PREDICTING COLLEGE STUDENTS' PROPENSITY TO FORGIVE WITH DIMENSIONS OF EXECUTIVE FUNCTIONING

By

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ABSTRACT

There is a shortage of research that investigates how, and to what extent, the propensity to forgive is predicted by neurocognitive processes. To address this, the current study analyzed how forgiveness was predicted by the core executive functioning (EF) dimensions of behavior regulation (i.e., inhibition skills) and metacognition (i.e., working memory skills). College students (N = 243) were administered two forgiveness measures, the Forgiveness Scale (Rye, 1998) and the Transgression-Related Interpersonal Motivations Inventory-12 (TRIM-12; McCullough, Rachal, Sandage, Worthington, Brown, & Hight, 1998) and one EF measure, the Behavior Rating Inventory of Executive Function Adult Version (BRIEF-A; Roth, Isquith, & Gioia, 2005). Results indicated that global EF skills successfully predicted overall forgiveness. Furthermore, when investigating each core EF dimension separately, EF behavior regulation skills were a better predictor of forgiveness when compared to metacognitive skills. When analyzing two forgiveness dimensions individually, both positive and negative forgiveness dimensions predicted EF behavior regulation skills. Findings from the current study clarify previous forgiveness and EF research and extend the investigation by applying a dimensional approach to both of the constructs.

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CHAPTER I

INTRODUCTION

The purpose of the current study is to examine how, and to what extent, the propensity to forgive is predicted by core executive functioning (EF) skills, namely inhibition and working memory. In the first section of the literature review, forgiveness is operationally defined and various models of forgiveness are introduced. In the second section, EF is operationally defined and two core dimensions of EF are presented. Next, the relationship between EF and forgiveness is explored and conflicting research is reviewed. Lastly, the studies main hypotheses and rationales are provided.

Forgiveness

It is inherent in human relationships that one will be wronged or hurt by others to a certain degree. While some people easily forgive, others may find it more difficult and experience strong propensities to ruminate, retaliate, and/or avoid the wrongdoer. These individual differences, or the degree a person responds in an eye-for-an-eye manner or attempts to transform negative responses into more positive ones, are of interest to those attempting to understand the human condition. Moreover, most world religions incorporate forgiveness as a core teaching (McCullough, 2000a). In the last 30 years, psychologists have begun to conduct empirical studies to better understand forgiveness constructs and the social-cognitive determinants that influence interpersonal behavior (Fincham & Beach, 2002; McCullough, et al., 1998; McCullough, Worthington, & Rachal, 1997). This investigation has now extended into several fields in psychology, including clinical psychology, social psychology, and health psychology. Recently, the field of neuropsychology has begun to investigate the neurocognitive processes that

contribute to or detract from forgiveness processes (e.g., McCullough, Kurzban, & Tabak, 2012). However, more research is needed that investigates how and to what extent neurocognitive EF processes contribute the propensity to forgive (Pronk, Karremans, Overbeek, Vermulst, & Wigboldus, 2010).

Given that forgiveness is a complex construct, psychologists have struggled to adequately define the construct. Even so, there are many definitions used in the literature. For example, Hughes (2015) defines forgiveness as a dyadic relation where an individual acknowledges and moves past a transgressor's harmful actions. Similarly, Berry, Worthington, O'Connor, Parrott and Wade (2005) define forgiveness as the replacement of negative emotions with positive orientated emotions. Lyubomirsky (2008) also includes a transformative definition and explains that forgiveness is a shift in thinking about a person who has harmed so that the desire to retaliate decreases and the desire to do well (or to benefit the relationship) increases. Despite the variety of definitions of forgiveness, most researchers generally agree that the construct denotes a variety of prosocial changes that occur within a person who has been offended or hurt by another person (McCullough, 2000a).

