorder, ADHD, depression, Tic disorder, and anxiety. Conduct problem compounded with other disorders can result in impairment of cognitive functions (Rothenberger, 2000) and an increase in substance abuse (Reebye, Moretti, & Lessard 1995). Now this paper will examine executive functions in depth and make an argument for the two executive functions of primary importance for CP.

Executive Function

The term executive function (EF) corresponds to a wide range of cognitive abilities (D'Esposito, 2003). Certain EFs correspond to specific areas of thought, and others correspond to conceptually unrelated areas; however, when combined, EFs make up the whole mind (Baron, 2004). EFs allow the mind to work as a unit and serve as a guide for thoughts and behaviors. In order for the mind to function at its fullest capability, all EFs must be operating. EFs can be measured and scored; these scores can be thought of as a rating of strength or competence of the measured EF and are useful in determining dysfunction. ADHD, for example, has been connected to a deficit in the EF domains of attention, impulse control, and planning (Nigg, 2001). With the knowledge that ADHD is a dysfunction of the domains listed above, psychologists can develop therapies and medications to treat ADHD.

EFs allow psychologists and researchers to categorize different disorders in terms of the domains affected. Once the disorder is categorized, treatments can be developed to address each dysfunctional domain. The ability to address and treat dysfunctional domains is convenient because it allows multiple disorders to be treated by similar methods of treatment. Examples of this can be seen below with the discussion of CBT and its multiple applications. Since EF is such an important, over arching concept of the mind, it should be taken into consideration when examining any disorder. As discussed above, EF has been examined in regards to ADHD, depression, anxiety, and many other disorders. These considerations have led to more realistic treatment outcome prospects, evidence based treatments, and an overall improved understanding of

the disorders. As will become clear later in this paper, considering how EFs mediate the course and treatment of CP is an important and overlooked topic. Now this paper discusses executive functions more broadly.

EF and its role in many higher order cognitive processes has implicated it in a variety of studies and treatments. EF has been called an "umbrella term" because it is a very broad construct that encompasses many cognitive processes (Baron, 2004, p 133). EFs are used by everyone in everyday life and has been regarded as necessary for everyday functioning. Since EF is such a broad construct, it is implicated in a variety of studies looking at its different domains and subdomains. Due to the number of cognitive processes EF is involved in, there is a great degree of overlap. Even though this is the case, there are certain domains which are generally considered the most important when studying EF including working memory, inhibitory control, and planning. (Baron, 2004).

There have been many definitions used to specify the exact cognitive mechanisms that EF is responsible for, but most have overlapped or been too specific. A good definition of EF, *the metacognitive capacities that allow an individual to perceive stimuli from his or her environment, respond adaptively, flexibly change direction, anticipate future goals, consider consequences, and respond in an integrated or common-sense way, utilizing all these capacities to serve a common purposive goal*" (Baron, p 135, 2004). Through this definition, we can see how working memory (WM), inhibitory control, and planning become the three main processes in EF. Viewing EF in this way allows one to see EF as a process that allows individuals to, in essence, live and adapt in a fluid changing environment. If one has a properly functioning EF, they can respond to changes in their current situation in a socially appropriate manner, and meet the challenges of everyday life. With a dysfunctional EF, we see many difficulties adapting to situations flexibly, acting appropriately, considering options, and meeting life's daily demands.

Individuals with EF dysfunction are more likely to have disorders in regular functioning (Baron, 2004). Since EF is such an all encompassing term, EF is the subject of many studies in normally functioning and dysfunctional individuals. Psychologists are intrigued with the different cognitive processes that EF governs, their biological underpinnings, and the behaviors they are involved in. Understanding EF and its components allows psychologists to understand learning, cognitive development, and other basic and complex processes

of the mind (Hughes, Graham, & Grayson, 2004). Through better understanding EFs and their components, the psychological community will be better equipped to handle dysfunctions that arise in these areas. Understanding EF and the areas of affects are of paramount importance in understanding disorders and possible treatments. There have been studies showing that EF dysfunction plays an important role in disorders such as ADHD, antisocial behavior, depression, etc. (Maniadaki, Sonuga-Barke, Kakouros, & Karaba, 2006). Not only are studies identifying the EF domains in disorders important, but these studies lead to effective empirically supported treatments. Through continued research, psychologists can pinpoint more specifically which domains are affected by certain disorders. Once the EF disorders are pinpointed, treatments based on strengthening or retraining these problem areas can be developed.

Throughout the lifespan, certain EF domains grow and increase their efficiency, unless there is an EF disorder. As the brain matures certain EFs become more capable and play a central role in learning, behavior, and cognitive processes (Baron, 2004). For example, the inhibitory control of a child in kindergarten is weaker than that of a high school student, so sitting at attention for a long time is not developmentally appropriate for a kindergartner. EF has been implicated in many developmental milestones. Theory of mind has been correlated with EF proficiency in children (Sabbagh, Xu, Carlson, Moses, & Lee, 2006). Much literature has been published on the importance of EF for normal development, but of interest in the present paper is the role of EF in disorders. EF has been shown to have an effect on a variety of disorders (Herba, Tranah, Rubia, & Yule, 2006). There are some who believe that there may even be an executive dysfunction. An executive dysfunction however is difficult to prove because of the complex construct of EF. Rather, current literature examining dysfunctions associated with EF have pointed to certain distinct domains in which a deficit exists. Since early treatment is of such importance in so many psychological disorders, much of the research on dysfunction focuses on children. Understanding and treating disorders at an early age decreases the need for treatment in later years.

An important domain of EF is Working Memory (WM). Recently though, most research on dysfunctions and EF have focused on other domains besides WM such as inhibition or planning because deficits in these areas cause for the most difficult behavioral disruptions.

Most recent research has been done on ADHD and which EF domains are affected, such as behavioral inhibition and attention. There is a possibility that WM is an important aspect of dysfunction and treatment that has been overlooked. Many other EF domains have been implicated in numerous disorders. WM is an important domain in dysfunctions and could offer new insight into effective treatments. Successful research on other EF domains has led to effective clinical treatments. Treatment is most successful when empirically supported. Through examining WM and CP more closely future treatments will be refined and improved. Before further discussion of the effects of WM on CP, we define WM, and examine its history, and implications of WM for the future or research.

Working Memory

WM "refers to memory for or information processing of, material or events in a temporary mental workspace, that is, lasting 30 seconds or less. WM can be thought of as an on-line information processing and manipulation system" (Baron, p136, 2004). WM is the limited capacity of the mind to hold in storage events or facts that have happened recently. For example, WM is the mechanism that allows a person to read these words, understand their meaning in relation to the sentence, and understand their relation to previous sentences in this paper. WM is used in all information processing. Without WM, no information could be encoded into long term memory. In essence WM allows for higher order cognitive functions. The prefrontal cortex has been shown to be of paramount importance in a normal functioning WM (Ziemus et al., 2007). The prefrontal cortex is involved in both verbal and nonverbal WM (Hirshorn & Thompson-Schill, 2006). More specifically, research demonstrates that the lateral prefrontal cortex plays is important for working memory and response inhibition. Both of which are essential for a variety of cognitive abilities (Tsujimoto, Kuwajima, & Sawaguchi, 2007). The basal ganglia has also been shown to have an active role in WM. WM strength increases with age and the development of more accurate and reliable inhibitory control. This improvement in WM is postulated to be due to maturation of the prefrontal cortex and basal ganglia. Thus, WM has a strong biological basis in the prefrontal cortex which suggests the possibility of a deficit in WM for individuals with behavioral disabilities (Baron, 2004).

There have been many models for WM, but Baddeley and Hitch's model has been tested, modified, and is widely accepted. Their first model consisted of

three interconnected parts that functioned as the whole construct of WM. The first part is the Central Executive System (CES) which "is responsible for oversight of functions of active short-term memory processes" (Baron, 2004, p 137). The CES must be intact and functioning correctly for an individual to maintain information in working memory, to recover information from semantic memory, and to perform tasks requiring divided attention. The CES could be considered the "nucleus" of WM in Baddeley and Hitch's theory and serves as the most crucial system (Baddeley, 1998).

From the CES, two separate storage and retrieval mechanisms were created (Baddeley, 1998). The first of these two systems is the phonological loop which dealt with auditory processing and was a storehouse for verbal information. The phonological loop is essentially an internal dictionary that is constantly being updated. The phonological loop has two components. The first is the phonological store which stores small amounts of auditory information for about two seconds. The second component is the articulatory rehearsal system which augments the short storage time of the phonological store through repeated utterances of information. The second retrieval mechanism, and the third component to Baddeley and Hitch's model of WM, is the visuospatial sketchpad. This is a storage area for visual and spatial information (Baddeley, 1998). In order for WM to function correctly one must have all these components working in unison. The CES is the most important component; it is necessary for WM to operate correctly. With a properly functioning CES, the phonological loop and articulatory loop can work. If all of these systems are fully operational then ones WM functions at its optimal level. For example, if one looks up a phone number and goes to dial it they will be successful if they employ their visuospatial sketchpad and articulatory rehearsal system. If not, one may forget the phone number before they get to the phone. Using an example like this, one can see how the systems build upon one another and enable each other to function effectively.

The Baddeley and Hitch model is not stagnant; it is constantly evolving and improving. Recently the episodic buffer was added (Baddeley, 2001). The episodic buffer essentially reformulates the CES' role into something more than purely a memory construct. The episodic buffer allows an individual to remember short events. These events are retrieved using conscious awareness. Now, with this addition to the theory of WM the roles of the CES are thought to be: focusing attention, dividing attention, and switching attention (Baron, 2004).

The model that Baddeley and Hitch proposed posits that WM will break down under stress, meaning, the more demand the worse the performance. If any function of the CES is compromised, the integrity of WM as a whole is affected. This means if there is a dysfunction in an area that is linked with WM, there may also be a deficit in WM as a whole. Baron highlights the possibility that WM can be affected by disabilities, "Thus, WM may be highly vulnerable to disruption by a variety of neurological conditions or by attentional disorder" (Baron, 2004, p138). Baron goes on to discuss the increasing interest that WM has been receiving in recent years. There have been a number of studies on ADHD and WM. One notable study by Klinberg and Forssberg demonstrated that negative motor activity was reduced in children with ADHD after they were trained to enhance their WM (Klingberg et al., 2005). Not only has pure WM been studied, but there have also been studies that examine visuospatial WM and its' effects on children with ADHD (Westerberg, Hirvikoski, Forssberg, & Klingberg, 2004). Deficits in WM in many other dysfunctions have been assessed however, WM and CP has not been studied. Analysis of CP and WM will lead to a fuller understanding of CP.

There are a number of assessments to measure WM. These include: Stroop task, Raven's Progressive Matrices nonverbal reasoning task, Auditory consonant trigram test, Test using Peterson & Peterson paradigm, Delayed alternation non-alternation task, Self-ordered pointing test, Pursuit rotor task, N-back task, Tower of Hanoi, tower of London, Verbal fluency tests, and Time estimation (Baron, 2004). These tasks are all designed specifically for use with children and adolescents. Many of these tasks have been adapted from earlier tests used to assess WM in adults. These new tasks are simpler, more engaging, and hold one's attention more easily; they are developmentally appropriate for children.

The abundance of research done on WM in recent years leads to the conclusion that WM is a very important factor when considering dysfunctions; especially those related to attentional deficits. WM may mediate treatment outcome; assessing WM before treatment would give a better sense of the success of treatment. However, there have been relatively few studies examining WM and treatment of CP using cognitive behavioral therapy. This gap in the literature is problematic. Without understanding if WM mediates treatment outcome, an assessment for treatment success is missing. Next we turn to the domain of

inhibition, the biological bases, effects on functioning, and how it can be related to CP and CBT.

Inhibition

Inhibition is a broad construct with a specific focus. Inhibition allows an individual to stifle a prepotent response and choose another more appropriate course of action. Thus, someone with good inhibition could delay the gratification of eating a sweet when they are hungry and on a diet, the prepotent response, and eat an apple instead, the more "appropriate" course of action. Baron states that "Inhibition mediates response selection in planning and problem solving tasks" (Baron, 2004, p 135). Inhibition is involved in all tasks and interactions in daily life, having an important role in dictating behavior (Simpson & Riggs, 2007).

There are many kinds of inhibition that all work in tandem to mediate daily tasks; for example, cognitive inhibition, interference control, and oculomotor inhibition (Baron, 2004). Inhibition has also been implicated in many different cognitive abilities such as task switching (Monsell, 2003), memory retrieval (Levy & Anderson, 2002), and action control (Cooper & Shallice, 2000). All of these are important when considering planning and problem solving as a whole, but there is one type of inhibition that receives considerable attention when examining behavioral disorders: behavioral inhibition. Behavioral inhibition is a trait everyone has which allows them to respond in a relatively unvarying manner in a variety of situations (van Brakel, Muris, & Bogels, 2004). The biological bases for inhibition are identified to be, the frontal cerebral regions (Spinella & Miley, 2004), the anterior frontal cortex, orbitofrontal regions, the inferior frontal region, the gyrus rectus, and the anterior cingulate gyrus (Baron 2004). Inhibition is a construct that matures and strengthens with age, unless there is a dysfunction (Leon-Carrion, Garcia-Orza, & Perez-Santamaria, 2004). A young child may not be able to inhibit a prepotent response but an adolescent is much more likely to. Ability to inhibit is due, in part, to the maturation of the prefrontal cortex. Although this ability matures with age, in certain dysfunctions, such as ADHD, individuals have great difficulty with inhibition regardless of their age.

Behavioral inhibition is central to understanding executive dysfunction in Barkley's theory (Barkley, 1999). In the model proposed by Barkley, inhibition is used chiefly to restrain the prepotent response to an event.

The construct of behavioral or response inhibition comprises of three interrelated processes:

1. Inhibiting the initial prepotent response to an event. 2. Stopping an ongoing response or response pattern, thereby permitting a delay in the decision to respond or continue responding. 3. Protecting this period of delay and the self-directed responses that occur within it from disruption by competing events and responses (interference control). Self-regulation greatly depends on response inhibition and interference control because there can be no actions taken toward the self aimed at modifying a future consequence related to an event if the individual has already responded to an event (Barkeley, p 177, 1999).

The prepotent response is a reaction that gives instant reinforcement, either positive or negative (Barkeley, 1999). Individuals with ADHD and other disorders have difficulty with self-regulation. Barkley's model also argues that behavioral inhibition affects five EF processes, self-control of mood, motivation, internalization of self-directed speech, WM, and reconstitution.