The ability to forgive oneself and others is recognized as a key aspect of psychological wellbeing and healing (Karremans, Van Lange, Ouwerkerk, Kluwer, 2003; McCullough, 2000b; Krause & Ellison, 2003; Toussaint & Friedman, 2009; Witvliet, 2001). For centuries, religious doctrine, scholars, and philosophers have advocated for the potential emotional and spiritual benefits of forgiveness (Krause & Ellison, 2003). More recently, psychologists have investigated the construct empirically by researching

how forgiveness relates to physiological health, psychological health, and fulfilling relationships. Regarding physiological health, multiple studies suggest that an increased propensity to forgive is associated with lower blood pressure, a decreased amount in medications needed, improved sleep quality, and lower levels of fatigue (Hannon, Finkel, Kumashiro, & Rusbult, 2011; Lawler, et al., 2003; Lawler et. al., 2005). Studies also suggest that increased forgiveness has many benefits on psychological health, such as lower levels of stress, increased life satisfaction, and a lower likelihood of being diagnosed with major depression, generalized anxiety disorder, phobia, and panic disorder (Kendler, et al., 2003; Krause & Ellison, 2003; Lawler, et al., 2005; Witvliet, Ludwig, & Vander Laan, 2001; Ysseldyk, Matheson, & Anisman, 2007). Regarding relationships, forgiveness appears to be influential in promoting successful conflict resolution, providing an increase in relationship efforts, and improving relationship well-being (Braithwaite, Selby & Fincham, 2011; Fincham & Beach, 2002; Fincham, Davila, & Beach, 2007; Hargave & Sells, 1997). Overall, this growing body of forgiveness research suggests that the ability to forgive is linked to a host of well-being variables.

Theoretical Models of Forgiveness. Currently, there are a variety of theoretical models of forgiveness. For example, McCullough, Worthington, and Rachal's (1997) model of forgiveness that is utilized for the current study incorporates two motivational components, namely forbearance and reductions in avoidance. First, forbearance is the propensity to deal patiently with persons or situations and restrain the desire to seek revenge. Although a harmed individual may be motivated to "get even" with the transgressor, McCullough's describes forbearance as a reduction of feelings of retaliation or righteous resentment (McCullough, Fincham, & Tsang, 2003). Accordingly, this

reduction increases forbearance and the willingness to forgive. The second motivational change in McCullough's model is a reduction in avoidance. Typically a harmed individual will experience motivations to avoid contact with the offender. This may result in physical and psychological distance or efforts to serve a relationship entirely and prevent further harm (McCullough, et al., 1998). Therefore, as there is a reduction in avoidance, willingness to forgive increases. Together, these two components, namely, forbearance and reductions in avoidance are viewed as core components of forgiveness. One assumption of the model is that an individual does not need to experience both components to truly forgive. However, an increased willingness to engage in each component, separately or combined, is associated with prosocial change and increased forgiveness (McCullough, et al., 1998).

Other theoretical models of forgiveness have incorporated factors based on positive feelings and behaviors directed toward the transgressor rather than centering merely on reductions of problematic motivations. For example, Rye (2001) postulates that forgiveness is a dyadic construct that, in addition to the absence of negative motivations (i.e., reductions of problematic motivations), includes the presence of positive feelings and behaviors directed toward the person that hurt or harmed. These positive inclinations might include having compassion and wishing good for the person who mistreated. Likewise, McCullough, Root, and Cohen (2006) added a third motivational component, namely benevolence, to the model previously described. This benevolence factor focuses on positive feelings and goodwill for the transgressor. It is described as promoting the propensity to forgive by increasing the desire to restore and nurture the relationship despite being hurt. It is important to note that the current study

utilizes both McCullough, et al. (1998) two component model (i.e., forbearance and reductions in avoidance) to capture the reductions of problematic motivations and the Rye's (1998) model to capture the presence of positive motivations, thoughts, and behaviors as well as the absence of negative motivations (i.e., reductions of problematic motivations).

Worthington (2006) also introduced a model of forgiveness that is psychoeducational in nature. This model has been utilized in a number of controlled intervention studies (e.g., Harper, et al., 2014; Lin, et al., 2014), and incorporates five forgiveness steps. First, a harmed person is directed to objectively recall the hurt without self-pity or blaming the transgressor. This is done to increase the awareness of the transgression and to overcome the fear or anger associated with the transgression. In doing so, the individual is able to decrease the feelings of victimization. Second, the individual is encouraged to empathize or attempt to better understand the viewpoint of the transgressor. The goal of this strategy is to increase sympathy, compassion, or love. Third, the individuals are asked to think about a time when they hurt someone and received forgiveness from them. This strategy may promote the exploration of altruism or viewing forgiveness as an unselfish gift. Fourth, the harmed individual is encouraged to publically forgive the person who wronged them. For example, the harmed person may write a note to themselves stating, "Today, I forgave [transgressor's name] for hurting me." This step promotes viewing forgiveness as a behavior or a tangible object, rather than just an idea. Fifth, the harmed person is encouraged to utilize strategies to stimulate a more permanent forgiveness by disputing thoughts of revenge and self-pity. For example, individuals might re-read their declaration of forgiveness to remind themselves

that they made a choice to forgive. Similarly, the person may engage in a conversation with a loved one and report the potential positive emotions that they experience as they forgive. In brief, Worthington's five step psychoeducational model of forgiveness assumes that if individuals follow these steps, they are able to rid the negative emotions from when someone has harmed them.

Enright & Fitzgibbons (2000) have also proposed a model of forgiveness comprised of four processing phases. First, the offended individuals identify the negative thoughts they experienced as a result of the transgression. In doing so, they may better understand that their negative thoughts are producing potential anger, shame, and distorted thinking, which decreases their mental and physiological health. Second, the offended individuals makes a conscious decision to forgive based on the notion that forgiveness is a choice. During this processing phase, the offended people make an attempt to further understand what forgiveness is and is not, and makes a conscious pledge to forgive the offender. Third, the offended individuals attempt to understand the offender and the context of the transgression. During this processing phase, termed the work phase, an understanding of the wrongdoer's perspective is cultivated in order to reduce anger and develop more compassion and empathy toward that offender. In the fourth processing phase, the offended individuals develop a sense of healing by reflecting on their own past offenses. This may promote a deeper understanding of why the transgression occurred, and decrease feelings of resentment. Overall, Enright and Fitzgibbon's processing model assumes that completion of the four processing phases increases the likelihood of forgiving. Moreover, this allows individuals the opportunity

for healthy emotional regulation and an analysis of themselves as more than just a victim (American Psychological Association, 2006).

As noted, there are a variety of models of forgiveness, three of which have been reviewed in this section. Although there is a general consensus that forgiveness is a positive response to human wrongdoing, the models approach the psychological, behavioral, motivational, conceptual, and/or normative functions of forgiveness somewhat differently (Hughes, 2015). For example, McCullough, Worthington, and Rachal's model (1997) approaches forgiveness from a motivational standpoint, while Worthington, Lerner, Sharp, & Sharp's model (2006) addresses forgiveness from a psychoeducational approach that emphasizes the emotions associated with forgiveness. Furthermore, Enright and Fitzgibbon's model (2000) views forgiveness as a series of a psychological processing phases. Though these models differ to some extent, there is substantial overlap. Specifically, each model views forgiveness as being comprised of prosocial changes related to restoring positive emotions and cognitions which, in turn, improves the relationship between a person being harmed and a transgressor.