There have been links between executive function deficits and conduct problem (Miller, 1988; Moffitt, 1993b; Pennington & Ozonoff, 1996). These studies arose from the high likelihood that CP has a correlation to frontal lobe dysfunction (Pennington & Bennetto, 1993). It has been demonstrated that individuals with frontal lobe damage exhibit similar symptoms of aggression that CP individuals do (Pennington & Bennetto, 1993). Furthermore, early neuropsychological deficits put one at a greater risk for early onset delinquency (Moffitt, Lynam, & Silva, 1994). Moffitt's work highlights the fact that EF's bear on CP however the questions the remain, which EF's affect CP? What/which EFs have the greatest deficit in CP? What/which EFs correlate with the most successful, or unsuccessful, treatment outcome? An answer to these questions would yield a greater wealth of knowledge for CP, one of the most costly childhood psychiatric disorders.

Similar to WM, inhibitory control has been implicated in disorders affecting behavior such as ADHD (see Nigg, 2001). If other behavior disorders have EF dysfunction, then EFs could be extended to other behavior disorders as well. Causes of disorders must be considered and these causes must also be addressed in treatment. A treatment for ADHD would be incomplete without mention of inhibitory control or impulse control. Since there has been little to no

research done on WM, inhibitory control, and treatment for CP, the logical next step is to investigate the links between them.

The difficulties arising from CP and similar disorders are thought to be a deficiency in certain cognitive processes and distorted thought processes (Kendall, Reber, McLeer, Epps, & Ronan, 1990). The deficiency in cognitive processes means that the individual has a poor ability for alternative thinking and prosocial solutions which leads to him/her defaulting to violence as a solution (Deulty, 1981; Dodge, 1985). In order to remedy the difficulties associated with CP, therapists use cognitive behavioral therapy. Cognitive behavioral therapy addresses both the deficient cognitive processes and distorted thought processes through retraining. Next our attention turns to CBT and the specifics of therapy.

Cognitive Behavioral Therapy

Although the diagnosis may look grim and the future prospect for children with CP may seem even worse, there are empirically based treatments that improve their behavior. The most reliable form of treatment is behavior modification. Behavior modification is an umbrella term which encompasses cognitive behavioral therapy. Behavior modification focuses specifically on altering patterns of behavior. In this approach, the therapist concentrates on providing the child with a model for good behavior and straight forward ways to change behavior. Before specific treatments for CP are addressed, the theories behind behavior modification and the goals of therapy are discussed. Executive finctioning is important for understanding CBT because, as will be discussed in detail later, there are many facets of CP treatment that draw on EFs. Without understanding the applications of various EFs in CBT, we are examining an incomplete model.

Behavior modification therapy started as a treatment concerned with overt behaviors and neglected the possible causes or reasons for these actions (Kazdin, 2003). Current behavior modification therapy draws on two conceptual views, a mediational view and a nonmediational view. The mediational view focuses on reasons for the behavior. These reasons address the specific affect and cognitions that provoke certain behaviors (Kazdin, 2003). The mediational view is concerned with different cognitive processes such as how an individual views his/her world, and the way these views affect behavior (Kazdin, 2003). For example, the mediational view would examine the thought processes

of an individual who defaults to violence in interpersonal situations and attempt to alter these thoughts. The nonmediational view addresses the connections between situational events and the behavior of an individual (Kazdin, 2003). The nonmediational view analyzes behavior as a combination of environmental factors and cognitive processes, with more emphasis on the former. For example, the nonmediational view would examine the contexts where problem behaviors arise and the thought processes of the client in these situations. Once the context where problem behaviors arise was identified, the therapist would attempt to address issues within this context that started the behavior.

Behavioral treatments use both mediational and nonmediational concepts as their foundations in considering what the most effective way to change behavior is. Some therapies take a strictly mediational or nonmediational view but most take a mixed approach (Kazdin, 2004). Therapy changes thought patterns of the individual using: positive self statements, homework, and games. Changing thought patterns is accomplished through a process; first the therapist will identify the problem behavior to target through therapy using an individual assessment and homework. The homework asks the client to identify when the problem behaviors happen, specify what they are, and the thoughts accompanying the behaviors. If the client is a child, the caregiver is also asked to complete similar homework assignments. Next the therapist will obtain information regarding the context when problem behaviors occur. Identifying the environment/context where behaviors happen is also accomplished through homework statements. Finally, in therapy, the client engages with the therapist and works to change the identified behaviors and thoughts. Change is accomplished by the therapist providing positive statements and encouragement to the client. Furthermore, games such as role-playing are used to help the client learn appropriate new behaviors to use in problematic situations. The aforementioned techniques work to alter thought processes and provide new behaviors to use instead of old behaviors. As will be discussed later in this paper, many of the techniques used by the therapist in behavior modification require the client to use executive functions.

As discussed earlier, behavior modification focuses on behavior. Everyday actions are analyzed and treated by the therapist. There are three main reasons for focusing on behavior; 1.) noticeable behaviors are often influence thoughts and emotions. 2.) In common everyday interactions, overt behavior is

the cause for treatment, meaning overt behaviors are the ones that cause the need for therapy, and 3.) understanding the reasons for problematic behavior, using the process of behavior modification, helps to get at the root of a problem (Kazdin, 2004). Even though behavior is not the only treatable facet of many disorders, changing it affects many other domains. Modifying behavior can serve to ameliorate negative feelings and change how one perceives environmental conditions. Adjusting behavior serves to change the way one perceives him/herself (Kazdin, 2004). The main theory behind behavior modification is: changing the way people behave leads to an equally noticeable change in how they feel about themselves and perceive their world. Kazdin cites the benefit behavior modification has for a depressed individual, "for example, increases in activity and interpersonal interaction have been found to alter depressive symptoms, including feelings and thoughts" (Kazdin, p988, 2004). Oftentimes in behavior modification therapy, it is not the behavior that is addressed but rather the feelings and ways to reduce the feelings. However, the outcome is still the same, a reduction or change in the targeted behavior.

To be most effective cognitive behavior treatment requires constant practice and feedback from the therapist (Kazdin, 2004). To change the behavior of an individual the therapist must practice effective "scaffolding" methods that guide the patient through carefully planned and easily understood techniques for change. In many cases, the therapist begins with a readily understood change that is easy to implement in everyday life. From there, subsequent sessions add increasingly complex changes that ultimately result in a positive behavioral change. While many behaviors can be changed through learning new techniques, not all behaviors are able to be "unlearned." Certain behaviors may be the cause of social or biological forces which are also relevant to treatment (Kazdin, 2004). The key to behavior modification is understanding that behavior can be altered through learning experiences. In therapy, the clinician must use learning strategies that mesh with experiences in the patients' own life.

A specific treatment that has been shown to be very effective for conduct problem is cognitive problem solving skills training, or PSST. PSST is similar to CBT as it also focuses on changing problem behaviors. However, PSST outlines specific steps for a client to use when confronted with a problem situation. The specifics of PSST will be addressed later in this paper. The model developed by D'Zurilla and Goldfried in 1971 was a move away from the laboratory setting

and focused instead on the ability of individuals to solve problems in their own lives (Nezu, 2004). Since then, it has been demonstrated that the ability to cope with and resolve everyday problems is correlated to social and personal functioning; the ability to cope increases psychological health (D'Zurilla & Nezu, 2001). PSST focuses on identifying problematic or stressful situations in ones' life and discovering solutions to them (D'Zurilla & Nezu, 1999; Nezu, 2002; Nezu, 2004). The problems found in ones' life may be due to difficulties within oneself, difficulties between individuals, or the environment (Nezu, 2004). Addressing these stressful situations using the steps of PSST allows the client to resolve their own issues and decreases negative behavior.

There are two ways that individuals approach problems, as challenges or threats. These two types of problem appraisals fit into a broader problem orientation that is either positive or negative (Nezu, 2004). Positive problem orientation lends itself to a more active and dynamic approach to solving later problems. On the other hand, a negative problem orientation leads to an avoidance tendency for further difficulties. Goals of PSST therefore are fivefold: "(a) enhance one's positive orientation, (b) decrease one's negative orientation, (c) improve one's rational problem-solving skills, (d) decrease one's impulsive/careless style, and (e) decrease one's avoidance style" (Nezu, p5, 2004). The key is changing the way the individual reacts to the problematic situation and altering their orientation so it is more positive. This change in orientation is cognitive and behavioral. The way the individual thinks and perceives situations alters, and the actions in situations adjust because of the new thinking. Thus, the client is better able to meet future challenges with an affirmative attitude and an improved way of solving them. Of interest in the present examination is how changing the way one reacts cognitively to a situation also changes behavior. Antisocial behavior and a negative outlook are hallmarks of antisocial behavior and are impediments to approaching a situation with a positive orientation. Behavior modifications are particularly salient in the treatment of conduct problem in changing violent reactions to interpersonal situations. Changing a CP patient's outlook towards problem solving may also aid in real life situations and prosocial resolutions.

A reason PSST is so effective in treating CP is because it focuses on the distorted and faulty cognitive processes seen in CP individuals (Kazdin, 2004; Malouff, Thorsteinsson, Schutte, 2007). PSST teaches a client to use a step by step process to solve problems

in their life. These steps are used in every applicable situation in their life (Malouff et al., 2007). People with CP, as discussed above, have difficulty regulating their behaviors and acting in socially appropriate manners. PSST works to retrain these individuals and their cognitive deficits which gives the client a means to express him/herself in a prosocial manner. The main goal of PSST is that the client can control their impulses and act in an appropriate way in a variety of situations. This means, for a CP individual, not defaulting to an antisocial behavior such as violence (Kazdin, 2004). Teaching an individual with CP to approach a problem rationally and objectively is very important because this helps them to inhibit their impulses.

The cognitive processes that are changed through CBT allow the client to think in different ways and subsequently help the individual acquire certain skills. One of these skills is alternative-solution thinking. This is the capability to think of a range of different options to use when solving interpersonal problems. Another skill, means-end thinking, is the ability to understand the steps needed to reach a goal. Causal or means-end thinking allows the individual the potential to relate events to one another and understand why a certain event led a person to a specific action. Means-end thinking is akin to empathy training. Sensitivity to interpersonal problems introduces an awareness training that allows the one to recognize a problem when it exists and become aware of the interpersonal pieces that could appear in the altercation (Kazdin, 2004). All these skills are learned in PSST and allow the child the chance to respond in appropriate ways to different situations.

Within PSST, there are certain variations but all types share certain uniform characteristics (Kazdin 2004; Kazdin, 2005). Uniformly, there is emphasis on how individuals approach situations and the primary focus is the thought processes of the client. Although the target is to change behavior, it is understood that by changing thought processes, behavior is also affected. Clients are taught a step-by-step approach to be used when encountering any situation. During an interpersonal encounter, the client makes statements to him/herself that orient their attention to certain aspects of the encounter and lead to a prosocial solution. During treatment, the therapist includes structured tasks that use games, academic activities, and stories. As treatment progresses, tasks increasingly resemble real life situations and the problem solving skills learned are applied to these problems. The therapist takes an active role in treatment by modeling the cognitive processes

using self statements, applying the steps to solving problems, providing signals for using the skills, and giving feedback and praise to the client. The last commonality of PSST treatments is that it uses procedures such as modeling and practice, role-playing, reinforcement and punishment (Kazdin 2004; Kazdin, 2005). Most programs use tokens as a way to peak the client's interest in using the methods. The tokens are used to "buy" certain items, such as toys. Although these are used initially, tokens are only a small part of the treatment and are used less frequently as therapy progresses.

The problem solving steps the child uses are the most important component of PSST. The skills discussed above are acquired through application of these steps. They include:

1.) What am I supposed to do?
2.) I have to look at all my possibilities.
3.) I have to concentrate and focus.
4.) I need to make a choice and select a solution.
5.) I need to find out how I did
(Kazdin, 2003,Kazdin 2004).

Each of these components of the problem solving steps has at least one executive function that bears on it. The first step, "what am I supposed to do?" uses inhibition, working memory (WM), and planning. The client must stop, inhibition, remember the specifics of their situation, working memory, and think about the next actions they should take, planning. Step number two, "I have to look at all my possibilities" uses WM because the client thinks about the possible course(s) of action that is/are appropriate for the particular situation. Step three, "I have to concentrate and focus" uses inhibitory control because the prepotent response must be stifled and another more socially appropriate act needs to be selected. The client also uses inhibitory control in this step by tuning out all distractions and focusing on the problem. "I need to make a choice and select a solution" uses WM and inhibitory control. WM bears on this step because the client refers back to step number two and picks from the possibilities. Inhibitory control is present in step four because the child suppresses the prepotent response in favor of a more socially desirable action. Lastly, step five uses WM because the client revisits all his/her steps and evaluates the outcome.

The aforementioned steps are introduced by the therapist in the form of games and easy problem solving situations. The client learns how to apply these steps and eventually internalizes them; using them whenever he/she approaches an interpersonal situation.

Initially, the client is prompted by the therapist to talk him/herself through a problem pausing to reflect on each step. The problem solving skills are further strengthened through homework assignments given to the client. These assignments reinforce what has been learned and ask the child to use their knowledge in interpersonal encounters outside the therapy session (Kazdin, 2003, Kazdin 2004). The client's answers to homework assignments are reviewed in subsequent sessions and improvements are recommended. The use of these assignments teaches the client to apply the newly learned procession at home and in other encounters. The assignments lead to utilization of the steps wherever one is, and not solely in therapy. Kazdin provides an excellent view of the steps at work in a therapy session. This allows the reader to see how the client uses the skills for each situation and how the therapist provides feedback and encouragement.

Therapist: Well, Cory, today we are going to act out some more problem situations using the steps. You have been doing so well with this that I think we can use the steps today in a way that will make it even easier to use the in everyday life. When you use the steps today, I want you to think in your mind what the first steps are. We are going to do the steps in our heads today like this so that it will be easier to use them in everyday life without drawing attention to what we are doing. The same rules apply as in our other sessions. We still want to go slowly using the steps, and we want to select good solutions…
Therapist: OK, read the top card in that stack. *[Points to the fourth stack]*
Cory: [reads the card] "The principal of your school is walking past you in the hall between classes when he notices some candy wrappers that someone has dropped on the floor. The principal turns to you and says in a pretty tough voice: 'Cory, Don't litter in the halls at this school! Now pick up the trash!'"
Therapist: This is a tough one. How are you going to handle this?
Cory: Well, here goes with the steps. *[Holds his index finger up and appears to be saying the steps to himself]* I would say to him that I did not throw the wrappers down and I would keep walking.
Therapist: Well, it was great that you did not get mad and talk back to him. He was sort of accusing you and you hadn't really thrown the papers down. But if you say "I didn't do it" and walk away, what might happen?
Cory: Nothing. Because I didn't do it.
Therapist: Yeah, but he may not believe you – maybe especially because you got into trouble before with him.

Also, he asked you a favor and you could help a lot by doing what he asked. Try going through the steps again and see if you can turn your pretty good solution into a great one.
Cory: [Goes through steps 1, 2 3, and 4] I would say to him that I did not throw the wrappers down but that I would gladly pick them up and toss them in the trash
Therapist: [With great enthusiasm] That's great – that's a wonderful solution! OK. Go to step 5: How do you think you did?
Cory: I did good because I used the steps
Therapist: That's right, but you did more than that. You nicely told the principal that you did not do it, and you did the favor he asked. What do you think he will think of you in the future? Very nicely done. OK. Now let's both get up and act this out (Kazdin, pp. 993-994, 2004).

In this session, the patient is picking from a deck of card with individual problems and works through each problem. At this point, Cory has internalized the procession and is confident enough to use them in his head and apply them to close approximations of real life situations. Cory is clearly at an advanced stage in his treatment and is progressing very well. For a basis of comparison for the reader, Cory was referred to an inpatient facility because of his antisocial and violent behavior and home and school. He was caught setting fires in his room and playing with matches at home three times. Cory was suspended from school for attacking a classmate and choking him until he almost passed out (Kazdin, 2004). Cory clearly had difficulty controlling his aggressive tendencies and met the criteria for conduct problem. The excerpt above demonstrates Cory's progress and fluid use of the skills in PSST.

Although this outcome may seem idyllic, the research evaluating the effectiveness of PSST is positive (Kazdin, 2004). Studies show that, "cognitively based treatment led to significant reductions in aggressive and antisocial behavior at home, at school, and in the community, and these gains were evident up to 1 year later" (Kazdin, 2004, p 994). PSST is an empirically tested and validated treatment with reductions in antisocial behavior seen one year after to treatment (Kazdin, 2004). Not only is PSST a valid treatment for CP but it also improves individuals' prospect for reduced deliberate self-harm (Hawton et al., 1998) hopelessness, depression, and improves problem resolution (Townsend et al., 2001). Furthermore, PSST is statistically significantly more effective than no treatment or a placebo treatment (Malouff et al., 2007). It is noted

that older children may profit more from treatment than younger children, perhaps due to their cognitive maturity (Durlak, et al. 1991). Although age is a good predictor of success in treatment, academic success is a greater indicator of treatment outcome. Another good indicator of treatment success is to analyze the level of family dysfunction and history of parental mental illness. Children with lower rates of these two predictors are more likely to have a better outcome in therapy (Kazdin, 2004). Not only is PSST an effective treatment for referred cases but is also highly effective outside of clinical cases (Kazdin, 2004).

PSST is an effective treatment although exactly which cognitive processes it affects are not completely understood (Kazdin, 2004). There are many questions regarding the specific mechanisms it affects such as which executive function domains are affected? Cognitive processes do improve with treatment. However, these improvements are not well measured and merit further investigation (Kazdin, 2004). Executive functions, particularly WM and inhibitory control, are crucial for a normally functioning individual. Through examination of CBT, one can be seen that both WM and inhibitory control are components of EF. Both are drawn upon in treatment and are strengthened. Now we turn our attention to how exactly WM and inhibitory control bear on treatment.

In CBT, the client learns to internalize problem solving steps and reviews them during a situation. In the example with Cory above, when confronted with a hypothetical situation Cory repeats the steps to himself and chooses his actions accordingly. As discussed above, WM is the limited capacity of the mind to hold in storage events or facts that have happened recently. WM allows one to work through a problem by remembering the problems specifics and ways to solve the dilemma. Since children with CP act on their first impulse, CBT helps them to stop, think about their actions, and act in an appropriate manner. The problem solving skills list the client go through is used every time they encounter a dilemma. Throughout their encounter with the dilemma, they need to remember the specifics and go through the steps. One can see how WM bears on treatment and, more importantly, how it is used in everyday situations to curb the negative behavior associated with CP. WM therefore plays an important role in the treatment of CP and in ones' continued use of the problem solving process.

Standard tasks used to measure WM such as operation span tests (Colom, Shih, Flores-Mendoza, & Quiroga, 2006) are similar to the problem solving skills

list in CBT. These measures have an individual listen to a list of digits or vocabulary words and repeat them. The principle is the same for the problem solving steps. The individual repeats the steps to him/herself in every dilemma. WM is present in treatment whenever the child has to use the problem solving skills. Since WM is present in the treatment of CP, it is reasonable to hypothesize that WM differs for children with CP in relation to normally functioning children. If children with CP were given a battery assessing executive functions then treatment outcome would be easier to assess. Tasks such as the n-back, digit span, or Corsi blocks could help to assess a child's WM. It is known that there are deficits in certain cognitive domains for CP (Kazdin, 2004) but exactly what domains are not known. Because of the nature of WM and the specifics of treatment, it is only logical that WM mediates treatment outcome. Using measures to assess WM before treatment would aid in the understanding of CP and provide researchers with more information on the specific cognitive processes affected.

Besides WM, inhibitory control is an important domain affected by CP and CBT. Inhibitory control helps to suppress a prepotent response. Children with CP have difficulty suppressing their first impulse, which usually leads to a violent or other unfavorable reaction in many circumstances. Since it seems that children with CP have poor impulse control, it follows that their inhibitory control is functioning poorly as well. In order to test this, a measure should be administered that would test inhibitory control. Certain measures used to measure inhibitory control are the Stroop tasks, go-no-go tasks, and the tower of Hanoi task, to name a few. In treatment, the child is told to first go through the list and pick a response that he/she thinks would be best. The point of using the steps helps the child understand the situation and to inhibit an antisocial response. Drawing on the example of Cory once more, one can see how he inhibits his first response after careful consideration of the situation.

Cory: [reads the card] "The principal of your school is walking past you in the hall between classes when he notices some candy wrappers that someone has dropped on the floor. The principal turns to you and says in a pretty tough voice: 'Cory, Don't litter in the halls at this school! Now pick up the trash!'"
Therapist: This is a tough one. How are you going to handle this?
Cory: Well, here goes with the steps. *[Holds his index finger up and appears to be saying the steps to*

himself] I would say to him that I did not throw the wrappers down and I would keep walking.

Therapist: Well, it was great that you did not get mad and talk back to him. He was sort of accusing you and you hadn't really thrown the papers down. But if you say "I didn't do it" and walk away, what might happen?

Cory: Nothing. Because I didn't do it.

Therapist: Yeah, but he may not believe you – maybe especially because you got into trouble before with him. Also, he asked you a favor and you could help a lot by doing what he asked. Try going through the steps again and see if you can turn your pretty good solution into a great one.

Cory: [Goes through steps 1, 2 3, and 4] I would say to him that I did not throw the wrappers down but that I would gladly pick them up and toss them in the trash

Therapist: [With great enthusiasm] That's great – that's a wonderful solution! OK. Go to step 5: How do you think you did?

Cory: I did good because I used the steps (Kazdin, pp. 993-994, 2004).

During the course of treatment, the therapist uses different games and exercises that help the client practice his/her inhibition and WM. Inhibitory and WM control mediate the outcome of therapy. Assessing a CP client's executive functions before treatment would allow for a better measure of treatment outcome.

CP is a costly disorder that affects families, friends, communities, and social services. An improved understanding of the dysfunction lends to better diagnoses, better treatment, and an enhanced prospect for the future. These improvements decrease the negative aspects of the dysfunction on all the spheres affected. Executive control functions are an area of interest for many disorders, and research has helped to better diagnose and treat individuals with certain disorders. Already the current therapies for behavioral disorders share certain characteristics in common and all treat the same EF domains. Since these are the domains that are of interest in the current treatments, they should be examined first in research. While WM and inhibition were highlighted in the present review, other EF domains may also be important in CP. Further research will illuminate other EF domains that would mediate treatment of CP.

Demonstrated in this paper is the theory that there is a deficit in WM and inhibitory control associated with CP. Due to the costly nature of CP, research is needed and would benefit families, communities,

patients, and clinicians alike. There are cognitive processes affected in CP, (Kazdin, 2004) but the specific affected processes remain unknown. This review attempted to demonstrate that the main domains of interest are WM and inhibition. Further research is needed to examine the specific cognitive processes affected by CP and since EF is such a broad construct, these cognitive processes are a reasonable place to start.

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Ψ

The Effect of Sleep and Context on Face Memory

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Abstract--*The present study tests the effects of both sleep deprivation and context on face memory. College students were shown pictures, some of which were followed by a descriptive context. These college students were randomly assigned to one of 4 groups that got 4 hours of sleep before and 4 hours of sleep after, 4 hours of sleep before and 8 hours after, 8 hours before and 4 hours after, or 8 hours before and 8 hours after initially viewing the pictures. In order to monitor their sleep, twenty-seven college students reported in every 3 hours while awake, when going to bed, and when waking up. The 2x2x2 mixed factorial ANOVA was used to calculate the effect of both sleep and context. No significant effects were found. This does not support the hypothesis that the more someone sleeps, the better he/she will remember faces or that seeing a face with a context will make it easier to remember that face. However, there was some difference between groups, with those who slept 4 hours before encoding and 8 hours after encoding doing better on face recognition, regardless of whether or not there was text present.*

Humans need to be able to recognize one another in order to communicate effectively. Some evidence suggests that facial processing is different from other forms of visual processing. This is illustrated by the disorder prosopagnosia, in which a person loses his/her ability to process faces, but is able to process other visual information (of the same or similar difficulty) properly (Galotti, 2004). Research on this medical condition implies that facial information is processed in a different area of the brain than other visual objects (Farah & Wilson, 1998).

According to Wagner, Hallschmid, Verleger, & Born (2002), not only is facial processing different from the processing of other visual stimuli, but the human brain has developed special processing mechanisms that process faces exclusively. Some researchers claim that this type of special processing for faces makes sense because humans are recognizing parts of a face that are unchanging from one situation to another (Wagner et al., 2002). That is, the features on the face do not change in location from one person to another because humans are all structured so that the nose is always in the middle of the face, the mouth is below the nose, the ears are on the side of the head, etc. Farah and Wilson (1998) proposed that face recognition is sensitive to orientation and is viewed as a whole, with little breakdown into individual parts. Therefore, we use the whole-level representation in order to decode the features of a face (Farah & Wilson, 1998).

Diamond and Carey (1986) described two orders of relational information in regard to faces. The first order relational information is used to recognize most objects, but second order relational information is necessary in order to recognize facial information (Farah & Wilson, 1998). Farah and Wilson explain that, in faces, first order information would be normal facial features, i.e., nose, eye, ear, etc. They point out that these are different from second order information found in faces, which includes how the facial features are spatially organized, and location of the first order features, as well as the shape of the individual face. This second order of information is used only when there is a standard arrangement for objects or features, and it uses the spatial relations in a prototypical arrangement of parts to compare to the relation of the actual parts being perceived (Farah & Wilson, 1998).

The research indicates that different parts of the face may be given more or less weight in distinguishing between individual faces. Research by Farah and Wilson (1998), shows that the eye region is given special weight in remembering faces, but this only occurs when the face is upright (if the face is upside down, the effect is no longer present). Farah and Wilson (1998) also found that participants recognized a part of a face independent of the face, if it was first rated as a good feature. These findings indicate that people can, at least under certain circumstances, see facial parts, not just the whole-level representation of the face (Farah and Wilson, 1998), which is evidently more easily distinguished by humans, as the second order of

relational information suggests. According to Farah and Wilson (1998), "This interpretation of the data suggests that faces are special in degree, not in kind. Specifically, it suggests that faces constitute an extreme case of stimuli that rely on holistic shape representation but are not necessarily discontinuous from other types of objects in their reliance on holistic representation" (p. 497).

The method in which face stimuli are presented to research participants may have some effect on facial recognition. Nega (2005) manipulated the sizes of the pictures between the first time the picture of a face was shown and the second time the picture of the face was shown. This research determined that there is a size congruency effect with facial memory in participants, since participants more easily recognized a face when the picture was the same size both in the study and the test (Nega, 2005).

Memory and Sleep

Researchers are trying to discover how sleep deprivation may affect facial recognition. Sleep may be necessary for memory consolidation (Wagner, Hallshmid, Verleger, & Born, 2002). Though most of this research has focused on short term memory, spatial memory, and declarative memory, as opposed to specialized memory (such as face memory), there is some evidence that sleep may impact many different types of memory. Karni et. al. (1994) suggest that since sleep appears to play a role in memory consolidation, and there are limited neural mechanisms to consolidate memory, it is likely that the importance of sleep can be generalized to other types of skill learning and long-term memory.

There have been some studies with regard to how sleep deprivation affects human cognition. Humans concentrate their efforts more when they are suffering from sleep deprivation, in order to maximize their perception and feel some sense of normalcy (Engle-Friedman et. al., 2003). In using these resources as efficiently as possible, the individual is not putting as much effort into memory as he or she would under normal sleep conditions, thus the individual shows diminished performance in his/her ability to recognize faces, but not necessarily an impairment in his/her ability to perform simple tasks (Engle-Friedman et. al., 2003).

The impact of sleep on memory may differ as a function of task difficulty. The effects of sleep deprivation may be less obvious for working memory and more obvious for more complex aspects of memory (Milsson, et. al., 2005). Face memory might be considered a higher cognitive test because it involves memory and (depending on the similarity of faces) may involve a large allotment of mental energy, due to the special processing that occurs when dealing with face memory. It could also be considered a higher cognitive test because it often uses not only first order relational information but also second level relational information (Farah & Wilson, 1998).

Harrison and Horne (2000) examined how sleep deprivation affects memory for faces. Their study used color photos of unfamiliar adult faces projected onto a screen, with a delay between the presentations. Participants were then asked whether the faces they were shown (during the test) were in the first group or the second group. In this study, Harrison and Horne (2000) found that sleep deprivation impairs the recency effect (with adequate sleep recent faces are remembered more easily). Sleep deprivation did not have a significant effect on face recognition accuracy. Sleep deprived participants were more prone to believe that their wrong responses were correct, as compared to the control group participants (Harrison & Horne, 2000).

Wagner, Hallshmid, Verleger, and Born (2002) tested implicit memory for faces by not informing the participants that they would later be asked to recognize facial position. The study measured how long it took the participants to react as a function of how many times the picture was repeated. By not informing the participants that they were going to be tested for facial recognition (in this case, of which direction the face was facing), the researchers were ruling out the possibility that the participants would be consciously trying to remember the faces and which way each face was facing (right or left). They found that participants actually had a reduced processing speed for old faces compared to new faces. This occurred when they had slept for 3 hours between the initial viewing and the test phase if the test was given between 2:15 and 2:45 in the morning. Participants who experienced the same procedure, 3 hours of sleep, and being tested between 11:00 and 11:30 at night, and those who had no sleep did not show reduced processing speed for old faces. This indicates that the time at which a participant views the faces and takes the test could have significant effects on his or her performance, probably due to normal fluctuations of the circadian rhythm.

Some research has focused on memory of which of several series of faces a specific face had been first seen. There has been little research on how sleep deprivation affects memory for specific faces, as opposed to memory for which list the face was in. In addition, Harrison and Horne (2000) reported that no

research has been done on how context and sleep might interact to affect face memory. No research was found in regards to how context and sleep interact to affect face memory.