Neuropsychological Skills Associated with Forgiveness. Psychologists have recently focused on the neuropsychological processes that influence interpersonal relationships. Congruently, the relationship between an individual's propensity to forgive and their EF skills has become a topic of investigation (Miley & Spinella, 2006; Pronk, Karremans, Overbeek, Vermulst, & Wigboldus, 2010). This is to be expected as core aspects of forgiveness include neurocognitive processes such as EF. For example, when individuals are offended or hurt, they may experience strong negative feelings toward the

offender and proclivities to retaliate. Pietraszewski theorized that these strong retaliatory impulses may have become species-typical artifacts influenced by a long history of revenge strategies used to address social problems and essentially deter harm. Today, these revenge instincts can be challenging to suppress when maintaining social relationships that inevitably incorporate aspects of being hurt. Essentially, core behavioral and emotional regulation skills are theorized to assist in reducing retaliatory propensities and rumination regarding the transgression. That is, considerable demands are placed on neuropsychological skills to aid in transforming negative responses into more positive ones (Pietraszewski, 2013).

Executive Functioning

The construct of executive functioning (EF) is an umbrella term that refers to a broad set of interrelated neurocognitive control processes that facilitate higher-order thinking skills and the regulation of thought and behavior (Stuss & Alexander, 2000). Executive functioning has also been defined as the cognitive control that organizes, directs, and manages cognitive activities, emotional responses, and overt behaviors (Gioia, Isquith, Guy, & Kenworthy, 2000; Stuss & Alexander, 2000). Likewise, others define EF as a collection of cognitive control processes that work collaboratively to regulate and shape behavior, thoughts, and feelings in a goal-directed manner (Borkowski & Burke, 1996; Miyake et al., 2000; Roth, Isquith, & Gioia, 2005). Though there are a variety of operational definitions, researchers generally agree that EF is a network of higher order problem solving, logical reasoning, and complex multi-tasking (Koechlin, 2011; Stuss & Alexander, 2000).

The role of EF has been compared metaphorically to an orchestra conductor (Brown, 2005). Regardless of how well musicians in an orchestra play their instruments, they cannot successfully create music without the direction of a conductor who performs a variety of tasks such as selecting the piece of music to play, cueing the orchestra to start and stop playing their instruments, modulating the tempo and volume, and introducing or fading out various instruments at suitable times. Likewise, EF skills orchestrate many higher-order tasks that allow an individual to plan, organize, manage, and guide behavior from moment to moment. Rather than a unitary construct, McCloskey and Perkins, (2012) extended this metaphor and compared core EF regulatory skills to "co-conductors." In this sense, there are many conductors working together simultaneously to regulate thought, emotions, and behavior

EF is associated with the frontal lobes of the brain, specifically the prefrontal cortex located behind the forehead region of the skull (Miyake, Friedman, Emerson, Witzki, Howerter, & Wager 2000). The prefrontal cortex is recognized as the last area of the brain to develop, and is acknowledged as having a developmental trajectory that continues into young adulthood (Kaufman, 2010; Sowell, Thompson, Holmes, Jernigan, & Toga, 1999). The frontal lobes are interconnected with other cortical and subcortical regions of the brain such as the limbic (motivational) system, the reticular activating (arousal) system, the posterior association cortex (perceptual/cognitive processes and knowledge base) and the motor (action) regions of the frontal lobes (Alexander, Crutcher, & DeLong, 1990; Goldman-Rakic, 1987; Thierry, Gioanni, Degenetais, & Glowinski, 2000). These interconnections between the frontal areas and other cortical areas of the brain highlight the multifaceted and complex regulatory systems of EF.

Multiple studies have demonstrated that EF deficits are associated with many negative outcomes. For example, studies have found that EF deficits are associated with complications such as generating ideas, time management, organization skills, sequencing ideas, recalling information while applying it, focusing on tasks until completion, and breaking a project up into workable components (Bull & Scerif, 2001; Denckla, 1996; Miyake, et al., 2000; Stuss & Alexander, 2000). Conversely multiple studies have documented that increased EF skills are associated with higher academic achievement and an increased ability to regulate emotion (Blair & Diamond, 2008; Carvalho & Ready, 2010; Duncan, et. al, 2007; Fuhs, Nesbitt, Farran, & Dong, 2014; McClelland, Connor, Jewkes, Cameron, Farris, & Morrison, 2007). Executive functioning skills allow individuals to organize their behavior overtime and override immediate demands in favor of long term goals (Dawson & Guare, 2004). In brief, EF is a group of higher order cognitive process that work together to shape and regulate behavior, feelings, and thoughts in a goal-directed manner (Denkla, 1994; Moran & Gardner, 2007; Miyake, et al., 2000; Roth, Isquith, & Gioia, 2005).