The present study examined how sleep deprivation affects a person's ability to correctly recognize specific faces that were previously presented (a more difficult task than remembering which list the faces were in) and how context might affect memory for faces. I hypothesized that sleep-deprived individuals would be less likely to correctly identify the faces presented. The effect should be strongest among participants who were sleep deprived both before and after studying the faces. I also hypothesized that viewing a face in a specific context, i.e., a brief description, would make it easier to remember faces.

Method

Participants

There were 27 participants: 7 who slept 4 hours the first night and 4 hours the second night; 7 who slept 4 hours the first night and 8 hours the second night; 8 who slept 8 hours the first night and 4 hours the second night; and 5 who slept 8 hours the first night and 8 hours the second night. Participants consisted of college students enrolled in introduction to psychology and cognitive psychology courses who were interested in participating in the study. These students received points for research participation, or extra credit on an exam, as well as being entered in a chance to win a $25 gift certificate to Wal-Mart. There were 8 males and 19 females that participated in this study. Eighteen participants were Caucasian/Non-Hispanic and 9 participants from minority groups.

Materials

Materials consisted of pictures of faces from the Computer Vision Laboratory, provided by Peer (2006), which were originally published in Solina et. al., 2003. The pictures were of college age white adult males facing the camera with a serious expression. Approximately half of these pictures were randomly paired with a brief description of a crime that the pictured person might have committed in order to help determine if a context (words) might affect later recognition. Participants came in to the research lab to view the pictures using the Superlab program. During the initial viewing/encoding, participants viewed the picture of each face for 5 seconds followed by a period of 10 seconds during which either text or a blank page was shown. The pictures and contexts were matched randomly to ensure that participants weren't remembering a face better because of the particular

context with which it is matched. Each participant viewed 10-12 pictures of faces with context and 13-15 faces without context. For the test, participants were shown a series of faces, consisting of 24 of those used in the first viewing (targets) plus 26 similar stock photos (distracters).

In order to document the amount of sleep, each participant used a Personal Digital Assistant (PDA), provided for the experiment, to check in every half-hour while they were awake during normal sleep hours (9_{PM} to 9_{AM}). In the event that there were more participants than PDAs available, participants were given a phone number to call into that were self dated and timed. Participants were required to check in every 3 hours (while they were awake), when they went to bed, and when they woke up, to ensure that they were sleeping the amount of time they were asked to sleep.

Procedure

Preparation for this study started the night before the participant viewed the pictures of faces. Participants were asked to refrain from the use of alcohol, caffeine, tobacco, and other sleep altering drugs from 24 hours before encoding until 24 hours after the encoding. Each participant was randomly assigned to a group of either an 8-hour night sleep or a 4-hour night of sleep prior to viewing the stimuli, and required to put a time stamped memo into a PDA when he or she went to sleep and when he or she woke up. All students were allowed to determine which hours they slept, as long as they slept the required amount each day.

The next morning, each participant came in during his or her scheduled research participation time (late morning to early afternoon). The participants saw a picture of a face flashed before them for 5 seconds, and then they were presented either with a blank screen or text to associate with the picture for an additional 10 seconds. When all of the pictures had been viewed, they could not see them again until 48 hours later, during the recognition phase of the study.

The night following encoding, participants were randomly assigned to groups of either an 8-hour night sleep or a 4-hour night sleep after encoding. All participants were emailed each afternoon that they are supposed to get either a normal night sleep or only sleep for 4 hours. Again, all participants were required to insert a time stamped memo into a PDA upon going to bed and once again upon waking up. Participants who were unable to get the required 8-9 hours of sleep for the "normal" sleep condition; were only allowed to continue if they have gotten at least 7 hours of sleep, in order to minimize the difference between participants with good sleep and those with minimized sleep. This

arrangement allowed all participants a night of recovery sleep immediately before the test of face recognition, presumably allowing everyone to be rested at the time of the recognition test.

By the day of the final test, participants had to return the PDA borrowed for the study. The day of the test, the participants once again viewed pictures of young white males and were asked to determine whether they had seen each face in the encoding session. If they believed they had seen the face before they were asked to click on the left mouse button; if they did not believe they had seen the face before, they were asked to click on the right mouse button. Recognition was calculated as the percentage of targets correctly identified, calculated separately for pictures presented with or without text. Therefore, the highest percentage correct possible was 1, meaning that all answers were correct, and the lowest was 0, meaning that no answers were correct.

Results

A 2 (sleep before encoding) x 2 (sleep after encoding) x 2 (presence of text) mixed factorial ANOVA was calculated with repeated measures on the last variable. The data are presented in Table 1. There was not a significant effect of sleep before encoding, $F(1,23) = .52$, $p = .48$, sleep after encoding, $F(1,23) = .46$, $p = .50$, or with presence of text, $F(1, 23) = .33$, $p = .60$. There was not a significant interaction effect of sleep before encoding by sleep after encoding, $F(1,23) = .91$, $p = .35$, sleep before encoding by presence of text, $F(1, 23) = .27$, $p = .61$, sleep after encoding by presence of text, $F(1, 23) = .49$, $p = .49$, or the interaction effect of sleep before encoding by sleep after encoding by the presence of text $F(1, 23) = .49$, $p = .49$.

There were no significant results found. There were, however, potentially interesting patterns among the groups. In the no text condition, participants who slept 4 hours the first night (were partially sleep-deprived at encoding) and 8 hours the second night (no sleep deprivation after encoding) did better on both categories of face recognition. Surprisingly, these participants more accurately distinguished targets from distracters than those who slept 8 hours before encoding, regardless of how many hours were slept after encoding. In the text condition, those who slept 8 hours before encoding and 4 hours after encoding did slightly better than those who got either 4 hours before and 4 hours after or 8 hours before and 8 hours after. However, the differences in means are small, and must be interpreted cautiously, as no significance was found.

It is evident that sleep is important in memory consolidation (Wagner et. al., 2002). Harison and Horne (2000) found (as our study did) that there was not a significant difference with face recognition between sleep deprived participants and those who had received adequate sleep. This could be due in part because learning is dependant on the type of sleep that the individuals are getting (Karni et al., 1994). As the type of sleep participants were getting were not monitored, it is possible that all participants were getting at least some REM sleep which Karni et.al. (1994) showed to be important to memory consolidation. In addition, McGaugh (2000) reports that acquiring new information makes a difference in the retention of information already learned. Therefore, if our participants were to go out and meet new people that day, it may be harder for them to remember the faces that they had seen on the computer screen.

Table 1

Mean Accuracy Scores and Standard Deviations on Text and Sleep Conditions for College Students

| | Text | | No Text | |
	4 hours before	8 hours before	4 hours before	8 hours before
4 hours after	.71 (.24)	.77 (.28)	.75 (.19)	.73 (.34)
8 hours after	.76 (.12)	.71 (.20)	.89 (.10)	.76 (.28)

Note: standard deviations are in parentheses. Accuracy scores range from 0 (no correct recognition of targets) to 1 (perfect recognition of targets).

Discussion

It is possible also that working memory played a role in the results of this study. According to Courtney et. al., (1998), working memory allows a perception to remain active in a person's conscious for a short period of time after the object (face) is perceived. In this case, the contexts may have appeared as distracters, making it more difficult for participants to keep the face in working memory. It is also possible that the context disrupted rehearsal, particularly for those participants who were easily distracted (sleepy) at the time of encoding. Finally, it is possible that the contexts resulted in emotional distractions as some of them reported quite aggressive acts. According to Cahill (2003), these emotional reactions to what is observed can make the memory more memorable (resulting in a better memory for it) or have the opposite effect and impair memory (making it harder to remember the memory).

Email reminders to participants of how long they were supposed to sleep each day they were supposed to get either 4 or 8 hours of sleep proved helpful to many of the participants and kept the dropout rate low. The use of PDAs and a call-in system that self-dates and times calls worked well, ensuring that the participants were not sleeping when they should be staying awake and that how long each participant documented that he/she slept each night that was documented could be calculated.

As there has been little research done on the role of sleep in face memory, it would be valuable to determine not only whether sleep affected face memory but also whether it was more important to be well rested before or after encoding in order to remember faces. Though none of these effects were significant, it may still be valuable for future research to include this in their study.

There were several potential flaws in this research. First, there were not enough participants, in order to have sufficient statistical power. Second, college students may not have the same sleep patterns as the general public and may be able to adjust to fewer hours of sleep more easily. It is also possible that 4 hours of sleep is not enough sleep deprivation to have an effect on recognition memory. Other studies have required more extended periods of deprivation (e.g., 5 nights, Karni et. al., 1994), or fewer hours of sleep (e.g., no sleep at all, Engle-Friedman et. al., 2003). Finally, despite allowing participants a night to catch up on sleep, there may have been a sleepiness effect, as there was not much time (only 48 hours) between encoding and retrieval. This could be corrected for by allowing more time (perhaps a week) between encoding and retrieval.

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Perceptions of the Effect of Sleep on Physical Therapy: A Patient's Perspective

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Abstract--*Past research has shown that the amount of sleep that an individual receives has direct effects on several areas of life. If a person receives inadequate amounts of sleep, there is a higher chance of injury or accidents, the individual tends to receive more healthcare, and work efficiency decreases. The purpose of this study is to examine the perceptions that patients have on how importantly sleep factors into the efficiency of physical therapy rehabilitation. Two hypotheses were tested by administering surveys in a physical therapy clinic. The first was that people perceive sleep to have a direct effect on speed and quality of treatment. The second was that people who sleep less hold this opinion more than those who get closer to adequate amounts of sleep. The analyses supported the first hypothesis that people perceive sleep to have a direct effect on physical therapy efficiency; however, the second hypothesis was not supported. These results can be used to refine the education for physical therapy patients to enhance efficiency of treatment.*

The amount of sleep that a person receives affects his or her performance in a number of areas. In order for people to remain healthy, and be efficient in several areas of life, people must receive adequate amounts of sleep. An important question is whether or not people realize that these relationships exist. The purpose of the current study is to determine to what extent people feel that sleep affects recovery from injury and other health related issues.

Research has shown that sleep problems are becoming common and widespread. In a study of over 12,000 participants, 22% reported having moderate or severe difficulty initiating sleep (Novak, Istvan, Shapiro, Rehelyi, & Kopp, 2004). Thirty-one percent of the respondents in this study reported a moderate or severe problem maintaining sleep. In addition, insufficient sleep was linked to increased complaints of daytime sleepiness

in a study of 186 nursing home residents' sleep patterns and wakefulness (Friedman, Bliwise, Tanke, Salom, & Yesavage, 1991/92). Nearly 25% of the respondents expressed dissatisfaction with sleep deviations. The results of this study support the idea that people have sleep problems; however whether or not they realize its effect on everyday life is a question to be answered.

These sleep problems can affect many areas of everyday life. One of these areas is the workplace. A survey was given to 3,000 Swedish residents to determine the prevalence of sleep problems in a working age population as well as the relationship between insomnia and work (Linton & Brynglelsson, 2000). Thirty-five percent of those surveyed reported sleep problems in the three months prior to the study. The authors observed a strong relationship between sleep and work productivity; poor sleep led to a reduced productivity. In 2001, Manocchia, Keller, and Ware studied the sleep problems, health related quality of life, and impact of sleep on work productivity. The results of this study supported Linton & Brynglelsson. According to the researchers, people with mild to severe sleep problems are half as likely to work full time. In yet another study on how sleep affects individuals in the work place, insomniacs spent more time away from work than people with no sleep problems (Leger, Guilleminault, Bader, Levy & Paillard, 2002). These authors also concluded that 15% of severe insomniacs make errors at work, compared to 6% of those classified as good sleepers. Due to these studies, it is obvious that the amount of sleep that a person receives affects his or her efficiency at work.

Another area of life affected by sleep is injury occurrence. Gregg, Banderet, Reynolds, Creedon, and Rice (2002) conducted a study at the US Army Sergeant Major Academy. The purpose of this study was to examine psychological factors associated with injury occurrence. One of these factors was self-reported sleep disturbance. Ten percent of the students sustained at least one traumatic injury during the nine month

program and 19% sustained an overuse injury. The authors determined that a relationship between traumatic or overuse injuries and sleep habits existed; those who reported sleep disturbances spent more time in the clinic, supporting the idea that sleepiness and fatigue contribute to human error and accidents.

A person's general health is another area that is influenced by sleep problems. The more severe a person's sleep problem is, the more likely he or she will spend time in the hospital (Mannocchia, Keller & Ware, 2002). According to Leger, Guilleminault, Bader, Levy & Paillard (2002), severe insomniacs spent 1.19 days in the hospital compared to 0.76 days for good sleepers over a 12-month period. Finally, people with insomnia both perceive their health to be poor, as well as receive the most healthcare (Linton & Brynglelsson, 2000). There is a relationship between sleep and a person's overall health.

In sum, it is clear that sleep greatly affects a person's daily life. The amount of sleep a person gets affects his or her ability to get work done by either preventing the person from working or decreasing efficiency. Finally, the chances that a person will be injured increases, which also tends to increase the individual's need for healthcare. If sleep directly decreases work efficiency, a similar relationship may also exist between sleep and physical therapy rehabilitation. The purpose of the current study is to examine the perceptions of the relationship of sleep and the efficiency of physical therapy rehabilitation. Due to the high number of injuries and accidents related to lack of sleep, it seems reasonable that people would recognize this relationship. Given this, there should be a similar perception between lack of sleep and physical movements in a rehabilitative setting. The first hypothesis tested is that more people think that the amount of sleep a person receives affects the efficiency of physical therapy rehabilitation.

Because insomniacs accurately self-reported poor health, people who receive less sleep are more aware of the effects of sleep deprivation. Therefore, the second hypothesis tested, that patients who sleep less are more likely to feel that sleep is a factor in the quality of physical therapy than those who sleep more. To compare the current sample to previous ones, other areas of life will also be examined including: work efficiency, accident proneness, and healthcare usage.

The results of this study will serve to help physical therapists better treat their patients. This study provides information on whether or not they should emphasize the importance of sleep to maximize the efficiency of treatment. Results can also help educate patients about the optimal amount of sleep needed to maximize treatment.

Method

Participants

The sample for this study included 30 participants (15 women, 12 men, 3 unidentified) between the ages of 21 and 80 ($M = 52.0$, $SD = 17.88$). Participants were recruited from one physical therapy clinic, either from the treatment area, or the waiting room. Most (83%) of the respondents were white, 13% were black and 3% did not answer the question. Participants received physical therapy for a number of different problems. The most common body part being treated was the knee. See table 1.

Materials

Respondents were asked how they felt that the amount of sleep they receive affects them in various areas of life, including: attendance at work, use of healthcare and physical therapy. Responses were on a 5-point scale, with 1 being "not at all, and 5 being "extremely". Other information recorded included: average amount of sleep per night, quality of sleep rated on a 5-point scale, and whether or not the participant has a diagnosis of insomnia.

Procedure

At first, the surveys were distributed in the rehabilitation gym, but not while the patient was actively participating in treatment. The second day, the same surveys were distributed in the waiting room of the same clinic, as participants were waiting for their appointment. This change was made in order to avoid conflicting with daily schedule, and more importantly, to not interfere with treatment.

Results

The first hypothesis tested, patients perceive there to be a relationship between amount of sleep and efficiency of physical therapy, was supported. Of the participants who responded, 46% felt that the amount of sleep had no effect on efficiency of physical therapy.

Table 1

Breakdown of Body Part Tested

Body Part	Frequency	Percent
Knee	9	36%
Back	6	24%
Shoulder	6	24%
Ankle/Foot	2	8%
Neck	2	8%

Note: Only valid frequencies and percentages were included in table. There were 4 non-responses to this question.

The remaining 54% felt that sleep at least somewhat affected physical therapy efficiency. Only 7% felt that physical therapy was affected in both the "somewhat" or "moderately" categories, while 39% felt that sleep had a definite or extreme effect.

Perceptions of how sleep affected other areas of the respondent's life were also noted. For example, 54% of respondents felt that sleep had an effect on healthcare use. Fifty-eight percent of the respondents perceived there to be a relationship between injury occurrence and sleep, while 67% felt that work efficiency was affected by the amount of sleep.

The second hypothesis tested was that people who sleep less will perceive there to be more of a relationship between sleep and physical therapy than those who receive higher amounts of sleep. The correlation was not significant, r (27) = .228, p = .121. This fails to support the hypothesis that the less sleep a person receives, the more likely he or she is to perceive a relationship between sleep and physical therapy efficiency.

Discussion

The first hypothesis examined, people feel there is a relationship between sleep and physical therapy efficiency, was supported; a higher percentage of respondents felt that at least somewhat of a relationship existed. Most of the participants responded in three categories: not at all, definite relationship, or extreme relationship. One explanation for such a large number of respondents not believing there is a relationship, is because much of the research on the importance of sleep has come out recently. The population for the current study was for the most part, older. Sleep may not have been a priority for them as they were growing up, and as a result, does not realize its importance in the various areas of life that were studied.

Stemming off of this, it is also possible that while growing up, it could have been believed that efficiency is something that is completely in the control of the individual. Many people in the "Baby Boomer" generation go to work no matter what the circumstances. There is a very firm belief that you "do what you have to do". If this is the case, it is even more important to educate people on the importance of sleep for physical therapy, and the other areas of daily life.

Regarding the effects of sleep in other areas of life, results were similar. With the exception of work efficiency, the largest group in all of the other categories was "not at all". In the work efficiency category, the most frequently used response was that sleep had an extreme effect. One reason for these findings may be that people tend to work more frequently and for longer durations, than using healthcare or attending therapy treatment. It is possible that a person is more likely to notice changes in tasks that are more. frequently

performed. In order to examine to examine this explanation, a follow-up study would be required to determine how much time people spend at work versus the amount of time spent in physical therapy

The second hypothesis tested was that people who sleep less would perceive there to be a relationship more often than those who receive more sleep. This hypothesis was not supported. The major explanation for these findings is that a large number of participants did not perceive there to be a relationship in the first place. If people do not perceive there to be a relationship, a certain group can't perceive it more than another. A broader sample is needed to address this question.

Because a large number of the participants did not perceive there to be relationships between sleep and the areas of daily functioning that were studied, education on the importance of sleep should be included as a part of physical therapy treatment. However, it is important to know if in fact a relationship between sleep and physical therapy truly exists, so that the best possible treatment can be administered. A proposed follow-up to this study is to determine whether there is a direct relationship between sleep and physical therapy efficiency.

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Effects of Declarative and Procedural Memory Study Techniques on Spelling Performance

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Abstract --*The purpose of this study was to compare procedural memory techniques with declarative memory techniques when learning to spell difficult vocabulary words. Participants studied different sets of words using the following three memorization techniques in a repeated-measures design: flash cards, writing words, and typing words. After each study technique, students were given a spelling test. It was hypothesized that using procedural memory techniques (typing, writing) would result in higher scores than techniques associated with declarative memory (flash cards). Results showed just the opposite: the flash card method resulted in a higher score than the two procedural methods. All three methods of memorizing words were successful relative to pretest scores. The report concludes with a discussion of implications for student study techniques.*

Today's college students use the computer more than their counterparts did in previous age cohorts (DeBell & Chapman, 2003). This cohort difference was made fully apparent when the researcher of this study tried to recall the spelling of a word. He held out his hands and started to move them in a typing motion and suddenly realized that the success of recalling and spelling the word correctly depended on his typing skills, since he used it more than any other technique for studying. Similar is the unconscious motion of dialing a phone number but not necessary recalling the actual numbers. One can also make a parallel argument for sign language and Braille. Therefore, it was my intention to explore this new technique of recalling information and its relationship with other memory recall techniques.

Tulving (1985, 1987) proposed the existence of three kinds of long-term memory storage, each with distinctly different properties, and each probably based on different brain mechanisms. I focusd on two types of memory, procedural and episodic (which is a division of declarative memory). Through out the course of this paper, the terms declarative and episodic will be used interchangeably.

The existence of procedural memory as a category separate from cognitive memory systems is supported by converging dissociations from amnesic patients (Cohen & Squire, 1980). Procedural memory is only accessed through performance and is usually contained within learned skills or modifiable cognitive operations (Squire, 1987). Procedural memory is a vast category, as yet largely unexplored and unknown (Squire, 1992). It is involved in learning various kinds of behavioral and cognitive skills and algorithms; it operates at an automatic rather than consciously controlled level; and its output is noncognitive (Hirsh, 1974; Squire, 1987). Sherry and Schacter (1987) stated that procedural memory is characterized by gradual and incremental learning. According to Squire (1987) procedural memory is slow, more automatic, adapted for incremental learning, not always accessible to information processing systems other than the ones that participated in its formation. According to Lieberman (2000) procedural memory is experience coded in a procedural or habitual form, in which one event activates another automatically, without conscious awareness, whereas other events are stored in a more autobiographical form to which subjects can gain conscious access.

On the other hand declarative memory is directly accessible to conscious recollection and is used with reference to time and facts (Squire, 1987). It refers to intentional or conscious recollection of prior experiences, as assessed in the laboratory by traditional tests of recall (Tulving, 1994). Episodic memory operates at a conscious level and its retrieval is explicit (Tulving, 2000b). According to Squire (1987) declarative memory is more cognitive, fast, adapted for one-trial learning, and it permits storage of information as single events that happened in particular times and places. Declarative memory can have a truth value, as opposed to procedural memory (Tulving, 1983).

Tulving made a very concise and accurate list of properties for both systems. Procedural memory is only demonstrated by performing a task that entails the skill being studied. It has no truth value and it usually requires extensive periods of practice. Its most salient feature is usually characterized by an absence of thought from its execution, it is automatic, but declarative requires directed attention (Tulving, 1983). Both of these memories are acquired through different brain mechanisms and considered to differ in their biological organization (Squire, 1987).

Procedural memory appears stronger with respect to retrieval, storage and resistance to deterioration (Lahey, 2004; Tulving, 2000a). Furthermore, Fendrich and colleagues (1991) stated that repeating motoric procedures or relative fluency can support *recognition* judgments. The logic stems from that fact when participants recall the spelling of a word, they base their decision on relative motoric fluency associated with the word. This is exactly what Jacoby and Dallas (1981) and Kolers and Roediger (1984) argued. They said that episodic memory is tied to the procedures executed when they were created. In another article by Fendrich (1995), it was stated that motoric repetition has a stronger influence than does perceptual repetition on explicit memory.

The intended measure of output for this study (i.e. spelling) was a measure of recall and not recognition because recall depends on declarative memory, and recognition depends on both declarative and non-declarative memory (Haist, Shimamura, & Squire, 1992). Because I am trying to strengthen memory through motoric operation to impact performance on explicit memory measures (Fendrich et al., 1991), it was necessary for all methods to have the same output so that memory differences could be compared. Spelling recall in this study was measured by the number of words correctly spelled.

Based on the different properties of procedural and declarative memory, I hypothesized that current college students would benefit from procedural memory study techniques of typing and writing and would score higher on a spelling test after these two study techniques, relative to their performance on a spelling test after declarative memory study using flash cards. Based on the current generation's experience with computer and other communications technology, I further hypothesized that there would be a difference between the two procedural study techniques, with the typing method yielding better scores on the spelling test than the hand writing method.

Method

Participants

Participants were recruited through the psychology research participation website at Virginia Tech in Blacksburg, Virginia. A total of 62 college students participated for extra credit, with the average age being 20.3 years. The majority of participants (53.2%) were undergraduate psychology students, with an overwhelming majority (75%) being females of Caucasian decent.

Materials

Four lists of vocabulary words were created using terms from the Peabody Picture Vocabulary Test (PPVT III; Dunn & Dunn, 1997). The words were chosen from the PPVT adult vocabulary lists (Sets 14-17) and three words from each of those four sets were placed into each of our four vocabulary lists. Three pseudo words were added to each vocabulary list for a total of 15 words per list (see Appendix A). The pseudo words were added to control for any individuals who may have had superior knowledge of vocabulary words, so there would be a fair estimation of each individual's spelling ability prior to the study session and, thus, the subsequent effect of the study techniques with post-test scores would be more clear (Kawamoto & Farrar 1990; Smith & Oscar-Berman 1990). The same pretest list was consistently used for each participant. The other three lists were used for the memorization techniques (see Appendix A).

Procedure

There were three different methods of memorization of vocabulary words: flash cards, writing, and typing. Each participant used all three methods of memorizing vocabulary words; therefore, each participant was his/her own control. All participants expected a recall test at the end of the studying phase of each condition and recall was immediate without any distractions. The session began with the pretest measuring each participant's performance on a spelling test without any practice. Each pretest word was pronounced out loud and the participants were instructed to spell the words as best as they can. Afterwards, each participant was provided with one of the methods of memorizing vocabulary words to use as practice for five minutes and then tested afterwards (posttest). The instructions were simple: participants were told to either read each word five times (flashcard method), write each word five times (writing method), or type each word five times (typing method). After the time limit ended for studying the words, participant learning was assessed for each of the 15 words on the list they had just studied. Each word was pronounced and there was a pause as the participants wrote each word. The spelling tests were then scored

and each word coded as correct or incorrect. Perfect performance on a specific spelling list yielded a score of 15.

To control for order effects, participants were tested in three different groups. Group one did the pretest, flashcards, writing, and typing. Group two did pretest, writing, typing, and flashcards. Group three did pretest, typing, flashcards, and writing. Furthermore, the vocabulary lists were switched so that they were associated with different memorization techniques throughout the study to control for any unintended difficulty or easiness within each vocabulary list.

At the end of the session, a survey was given out to each participant asking various demographic questions, as well as questions about memory recall techniques.

Results

When asked what technique they use when memorizing the spelling of words, 71% of participants responded that they use declarative methods (flash cards) while 29% said they used procedural methods (typing, writing). When asked what technique they use when actually spelling words, 51% said procedural and 48% said declarative. However, when asked what they think is the best method for memorizing the spelling of words, 64% said procedural techniques in contrast to 36% who said declarative. The questionnaire findings are intriguing because the participants' scores on the tests showed a different pattern.

As can be seen in Table 1, all three study conditions improved spelling performance above pretest levels; pretest vs. flash cards ($t(61) = 29.12$, $p \leq .001$); pretest vs. writing ($t(61) = 16.15$, $p \leq .001$); pretest vs.

follow-up t-tests were performed. Those results showed that studying with flash cards yielded a higher score than studying by writing down the words ($t(61) = 6.70$, $p \leq .001$) as well as higher than studying by typing ($t(60) = 6.43$, $p \leq .001$). However, there was no significant difference between typing and writing study techniques ($t(60) = .84$, $p = .41$).

Performing the same analyses for the pseudo words yielded a similar pattern of results (see Table 1). All three study conditions for pseudo words improved spelling performance above pretest levels: pretest pseudo words vs. flash card pseudo words ($t(61) = 18.7$, $p \leq .001$); pretest pseudo words vs. writing pseudo words ($t(61) = 13.23$, $p \leq 001$); pretest pseudo words vs. typing pseudo words ($t(60) = 12.41$, $p \leq .001$).

Results from a MANOVA with all the scores of all three methods entered as dependent variables verified that the three different study techniques yielded different posttest scores on the pseudo words, Wilks' Lambda = .71, Multivariate $F(2,59) = 12.36$, $p \leq .001$, $\eta_p^2 = .30$. To examine the specific hypothesis that typing pseudo words is better than the other two techniques and writing is better than flash cards, follow-up t-tests were performed. Those results showed that studying pseudo words with flash cards yielded a higher score than studying by writing down the words ($t(61) = 4.0$, $p \leq .001$), as well as higher than studying by typing ($t(60) = 4.6$, $p \leq .001$). Again, there was no difference between typing and writing study techniques ($t(60) = 1.53$, $p = .13$).

Table 1

Means (and standard deviations) on the pretest and on each of the posttests

	Pretest	Flash Card Posttest	Writing Posttest	Typing Posttest
Overall score (maximum=15)	7.03 (1.98)	13.69 (1.31)	12.05 (2.11)	12.21 (2.14)
Pseudo words only score (maximum=3)	0.42 (.62)	2.56 (.64)	2.15 (.73)	1.95 (.83)

typing ($t(60) = 18.45$, $p \leq .001$). As indicated by the degrees of freedom, one participant did not complete the typing test.

Results from a MANOVA with the scores of all three methods entered as dependent variables verified that the three different study techniques yielded different posttest scores, Wilks' Lambda = .48, Multivariate $F(2,59) = 31.51$, $p \leq .001$, $\eta_p^2 = .52$. To examine the specific hypotheses that typing is better than the other two techniques and writing is better than flash cards,

Post-hoc Analyses

Correlations were examined between the pretest and the three posttests (see Table 2) and determined that participants maintained their rank; in other words, individual differences in initial spelling abilities were maintained after each different study technique. Furthermore, the correlations with the pseudo words showed that performance after each study condition was not correlated with the pretest psuedoword score. Thus, each participant did not keep their rank after studying the

pseudo words. This should be the case because the participants should not know how to spell fake words; this demonstrates that the protocol was well conceptualized.

Summary

All three study conditions improved spelling performance above pretest levels; however, studying with flash cards (utilizing declarative memory) yielded a higher score than studying by writing down the words or by typing them (utilizing procedural memory). These last two techniques yielded similar spelling performance.

longer to complete the list rather than typing or writing it from top to down. Thus, some participants did not finish the procedural memory practice and did not have experience with the entire word list. Everyone finished the flash cards, however, because they did not include any writing or typing of words.