Theoretical Models of Executive Functioning. Currently, there are a variety of theoretical models of executive functioning. Miyake, et al.'s (2000) model of executive functioning incorporates three key control processes, namely, inhibition, updating, and shifting. First, "inhibition" refers to the ability to maintain attention and discount prepotent responses (Denckla, 2005). For example, when individuals are working toward a goal, they must fight distraction and override the desire to engage in other activities that are more pleasing than the task at hand. Second, "updating" refers to the ability to continuously update and monitor the task at hand. In doing so, individuals are able to

replace old, irrelevant information with newer, more relevant information. For example, when working toward a goal, individuals must resist distraction and overrule the desire to engage in activities that are more pleasing than the task at hand. Third, "shifting" refers to the capability of transitioning from one task to the other. For example, when individuals are working on multiple tasks, they must be able to transition their attention between the tasks. Together, these three key components of EF help guide problem solving and execution of long term goals.

Denckla (1994) also introduced a model of executive functioning which is comprised of four core processes, namely initiate, sustain, inhibit, and shift. First, initiate, refers to the ability to start a task through goal setting and organizing time and materials. Second, sustain, refers to the ability to utilize attention and self-monitoring to complete initiated goals (Kaufman, 2010). Third, inhibit, is regarded as the ability to maintain attention and disregard prepotent responses (Denckla, 2005). Fourth, shift, refers to the ability to transition from one task to the other (Denckla, 1994). Together, these four key components of EF help guide successful problem solving and execution of long term goals (Denckla, 1994).

Moran and Garder (2007) have introduced a model of executive functioning which consists of the three key control processes, namely hill, skill, and will. First, hill refers to an individual's ability to set clear goals for future tasks. In doing so, individuals are able to manage their future plans so they can reach their goals accordingly. Second, skill describes an individual's capacity to learn, perform, and master skills. This process suggests that an individual must have the necessary abilities and techniques in order to

reach their goal. Third, will refers to an individual's determination and perseverance which leads to goal completion. This process proposes that an individuals must have the desire to begin and persevere the task until their goal has been reached. Together, these three key control processes allow an individual to regulate thought and behavior in order to complete a task successfully.

As noted, there are a variety of models of EF, three of which have been reviewed in this section. Although there is much overlap in the definitions and conceptualizations of EF, researchers, generally agree that the construct of EF is multifaceted rather than a single entity (Denckla, 1994; Miyake, et al., 2000; Moran and Garder, 2007; Suchy, 2009). Though these models differ to some extent in how they incorporate the importance of different components of EF, there is much overlap. Specifically, each model views EF as being comprised key control processes that promote successful problem solving, execution, and completion of long term goals. Specifically, each recognize two core components, inhibition and working memory.

EF Variables. This current study will focus on inhibition and working memory, as they are viewed as the most critical components of EF (Garavan, Ross, Murphy, Roche, & Stein, 2002; Roth, Isquith, & Gioia, 2005).