This study was based on a sound conceptualization of memory systems and the protocol was well executed. However, the findings demonstrate that it is difficult to study complex brain and memory systems that subsequently affect behavior because of the amount of control that must be administered in the study.

Table 2

Correlations between pretest and each posttest score

	Flash Card Posttest	Writing Posttest	Typing Posttest
Overall Pretest	.46**	.44**	.28*
Pseudoword Pretest	-.03	-.14	-.14

$** p \leq .001 \quad * p \leq .05$

Discussion

Because the objective of the study was to compare procedural memory study techniques and episodic memory study techniques with respect to spelling performance, I hypothesized that usage of procedural memory techniques would result in higher scores on a spelling test relative to other techniques that are associated with declarative memory. The data demonstrated, however, that in this study the declarative memory recall technique worked better than techniques of procedural nature. These findings are important for college students because many students may be using less than optimal techniques to study and memorize words, terminologies, concepts, or any other related vocabulary lists. These findings may provide evidence for students to consider when choosing a method of studying for test.

The theoretical framework of the study was based on conceptualization of long-term memory systems, however, the actual spelling test may have utilized short-term memory systems. The protocol was designed to incorporate five minutes of practice time for each memory study technique. If the experiment included a longer time to practice, then the participants may have had longer time to encode the words into long-term memory stores and thus may have had more efficient procedural memory systems for those words.

Throughout the course of data collection for this study, some students appeared to have more efficient techniques for the procedural memory practice. Some typed or wrote the words from side to side which took
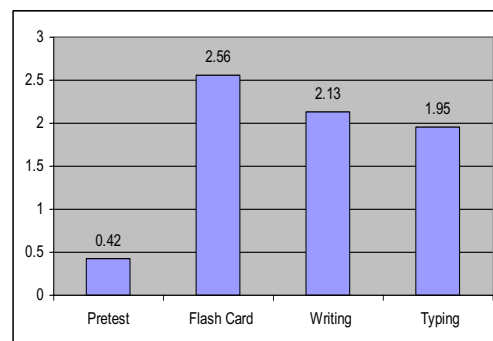
Nevertheless, these data provide insight into the associations of memory systems and performance on tests and other activities that are associated with academic performance.

Graph 1. Means on the pretest and on each of the posttests

OVERALL MEAN SCORES
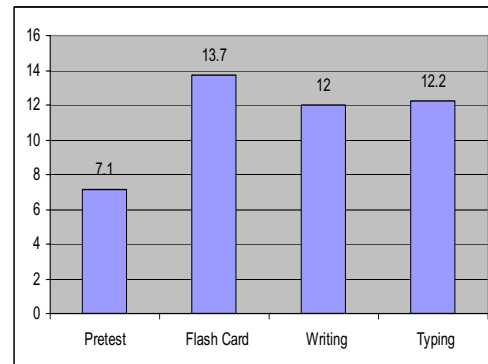
OVERALL PSEUDOWORD MEAN SCORES

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Appendix A – Vocabulary Word Lists

PreTest List
1. Indigent
2. Oasis
3. Stibe
4. Disappointed
5. Thrakedly
6. Incandescent
7. Pilfering
8. Trajectory
9. Clait
10. Coniferous
11. Wildebeest
12. Caster
13. Embossed
14. Perambulating
15. Arable

List B
1. Perpendicular
2. Poultry
3. Confiding
4. Mercantile
5. Tomingly
6. Derrick
7. Ascending
8. Reposing
9. Convex
10. Prusedly
11. Courmand
12. Importunity
13. Cenotaph
14. Tonsorial
15. Noast

List A
1. Periodical
2. Filtration
3. Piord
4. Primate
5. Monetary
6. Entomologist
7. Gaff
8. Dromedary
9. Diverging
10. Mudger
11. Incertitude
12. Nidificating
13. Clurt
14. Terpsichorean
15. Cairn

List C
1. Spherical
2. Talon
3. Rastinity
4. Octagon
5. Tellitry
6. Quintet
7. Nautical
8. Incarcerating
9. Quiescent
10. Honing
11. Crobedness
12. Cupola
13. Osculating
14. Vitreous
15. Lugubrious

NOTE: The underlined words in each list are the pseudo words.

Crime Stereotyping and Perceived Seriousness of Ethnic Criminals and Terrorists

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Abstract—*This study investigated types of crime people associate with different ethnicities and how seriously these types of crime are perceived. Participants matched ten mug shots from 5 different ethnic groups with ten crime descriptions representing 3 categories of crimes and ranked the seriousness of the crimes. While Middle Eastern criminals were associated with terrorism, there was an even mix of White, Black, and Hispanic criminals for violent and non-violent crime. Each crime held a 30% or better association with a certain ethnicity. Terrorism was found as the most serious crime type, but the top rated individual crimes were murder and rape. Results can help profilers and police officers understand what types of crime are most threatening and better protect citizens.*

In the most recent report from data collection on crime, the FBI revealed that over 14 million arrests (excluding traffic violations) were made in the United States during 2005 (Department of Justice- Federal Bureau of Investigation, 2006). This vast number helps us to realize how pervasive the impact of crime is in America. Recently, many social psychologists and criminal justice scientists have focused their research in the area of criminality and society's reaction to crime. Herzog (2003) notes that researchers in this area can help to look at individual and societal interpretations to crime, cultural beliefs, and how law works in society to learn how crime affects society at large and people individually. The aim of the current research is to look at different types of crime to see if people stereotype American ethnicities regarding different criminal activities.

Research has shown that there exist general stereotypes about crime and its perpetrators. Furthermore, studies have shown that media provides a forum through which such stereotypes can be perpetrated. Oliver and Fonash (2002) studied participants' memories of news stories and photographs to see if participants misidentify more Black than White criminals. Participants read crime related news articles that included pictures and then were distracted for twenty minutes. Next participants were shown pictures from the articles and new pictures of White and Black university students and professors, and were asked to choose the criminal from the story. The researchers found that participants chose more new pictures (i.e., that had not been shown in the story) of Black people than White people to go with the violent crime stories. The researchers suggest that the media may give a biased portrayal of Blacks in the news, thus causing participants to form stereotyped cognitive associations as seen with the misidentification of pictures in this study.

MacLin and MacLin (2004) tested beliefs about criminality by first having participants' rate the memorability, typicality, likeability, familiarity, criminality, and attractiveness of criminal mug shots presented. A second group of participants were shown the previously rated mug shots, distracted for 15 minutes, and then shown a new set of pictures and asked to determine which had previously been seen and which were new pictures. The researchers found that significantly more faces rated high in criminality by the first group were remembered by the second group than faces rated low in criminality. A follow up study by MacLin and Herrera (2006) added race into their study of criminality. The researchers asked participants open ended questions about their perceptions of criminals on variables such as demographics, occupation, personality traits, etc. Participants believed that more (60%) criminals were males and more were Black (40%), followed by Hispanic (30%), White (20%), and finally Asian (10%). Stereotypes, as discovered by Maclin and Herrera (2006) can become harmful in offender profiling because people who "look" like criminals may be

thought to be guilty when they are actually innocent. Dabney, Dugan, Topalli, and Hollinger (2006) did an observational study of shoplifting by placing secret video cameras in the ceiling of a drug store. Initially, researchers had the cameras follow every third shopper, but halfway through they revised their procedure. They re-trained observers to look for shoppers that exhibited suspicious behavior such as looking nervously over their shoulder or who wore clothing capable of concealing a stolen item. With this new procedure, they found that their observers were twice as likely to select a non-White shopper as when they chose every third shopper. Even after extensive training in unbiased observation, the observers continued to show bias in their profiling. This bias could have larger implications in the criminal profiling system of trained professionals.

Other researchers examined police officers to see if results found with the general public could be generalized to trained officials. Eberhardt, Goff, Purdie, and Davies (2004) primed police officers with crime related words and then gave officers a dot-probe task using criminal faces. For the dot probe task, participants were asked to focus on a dot in the middle of a computer screen. After they were shown pictures of criminals, a flash would occur to the left or right of the dot, and they were told to determine where the flash occurred as quickly as possible. Afterwards they were given a surprise face-recognition memory task. The researchers found that police officers showed the same pattern of bias as college students. When the flash was shown after a Black face, officers primed with crime words were quicker to pick out the flash. Officers also rated pictures for stereotypicality and criminality. The researchers found that Black faces were rated as looking more like a criminal than White faces. Black faces rated as stereotypicaly Black were judged as more criminal looking than faces rated low in stereotypicality.

A similar study on ethnicity by Bar-Tal and Labin (2001) was based on the realistic conflict theory which claims that stereotypes mirror real life conflicts over scarce resources or power. Bar-Tal and Labin applied this theory to terrorist attacks by giving a survey on stereotypic perception of Palestinians, Jordanians, and Arabs to Israeli adolescents before, a day after, and several months after a major terrorist attack in Israel carried out by Palestinians. Participants had the most negative view of Palestinians directly after the terrorist attack and continued to hold this negative attitude three months later. This study is important because it shows that a major event can cause negative stereotyping towards a group. Thus it is possible that the 9/11 attacks have changed people's perception of crime and specifically terrorism in America.

Taking the past research together, it is clear that stereotypes do exist regarding criminals and their ethnicity. This research takes a closer look at ethnic stereotypes and crime to see if a direct relationship exists. The first research question relates to differences in the types of crime people associate with different ethnicities. Based on the suggestion by MacLin and Herrera (2006), stereotypes about people from five different ethnicities: Caucasian Americans, African Americans, Hispanic Americans, Asian Americans, and Arab Americans were compared with each other on different types of crime. These races were chosen specifically because the United States Census Bureau cites them as the most populous or fastest growing races in America today (United States Census Bureau, 2005). The stereotyping of criminals associated with the three types of crime: violent, non-violent, and terrorist was also studied. It was hypothesized that Caucasian Americans will be most associated with non-violent crime, African Americans with violent crime, Arab Americans with terrorist acts, and with an even distribution for Hispanic and Asian Americans. This hypothesis was based on Oliver and Fonash's (2002) finding that people misidentified mug shots of Black persons to be violent criminals more often than mug shots of White persons. It was also hypothesized that Arab Americans would be linked with terrorism due to the association with the events of September 11, 2001.

A second research question was posed to discover how serious various crimes are perceived to be and proposed that participants would find terrorism to be most serious, followed by violent and then non-violent crime. This hypothesis is based on Bar-Tal and Labin's (2001) research with Palestinians and the current stigma of terrorism surrounding the events of 9/11 which is still commonly referred to in the media and is a main priority of government agencies. Secondly it was hypothesized that violent crime will rank second because it is prevalent in people's everyday lives and many people may have been affected by it, but it does not hold the overall stigma that terrorism does.

Researching the perceived seriousness of crime is important in making improvements in our criminal justice system. This information will help law enforcement agencies understand what people in society find to be most threatening. Also if crimes are associated with different ethnicities, law enforcement officers and juries can become more aware of these

associations and stereotypes and do their best to refrain from holding biased views. Increased knowledge about ethnic stereotypes will hopefully lead to a more unbiased system. By making stereotypes in the criminal system evident, hopefully the increased knowledge will lead to a more unbiased system.

Method

Participants

Forty-one participants were recruited from classes at two southeastern universities. Participants included 5 men and 36 women between the ages of 18 and 48 with a mean age of 24.05 (*SD*= 8.25). The participants consisted of 31 Caucasian Americans, 5 African Americans, 1 Asian American, 2 Hispanic American, and 2 classified as other. Participants were not paid for their involvement.

Materials

Participants were first asked to fill out a demographic sheet including questions on race, gender, age, education, hometown, and socioeconomic status. Next, participants were presented with ten mug shots of faces (two for each ethnicity: White, Black, Hispanic, Asian, and Middle Eastern). The pictures consisted only of males so any differences could be related to ethnicity only and not to gender. The pictures and crimes were generated by working with an FBI agent to produce a list of commonly occurring crimes and using a picture more than once. Ten individual crimes were placed into the three larger categories of terrorism, violent crime, and non-violent crime. Violent crimes included: murder, kidnapping, and rape; non-violent crimes included: shoplifting/larceny, burglary, bank embezzlement, and identity theft; and terrorist crimes included: biological terrorist act, sky jacking, and bombing. Participants were then asked to rate which of the three larger categories of crime they believe to be most serious in American society. Then participants rated each of the ten individual crimes on a seriousness scale from 1-5 (5 being the most serious).

Procedure

Participants were tested individually or in small groups in classroom settings. The procedure of the study was explained to them and they were given an informed consent form to sign. The photographs were laid on a table for clear viewing. Participants were asked not to speak with other participants, but were given as much time as needed to complete the study.

Results

Frequency of ethnicity assigned to certain crimes was assessed to test the first hypothesis. The ethnicities with the highest associated percentages per crime are listed below. For a complete listing of individual percentages refer to Table 1. For non-violent crimes, participants chose a mix of White, Black and Hispanic criminals. For shoplifting, participants chose

Table 1

Percents of Ethnic Criminals for Specific Crimes

Crime	White	Black	Middle Eastern	Asian	Hispanic
Shoplifting	9.8	31.7	4.9	22.0	31.7
Bombing	4.9	4.9	56.1	22.0	12.2
Rape	51.2	19.5	4.9	9.8	14.6
Burglary	2.4	31.7	4.9	19.5	41.5
Kidnapping	29.3	36.6	4.9	7.3	19.5
Skyjacking	4.9	7.3	65.9	7.3	14.6
Bank Embezzlement	46.3	14.6	14.16	22.0	2.4
Murder	0.0	36.6	2.4	22.0	39.0
Bioterrorism	7.3	0.0	39.0	41.5	12.2
Identity Theft	43.9	14.6	0.0	26.8	12.2

accurate photo representations of ethnic criminals. Categories of ethnicity of mug shots were pre-tested, and all pictures had a 90% or better rate of agreement on ethnicity. A response sheet was designed with ten types of crimes. Participants were asked to match the criminal in the picture with the crime he committed not 32% Black and 32% Hispanic criminals. For burglary, participants chose 42% Hispanic and 32% Black criminals. For bank embezzlement, participants chose 46% White criminals and for identity theft, participants chose 44% White criminals. For violent crimes, participants chose a mix of Black, White, and Hispanic

criminals. For rape, participants chose 51% White criminals. For kidnapping, participants chose 37% Black and 29% White criminals. For murder, participants chose 39% Hispanic and 37% White criminals. For terrorist-crimes, participants mainly chose Middle Eastern and Asian criminals. For bioterrorism, participants chose 42% Asian and 39% Middle Eastern criminals. For skyjacking, participants chose 65.9% Middle Eastern criminals and for bombing, participants chose 56% Middle Eastern criminals. A comparison of means was done to test the second hypothesis of perceived seriousness of crime type. Terrorism was rated most serious ($M = 2.30$, $SD = .72$) followed by violent crime ($M = 2.13$, $SD = .76$), and lastly non-violent crime ($M = 1.70$, $SD = .88$). A MANOVA was also performed and yielded significant differences between these means, $F(2,38) = 3.65$, $p = .03$. Finally, means were ranked by perceived seriousness of individual crimes. (See Table 2 for a distribution of means)

across violent and non-violent crimes. It is possible that there were not more clear associations with crime type because of the large number of ethnicities and limited number of crime types. The design forced participants to associate a crime with a certain criminal so they would not see themselves as stereotyping and therefore participants may have been forced to place a criminal with a crime they did not truly associate with that criminal. Whereas, if the participants could have picked any ethnicity to go with the crimes, they would have known they were stereotyping, yet may have given more valid results. This design could explain the even distribution of criminals for crime type. This is an empirical proposition however, and future research might look to test a different number of ethnicities and crimes to see if the result would differ.