Inhibition. Inhibition has been defined as the ability to control or override one's thoughts, emotions, urges, and behavior for a desired outcome or goal (Gailliot et al., 2007). Broadly, inhibition is defined as the capability to stop behavior and control impulses (Gioia, Isquith, Guy, & Kenworthy, 2000). Research has suggested that orbitofrontal cortex, a part of the frontal lobe that lies on the roof of the orbit above the

eye, acts as a critical frontal area that informs downstream regions of the need to inhibit behavior (Bryden & Roesch, 2015; Zeeb, Floresco, & Winstanley, 2010). This brain region appears to be important in that it appears to be responsible for "selecting an appropriate course of action in the face of competing or interfering demands" (Garavan et al., 2002). Many studies suggest that a lack of inhibitory control overrides behavioral responding when control is necessary for accurate performance. This lack of inhibition is associated with a number of problematic outcomes and conditions such as ADHD (Alderson, Rapport, Kasper, Sarver, & Kofler, 2012; Crosbie, et al., 2013; Skogan, et al., 2014), delinquency (Carroll, Hemingway, Bower, Ashman, Houghton, & Durkin, 2006; Kerr, Tremblay, Pagani, & Vitaro, 1997; Koolhof, Loeber, Wei, Pardini, & D'Escury, 2007), drug and alcohol addiction (De Wit, 2009; Joos, et al., 2013; Lubman, Yücel, & Pantelis, 2004; Nigg, et. al, 2006), eating disorders (Claes, Mitchell, & Vandereycken, 2012; Galimberti, Martoni, Cavallini, Erzegovesi, & Bellodi, 2012; Hege, et al., 2015), and obesity (Batterink, Yokum, & Stice, 2010; Braet, Claus, Verbeken, & Van Vlierberghe, 2007; Sutin, Ferrucci, Zonderman, & Terracciano, 2011). Moreover, strong and intact inhibitory control is associated with a number of positive outcomes such as academic success (Barkley, 1997; Bull & Scerif, 2001) and controlling one's behavior and emotions (Rand, Kraft-Todd, & Gruber, 2015).

Working Memory. Working memory is also viewed as a core EF skill. Working memory is theorized to be a central executive function that regulates the capability to hold information for instant recall, and the ability to create and maintain visual-spatial representation in the mind needed to persist through distractions (Baddeley & Hitch, 2010). This capacity provides a foundation for the flexible manipulation of information

needed for individuals to complete problem solving activities (Redick, Calvo, Gay, & Engle, 2011). Researchers have found that the dorsolateral region of the frontal cortex, located in the front of the brain, can be associated with working memory skills (Fried, Rushmore, Moss, Valero-Cabré, & Pascual-Leone, 2014; Petrides, 2000). Working memory deficits are linked to a number difficulties such as completing multiple steps tasks, losing track of situational demands, and difficulty remembering rules for a specific task (Roth, Isquith, & Gioia, 2005). Furthermore, working memory problems are associated with a number of deficits such as ADHD (Alderson, Hudec, Patros, & Kasper, 2013; Martinussen, Hayden, Hogg-Johnson, & Tannock, 2005; Roodenrys, Koloski, & Grainger, 2001) and reading and math learning disabilities (De Jong, 1998; Passolunghi, & Siegel, 2004; Menghini, Finzi, Carlesimo, & Vicari, 2011; Schuchardt, Bockmann, Bornemann, & Maehler, 2013). Moreover, strong and intact working memory skills are associated with a number of positive outcomes such as following directions (Engle, Carullo, & Collins, 1991), reading ability (Nevo, & Breznitz, 2011), and mathematic ability (Alloway, & Passolunghi, 2011).

Forgiveness and EF

To date, there has been limited research that has linked forgiveness and EF. Of these studies, there have been mixed results regarding the relationship. For example, Miley and Spinella (2006) reported a negative correlation between forgiveness and EF impulse control ($r = -.32$, $p < .001$). Put differently, increased propensity to forgive was linked to decreased EF control. Participants (N=154) between the ages of 17 to 76 years (M = 32.9) completed the Executive Function Index (EFI), the Heartland Forgiveness

Scale, the Satisfaction with Life Scale, and the Gratitude Questionnaire. The researchers concluded that EF control may prevent indiscriminate forgiveness that could cause more emotional harm. That is, EF control, specifically inhibition, prevented forgiveness as a preventative precaution of being harmed again. The authors further explained that EF skills in general may help strike a balance between being cautious in order to avoid getting hurt again, and forgiving in order to resolve a relationship.