While there was a mix of ethnicities for each crime type, there were clear associations of ethnicities with individual crimes. For example, Caucasian

Table 2

Means of Ranked Seriousness of Individual Crimes

Crime	Mean	Standard Deviation
Murder	4.79	.41
Rape	4.55	.55
Bioterrorism	4.24	1.22
Kidnapping	4.03	1.00
Bombing	4.00	1.21
Skyjacking	3.82	1.27
Identity Theft	3.47	.89
Bank Embezzlement	3.34	.75
Burglary	3.11	.80
Shoplifting	2.68	.90

A MANOVA was also performed on these means again yielding significant differences, $F(9,29) = 39.24$, $p < .000$.

Discussion

While the data only partially supported the hypotheses, they provided strong support of ethnic stereotypes of criminals. As hypothesized, there was a clear stereotype of Middle Eastern Americans as terrorists as they held high frequencies for all three terrorist acts (over 55% for both skyjacking and bombing). In contrast to my hypothesis, White, Black, and Hispanic criminals were more evenly distributed

Americans were clearly associated with rape, receiving 51 % of the matches as well as bank embezzlement receiving 46 % of the matches. African Americans were associated with kidnapping (38%) and shoplifting (32%).

Hispanic Americans were associated with murder (39%) and shoplifting (32%). Thus, these three ethnicities held clear associations with both violent and non-violent crimes. The greatest association for Asians was with bioterrorism for which they received 42 % of the matches. This could center on another stereotype i.e., intellectual capacity. As there is great emphasis

placed on the dedication of the Asian culture to academics, it is possible that participants could have viewed them as most capable of committing bioterrorism. Based on these results, people clearly hold stereotypes about what ethnicities are responsible for committing types of crimes.

In regards to perceived seriousness of crime, very interesting results were obtained. Terrorism was found to be most serious, followed by violent and lastly non-violent crime. Yet when individual crimes were ranked, all three of the violent crimes were ranked in the top four along with only one terrorist act, bioterrorism. This probably reveals that people hold a strong negative stereotype of terrorism and its place in our society but are more affected by violent crimes on an individual level. These results provide some support for my hypothesis that terrorism is ranked as the most serious in general, while individual violent crimes are still considered very serious. The high ranking of terrorism reflects how a major terrorist attack on our country can affect stereotypes for years. Even though the Oklahoma City bombing occurred only 12 years ago, Caucasian Americans received only 4.9 percent of the matches to Middle Easterners' 56.1 percent. An interesting follow up could be to test participants at different timed intervals after a tragic crime in society (e.g. the Virginia Tech massacre) and observe if and how stereotypes change.

Further research could be done in this area to look at a more broad range of crimes and ethnicities. Additionally, it would be interesting to see if similar stereotypes exist for female criminals. The limitations in my research could also be addressed by getting a larger sample size, a more even gender proportion, eliminating self report data, and looking at responses based on participant's ethnicity. The implications of this research are that clear stereotypes about ethnic criminals exist and people take crime very seriously. As stereotypes can have negative repercussions in the criminal justice system, continued research in prevention is vital.

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The Evolutionary Roots of Prejudice and Plausible Solutions

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Abstract —*A review of a range of literature examines prejudice, discrimination and hatred from a biosocial model. In addition, the purposes of species-specific differences which kept genetically distinct populations separate throughout evolution are discussed, to explain territoriality and the concept of altruism towards one's own in-group. The conclusion finds that the foundations of prejudice and discrimination are rooted in genetics and evolution, as opposed to a cultural root as previously hypothesized. This stance is established by diverse lines of reason, namely the theory of inclusive fitness; the examination of in-group and out-group identity; the Genetic Similarity Theory; the dual-inheritance theory; and the biological basis of prejudice. Implications in modern day society of the evolutionary roots of prejudice, discrimination and hatred are discussed. Directing this knowledge in significant ways can facilitate finding plausible solutions to twenty-first century prejudice; and thus relevant solutions to modern day variations of prejudice, discrimination, and stigmatization are posed.*

The fields of evolutionary psychology and social psychology often cooperate to understand the sociobiological root of many diverse focuses. The topic of prejudice has been researched and studied for years, including approaches that attempt to influence society and individuals towards stigmatized groups (Zitek and Hebl, 2006). Despite the influence of Darwin on evolutionary thinking, the idea of group selection fell out of favor after the publication of George Williams' *Adaptation and Natural Selection* (1966). For a long time, it was the opinion of some researchers that American sociologists were the least likely to accept the evolutionary explanation of human behavior (Stone,

2008). A 1992 survey of sociologists reported that only 3.7% identified with "sociobiology-evolutionism" as their primary or secondary orientation (Sanderson and Ellis, 1992). This might be because of what Stone (2008) identifies as "orthodox neo-Darwinism", or the conventional belief in Darwin's original theory of evolution, which does not adequately address some aspects of human nature – including aspects such as group identities and behavior, social learning, and morality – that are the most important and exclusive to the human species. The last two decades have brought more attempts to explain human nature from the evolutionary perspective (Stone, 2008).

A review of a range of literature which examines prejudice, discrimination and hatred, suggests that modern day prejudice has a root in evolution and genetics, as opposed to a cultural root as many have previously thought. Additionally, understanding the genetic predisposition to prejudice and discrimination and directing this knowledge in significant ways can facilitate finding plausible solutions to twenty-first century hatred.

In identifying the evolutionary purpose of awareness of ethnic differences and the sense of "racial distance" that kept genetically distinct populations separate through hundreds of thousands of years of evolutionary development (McGregor, 2001), the trend of evolution is exposed. Evolution has evolved at least two inclinations. The first is where a single-celled organism evolves into an advanced organism such as humans or mammals. The second inclination is where early life forms into diverse races (McGregor, 2001). Both the trend towards increasing complexity and the trend towards increasing diversity of life forms depend

on genetic isolation (McGregor, 2001). This is where prejudice begins to make its first appearance in evolutionary history. During the period in which sub-species developed into their own separate species, some type of barrier was necessary to keep intact their genetic identity; this barrier could either be physical or geographical (McGregor, 2001). If no barrier was present, the sub-species would cross-breed and become indistinct. To prevent this negation, the different species developed a sense of territoriality and what zoologists call "feral restraints," an aversion to breeding with other sub-species (McGregor, 2001). As evolution continued, the feral restraints progressed into altruism within one's breeding group.

Biological altruism can be defined as when an organism behaves in a manner that benefits other organisms, at no cost to itself (Stanford Encyclopedia of Philosophy, 2003). It is theorized that by behaving altruistically, an organism enhances its inclusive fitness, or the likelihood that its offspring will survive into the future. Biological altruism is not the same as psychological altruism, where the subject is consciously aware that they are helping another (Stanford Encyclopedia of Philosophy, 2003). Altruism, in evolution, was not only important for the continuation of a species and reinforcing boundaries between in-groups and out-groups to keep genetically distinct populations; but also for group cooperation. The cooperation of cultural groups would have made it more likely for mating and reproduction (Stone, 2008).

The purpose of the review of literature which researched prejudice was to show evidence which maintained the position that prejudice has evolutionary roots, and give suggestions for probable solutions to modern day variations of prejudice and discrimination.

Theory of Inclusive Fitness and Authority-Bearing Systems

According to psychologist and evolutionary researcher Harold Fishbein (2004), "our genetic heritage provides the initial push towards prejudice." Fishbein asserts that the theory of inclusive fitness is partly responsible for the evolution of prejudice in hunter-gatherer tribes (Fishbein, 2004). The theory of inclusive fitness hypothesizes that members of a

community will show preference towards their own kin (Wilson, 1980). In other words, an individual will act in a manner that increases the health of one's group rather than one's self. It enables an organism's genes to leave a maximum amount of copies in a population and thus attempt to guarantee survival of a genetic line.

The genetic progression of man emerged from a competition for survival between genetically different hominid populations. The genetic differences were sustained by not only geographical seclusion, but also by the advancing bonds of cooperation and love within kindred (McGregor, 2001). From these bonds of cooperation might have emerged warfare and alienation of other out-groups, in the competition for resources (McGregor, 2001). Every member of every human group has experienced two different reactions when dealing with others: devotion towards one's in-group and rivalry with the out-group (McGregor, 2001). Primates, for instance, prefer their own group, rather than foreign groups, by instinct because they have more relatives in their own group (Fishbein, 2004). It is suggested that the opposition from out-groups reinforces the feeling of loyalty and devotion to one's in-group, which helped to sharpen the consciousness of ethnocentrism and prejudice against those not in the in-group (McGregor, 2001).

According to Fishbein (2004), the main source of hatred and prejudice today may be from the integration of "authority-bearing systems" which originally were probably formed by dominance, but extended into what Fishbein (2004) calls the "realm of concepts and values." We not only accept as valid what authority figures tell us, but internalize that information, in authority-bearing systems. Today, authority acceptance is clearly one root of prejudice and hatred (Fishbein, 2004), which can be seen in the opinions that children pick up from their parents and pass down through the generations. One might even be tempted to associate groupism as a meme. A meme is any cultural information, such as a practice or idea, which gets transmitted from one member of a community to another. This concept was coined in Richard Dawkin's book *The Selfish Gene* (1976). Parents pass down not only their biological influence and prejudice, but also their prejudice as a way of life.

This thought is supported by Wesson (2006) who asserts that social conditioning and neurobiological survival instincts are the cause of our modern prejudices. Literature in the social and cognitive developmental field shows that children exhibit ethnical and racial awareness around three of four years old, but it is not the differences themselves that present problems to children, but rather the prejudicial ascriptions they are subjected to (Wesson, 2006).

In the eyes of evolutionary psychologists, the evolutionary message is clear. The message according to McGregor (2001) is: "Human groups which lose their internal sense of identity and cohesion in respect of other groups eventually cease to exist as discrete realities." In the mobile, higher life forms such as humans, seclusion methods such as prejudice are necessary to protect the genetic identity of races and sub-species (McGregor, 2001).

Explanations of Group Preferences

The ethno-symbolism theory, originally outlined by Anthony D. Smith (2001), integrates a unified view of history and psychology. This view solved the problem that nationalism posed for socio-economic theories, which was the phenomena of mass devotion and the belief that one's own group is "chosen" or unique. (Smith, 2000; 2004; Guibernau and Hutchinson, 2004; Hutchinson, 2000). The Genetic Similarity Theory expands Smith's (2001) theory by tying it all together with a biological basis.

Darwin acknowledged in *The Origin of the Species* an unexplained problem: altruistic behavior should not evolve through "survival of the fittest" because those who are altruist are more likely to self-sacrifice for the welfare of one's group, and therefore the altruistic gene would have less of a chance of being reproduced. In this sense, selfishness should be the trait that was passed on (Rushton, 2004). The idea of inclusive fitness, not just individual fitness, put the dilemma to rest in 1964 when evolutionary biologist William Hamilton came up with the concept (Rushton, 2004). Genes survive and are passed on to future generations. Distinctive genes can be found in an individual's siblings, cousins, nephews, and grandchildren, as well as offspring. In terms of percents, siblings share 50%; nephews and nieces share 25%; and cousins share 12.5% (Rushton, 2004). When an altruist gives up its life, it is given up for those common genes. From an evolutionary standpoint, an individual organism is only a channel for a gene's replication. (Rushton, 2004).

William Hamilton, Richard Dawkins, Edward O. Wilson, and John Maynard Smith all stood behind the concept of a theory known as 'Hamilton's Rule', later dubbed the kin selection theory by Smith (1964) (Rushton, 2004). "'Hamilton's Rule' states that across all species, altruism (or conversely, reduced aggression) is favored when $rb – c > 0$, where r is the genetic relatedness between two individuals, b is the (genetic) fitness benefit to the beneficiary, and c is the fitness cost to the altruist" (Rushton, 2004).

The concepts of kin altruism and reciprocal altruism, as detailed above, are among the least controversial behaviors to sociologists, because both behaviors have been documented in other species (Stone, 2008). Reciprocal and kin altruism can be considered, at least in part, self-serving, and in the past this idea has been part of the characterization of the human species (Stone, 2008). The theory that reciprocal and kin altruism is part of the human character falls flat after experimentation, though. Henrich et al. (2004) studied 15 small societies incredibly different from each other, and consistently came up with the result that the previously mentioned theory of self-interest was not a reliable predictor of behavior (Stone, 2008). Stone (2008) asserts that the reason these results were shown is because humans evolved with the concern or morality and fairness, which cannot be equated to kin altruism.

In 1984, J. Philippe Rushton, Robin Russell, and Pamela Wells began utilizing and applying the 'Hamilton Rule' to larger national and international bodies. They hypothesized that if genes could allow an organism to recognize and prefer other similar organisms, then altruistic behavior could evolve beyond kin selection. They called this theory the Genetic Similarity Theory (Rushton, 2004).

The Genetic Similarity Theory and culturalist theory make opposite predictions about social assortment. Cultural theory suggests that spouses would be more attracted to each other on similar

experiences, while the Genetic Similarity Theory suggests more attraction on heritable qualities (Rushton, 2004). Rushton asserts, "Several studies have shown that people prefer genetic similarity in social partners, and assort on the more heritable components of traits, rather than the most intuitively obvious ones, just as Hamilton (1971) predicted they would if genetic mechanisms were involved. This occurs because more heritable compounds better reflect the underlying genotype" (Rushton, 2004). It has been shown in several studies that people prefer genetic similarities in spouses, rather than the most obvious ones, such as a common like of reading, just as Hamilton (1971) predicted they would if genetic mechanisms were involved (Rushton, 2004). The term heritability refers to physical traits that are genetic, such as the length of one's fingers or upper arm circumference (Rushton, 2004).

Causation is multifaceted, and it is unwise to reduce relationships between ethnic groups to one factor (Rushton, 2004). According to Rushton (2004), there will always be exceptions to the rule. People of the same ethnic group will not always group together and conflict is not always inevitable between groups. However, as van der Burghe (1981) pointed out, from an evolutionary perspective, the ultimate measure of human success is not production but reproduction.

Coined by Richerson and Boyd (2004), "tribal social instincts" supplemented "ancient animal instincts" of kin and reciprocal altruism. Cumulative culture is distinctly human, and it has affected the human species from the way of evolution to where the human species exists geographically. In turn, tribal social instincts allowed for the building of first several hundred, and then about 5,000 years ago thousands, of people to build complex societies (Stone, 2008). By "instincts," Richerson and Boyd do not refer to the innate biological behaviors that are not modified by the environment, but rather use it to distinguish between genetic and environmental behaviors (Stone, 2008). According to Richerson and Boyd (2004), human genetics and culture coevolved.

As culture evolved within the parameters of humans having preference to groups, it would seem that those who were less able to participate in cooperative groups would be less likely to find mates and propel their genes into the future (Stone, 2008). This claim is backed up by the research of John Hawks et al. (2007) who used new genomic technology to conclude that the pace of our evolution has increased dramatically over the last 40,000 years (Stone, 2008).

The best evidence for tribal social instinct does not come from Hawks et al. (2007), but from research of Henri Tajfel (referenced in Harris, 1998) and what he called "groupness"; and from Matt Ridley's research, and what he called "groupishness." In 1950, Tajfel produced a psychological study involving teenage boys who were given a test told to be on "visual judgment" that involved guessing the number of dots projected onto a screen. They were also told that participants tending to either under estimate or over estimate the number. After they took the test, the boys were told whether they under or over estimated. They were then asked their opinions on how much money the participants should receive for their time. The other participants were identified by a number and whether they over or under estimated. The "groupness" was prevalent – all the subjects were motivated to overpay those in the same group (under or over estimation) as them (Stone, 2008). Tajfel concluded his experiment with the observation that the mere fact of division in groups is enough to trigger discriminatory behavior (Stone, 2008).

Further research by Tajfel's student, John Turner (et al. 1967), demonstrated that the intensity of our group identification depends on the presence of contrasting groups (Stone, 2008).

Neuropsychology and Prejudice

"There appears to be an evolutionary neural code orchestrating a few of our prejudices," Wesson (2006) claims, "rendering them beyond our conscious capacity to choose unless we make a deliberate corrective effort to do so." Ultimately this means two things. On one hand, prejudices would be considered learned, and therefore would have the ability to be unlearned. However, it would also seem that prejudice is "hard-wired" into the brain, and it would take immense effort to not default back to the prejudice.

In the brain, there is a relationship between the cerebral cortex and the subcortical structures, including

the limbic system, where information crosses back and forth. This relationship allows aggression, hatred and violence, when these emotions come to pass, to mingle with "judgment and meaning" (Wesson, 2006) in the frontal lobe. Because of this, taught behaviors or morality are not enough to change default behavior (Wesson, 2006). The normal, rational processing of an individual can easily be overridden by the limbic system in a moment of anger or anxiety (Wesson, 2006).

Another point to consider is that the brain does not store energy like other areas of the body do. Wesson (2006) describes it in descriptive terms: "Instead, the brain requires a pint and a half of blood to flow through its more than 40,000 miles of blood vessels every minute." When a considerable amount of blood flow to the brain is decreased, such as when we experience a threat, and the blood rushes to major muscle groups to support a defense stance or a quick departure, one's cognitive abilities can diminish (Wesson, 2006). According to Wesson (2006), when any threat is apparent the first casualties are (1) efficient information coding, (2) higher-order thinking abilities, (3) memory formation and storage, and (4) efficiently utilizing stored memories or recalls. Given this information, it is easy to see how prejudice can be heightened in a vulnerable state. It also gives considerable evidence towards the genetic and predisposition components to prejudice.

Another point to consider neuropsychologically is that groupishness, or conversely prejudice, coevolved with intelligence, language, self-awareness, and religion/moral systems (Stone, 2008).

The size of our cortex, particularly the neo-cortex, is a distinctive adaptation of the human species (Stone, 2008). Evolutionary psychologist Dunbar (1996) asserts that the neo-cortex ratio (the size of the neo-cortex divided by the body weight) corresponds with group size. Humans have the largest groups, and humans have the largest neo-cortex, therefore human groupishness evolved with intelligence. Dunbar also argues that language evolved out of intelligence as human groups grew too large for primate grooming behavior (Stone, 2008). Essentially what is being said is that gossip is the human form of grooming (Stone, 2008).

The fact that language evolved so intricately speaks volumes about the intelligence of the human species. It also is an obvious form of groupishness and prejudice (Stone, 2008). It can unite groups by members having a common bond, and alienate others by pushing them away with not understanding what is being said.

From and with the emergence of language emerged what cognitive scientists call Theory of Mind (ToM) (Stone, 2008). The ToM begins to be seen in humans around 3-4 years of age, and allows assignment of cause to other's actions. ToM is what allows self-awareness, and allows us to "imagine how someone who does not actually exist might respond to a particular situation" (Stone, 2008). Dunbar (1996) notes that ToM allows humans to imagine different intentions, which gives new meaning to morality and to deception even though deception is seen all throughout nature. Moral systems would not be able to be conceived, let alone acted within, without ToM and groupishness, both within group cooperation and competition between groups (Stone, 2008).

Finally, religion is a powerful vehicle for human groupishness, as Stone (2008) explains. Religion is the backbone behind many moralities and creates certain social unities (Stone, 2008)

Discussion
Implications and Consequences

Genetic similarity can be expected to play a large role in social behavior – in small groups and large ones, nationally and internationally (Rushton, 2004). The implication of the pull of ethnic identity can extend to many things; it can even be extended to voting behavior. In the 2004 presidential election, George W. Bush was re-elected by a large amount of White votes; these voters placed 'values', rather than the economy, as having higher worth (Rushton, 2004). Rushton (2004) asserts that a closer look at demographics reveals that "values" might be at least in part, a proxy for ethnic identity and genetic similarity. The voting trend for this upcoming 2008 election is very interesting, and actually goes against the Genetic Similarity Theory when looking at ethnic Democratic candidate Barack Obama . Voting demographics from January 27, 2008 show that Obama clearly won the African-America vote; African-Americans constituted 53% of the vote, and 80% of

that number voted for Obama. However, a closer look at demographics show he has won a significant portion of white votes as well. He won voting predictions in Iowa with a large margin, and Iowa consists of 93% of white voters. In New Hampshire, while Hillary Clinton won the white women votes, Obama won the votes of white men – and even though Clinton won the state because there was a higher number of women voters than men, New Hampshire and Iowa show that Obama can win sufficient white votes despite being a different race. There were also states that Obama did not win – such as Nevada, though he received strong support in Las Vegas – that have a majority of white voters, and research into this matter does not produce clear reasons why some whites vote for Obama and some do not. Two possible explanations for voting behavior in whites straying from what the Genetic Similarity Theory predicts could be (1) negative political attitudes towards conservative policy because of all the unrest with the Iraq war situation and George W. Bush, therefore whites are more likely to look to other candidates than the cookie-cutter white Republican, or (2) higher income whites seem more likely to vote for Obama rather than Clinton, which explains the win for Clinton in Nevada and New Hampshire. Time will tell what the voting inclination will be in November of 2008, and whether the pull of one's genetic identity will influence on a small or large scale the next United States president.

Ethnic consciousness can have a threatening side as well. It is rooted in the biology of altruism, and in the right (or wrong) circumstances, it can propel ethnic nationalism, xenophobia and genocide. (Rushton, 2004). A possibility is that even before the appearance of Richerson's and Boyd's tribal social instincts, hominids were ruled by a way of life similar to "be groupish or die" (Stone, 2008). One huge possibility is that the chief predator of human ancestors was not wild animals or starvation, but other hominids who formed xenophobic tribes (Stone, 2008). Further back than this, it is possible that the human groupishness was a result of constant war with other groups and the fact that today's humans descend from the winners of these constant wars (Stone, 2008).

One casualty of fundamentalist Islamic groups' attack on the World Trade Center in New York City, NY, is the increase in prejudice against the Islamic religion. Regardless that nearly six in ten Americans profess to not understanding the religion; nearly 46% of Americans express an unfavorable opinion of Islam (Cohen, 2006). The misconception that all of Islam advocates violence is one furthered by the media; and the worrisome truth of the end result of viewers falling into the trap of misunderstanding is that it is harder to cultivate an open mind and understanding of truth, once a falsity is accepted as reality.

Politics can be particularly dangerous when survival and reproduction are at stake. According to Margalit (2003), polls conducted among Palestinian adults from the Gaza Strip and the West Bank show that about seventy-five percent support suicidal attacks, whereas only about twelve percent are opposed. Examination of the motives behind Middle Eastern suicide bombers reveal known factors: the Palestinian and Iraqi political situation, teaching of radical Islam, and the adoration of martyrs by some of the culture (Rushton, 2004). From an evolutionary viewpoint, these people have evolved a 'cognitive module' for altruistic self-sacrifice that rewards their gene pool; in a sense, suicide bombings can be viewed as a contribution to inclusive fitness (Rushton, 2004). Richerson et al. (2003) assert that social learning is not the only way humans maintain group stability. Our tribal social instincts incline humans to want to "morally punish" those who step outside of group norms. Fehr and Gachter (2001) back up this belief with their research which shows evidence for this inclination.

Relevant Solutions for the 21st Century

Biological intuition and broad categorizations help us to simplify the world and the government; but quick and inaccurate categorizations distort perceptions, make it nearly impossible to understand reality as it is, and interfere with accurate recollections (Wesson, 2006). Identifying and being constantly aware of our emotional filters, or how we interpret the world, can be ground-breaking in destroying prejudice. According to Wesson (2006), emotional filters are grounded in (1) what we have been taught explicitly or implicitly, (2) conditioned beliefs that become 'hard-wired' in the brain by experiences and thoughts, forming semi-permanent

neural circuits inside the brain, (3) expectations based on schemas and our awareness of 'if-then' relationships, and (4) evolutionary and genetic directions that assist us in identifying potential threats, which are often, unfortunately, defined as "those who look different than me and my group. By finding the biases we were taught, the conditioned beliefs we were exposed to, and changing our expectations, a significant dent can be made in prejudice awareness. It is worth a thought that if modern prejudice is able to be conditioned into culture, it may very well be able to be classically conditioned out as well.

However, education is not all that is needed, especially with those who are truly prejudiced. Anti-prejudice education is best heard by those who are already anti-prejudice (Farley, 2000). This is an important point, because it is an introduction to some of the more challenging components of prejudice. It stands to reason that if those who are anti-prejudice understand best the anti-prejudice message, then those who are prejudiced and who the message is intended for are the least likely to hear it. An explanation for this phenomenon could be that some do not like to have their beliefs challenged; furthermore, prejudiced people sometimes do not view themselves as prejudiced (Farley, 2000).

Education in a school setting is particularly important in the anti-prejudice fight. First, because when the object is to impart information rather than challenge discriminatory beliefs, those being educated are less likely to be defensive and more likely to actually listen. Second, because seeing authority figures, such as teachers, be unbiased reinforces how prejudice is unnecessary (Wesson, 2006). Schools, teachers, authority figures and parents can be part of the environmental support system, which is so important in extinguishing prejudice, because they can reinforce alternate methods of thinking and give other options for responding to threats or other behavioral stimuli (Wesson, 2006). Some suggestions for classroom interaction are given by Wesson in Appendix I. One suggestion is to plan more activities that mix up the social groups students are involved in (Wesson, 2006). It gives opportunities to interact with different types of people, and handle different situations. Another

suggestion is to adopt the attitude that prejudice and hatred are never solutions to problems (Wesson, 2006). It stands to reason that taking that attitude will force other solutions to emerge.

A mind that can reposition empathy for a fellow human to an unimportant value is a mind that is not healthy (Wesson, 2006). "Similar to addressing the debilitating effects of alcoholism, raising one's awareness of the impact of the continuing race and class problems in America and their long-term emotional and psychological damage, is an important first step towards a healthy psychological future for all Americans" (Wesson, 2006). Researcher Steven Neuberg stresses that just because prejudice has evolutionary roots, does not mean that specific prejudices can't be changed (Science Daily, 2005). "What we think and feel and how we behave is typically the result of complex interactions between biological tendencies and learning experiences." He asserts that evolution may have primed our species for prejudice, but our environment is equally important in how we act on those prejudices.

Conclusion

Evolutionary thought in the field of sociology has produced important contributions to the understanding of diverse issues, including prejudice and discrimination – such as the Genetic Similarity Theory or the dual-inheritance theory. From the emergence of genetically distinct species to the appearance of altruism, the evolutionary biosocial perspective gives light to how our modern-day prejudice evolved.

Regardless, as socially conscious as humans are now, there is absolutely no reason to not be actively seeking ways to eradicate prejudice, discrimination and hatred based on ethnicity and race, regardless that prejudice is biologically ingrained. The knowledge and intelligence that humans possess should allow us to examine and understand the roots of our prejudice, and construct a way to handle contemporary discrimination. By allowing prejudice to rage on, we eliminate the possibility to grow to our potential.

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Appendix

Ten Strategies for Reducing Prejudice in Schools
By Kenneth Wesson

Ours is not a colorblind society. Noticing physical differences is a natural aspect of our visual experience. Placing a negative frame around those differences fosters prejudic. Schools can play an important role in teaching students to celebrate "proversity", our shared human commonalities. We are all 99% alike.

1. Avoid convenient all-group categorizations. They always have built-in biases. Equating personal traits or behaviors to physical differences is always erroneous.

2. Plan more interactions with people from diverse racial and social groups. Volunteer to work in inter-group settings where common goals are pursued with room for making new friends.

3. Take pride in your achievements, not in your skin color. Every person becomes part of a race through no personal effort of his or her own. Taking advantage of privileges that your race unfairly enjoys over others reinforces past prejudices.

4. Carefully evaluate all assumptions. We cannot assume every member of a group is alike based on one common characteristic. Members of the same family are quite different, so why would you expect the members of an entire race to be alike?

5. Always give yourself plenty of time for thorough and rational information processing. When decision-making is hurried, your best thinking will be compromised.

6. Pursue opportunities to learn about the historical, psychological, and existential consequences of human prejudices. Read about and discuss the lives of admirable individuals who overcame the obstacles of prejudice and discrimination.

7. Intelligently analyze events and information, including TV content. The biases and prejudices sponsor misjudgments. TV panders to stereotypes because simplicity makes television programs easier to follow and understand. Reduce exposure to any informational sources that rely heavily on prejudices and stereotypes to entertain. (If you see it often enough, eventually you will believe it.)

8. If "feeling good" requires putting down others, then you need to find another way to bolster your self-esteem. Hurting others is a sign that counseling interventions are needed.

9. Prejudice, hatred, and violence are never solutions to problems.

10. Remember, you can't choose up sides on a round planet. We're all on the same side. Let's show it every day and at every opportunity.

We exponentially add to the quality of life when we focus on all of the ways in which we are all the same, rather than those few superficial ways in which we are different. Love, security, and a sense of hope bind humankind together.

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