However, Kruger (2011) replicated a portion of Miley and Spinella's study and indicated a positive correlation between EF inhibition and forgiveness ($r=.25$, $p<.05$). Participants ($N=113$) aged 17 to 24 ($M=19.4$) completed a biographical questionnaire, the Executive Function Index (EFI, Spinella, 2005), the Gratitude Questionnaire-6 e-6 (GQ-6; McCullough, Emmons, & Tsang, 2002), the Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985), the Heartland Forgiveness Scale (HFS; Thompson & Snyder, 2003), the Trait Hope Scale (Snyder, et al., 1991), and the Revised Life Orientation Test (LOT-R; Scheier, Carver, & Bridges, 1994). Kruger found that dimensions of EF, namely, organization, empathy, and strategic planning, correlated with hope and forgiveness. This may be because both hope and forgiveness have motivational factors, and therefore utilize EF skills.

Furthermore, Pronk, Karremans, Overbeek, Vermulst and Wigboldus (2010) also investigated the relationship between dispositional tendencies to forgive, forgiveness, and EF by conducting four independent studies. Researchers investigated an array of relationships between EF and forgiveness dispositional tendencies, forgiveness regarding a specific offense, forgiveness in a trajectory over time, and the role of the transgression's severity. Participants in each study ($N=$ ranging from 48 to 111) were administered a

variety of survey and computer-based EF tasks, transgression questionnaires, and forgiveness surveys such as the Tendency to Forgive Scale (TTF) and the Transgression Related Interpersonal Motivations Scale (TRIM). Overall, results of the studies suggested that EF skills, such as inhibition, task switching, and updating, were associated with dispositional forgiveness and predicted forgiveness regarding past offenses. Furthermore, they found that EF skills predicted the development of forgiveness over time when examining severe offenses. The authors explained that EF inhibition may enable individuals to suppress negative thoughts, behaviors, and emotions toward a transgressor. Furthermore, task switching may allow the individual to change a negative mindset to positive mindset. Finally, updating may allow the individual to replace negative memories of the transgression with recent, constructive experiences. Overall, their findings provided evidence that executive functioning is associated with forgiveness.

The limited forgiveness and EF research has been mixed to some degree. Though there appears to be more support that increased EF facilitates the willingness to forgive, Miley and Spinella (2006) reported that higher levels of EF was linked to a reduction in an individual's willingness to forgive. In this sense, more studies are needed to clarify the relationship. Moreover, existing forgiveness and EF research has not applied a dimensional approach to both of the constructs. It is important to investigate how, and to what extent, the core dimensions of EF (i.e., inhibition and working memory) predict the propensity to forgive. Likewise, studies are needed that explore how core dimensions of forgiveness (i.e., reductions of problematic motivations and positive behaviors and feelings) predict EF.

Dimensions of forgiveness can be conceptualized in terms of EF. For example, McCullough, Worthington, and Rachal's (1997) model of forgiveness incorporates three motivational components (i.e., forbearance, reductions in avoidance, and benevolence) that can be linked theoretically to EF dimensions. First, forbearance, or the reduction of feelings of retaliation and revenge, in theory necessitates EF inhibitory skills. Victims of a transgression may experience strong impulses to retaliate and avoid the transgressor. To override these prepotent retaliatory impulses, inhibitory skills may be required to direct behavior and thinking toward more constructive problem-solving strategies. In this sense, forbearance and EF inhibition can be viewed to a certain degree as synonymous. Second, reductions in avoidance can also be viewed in terms of EF. In order for an individual to restore positive feelings toward the transgressor, EF inhibitory processes are needed to manage and shift the repetitive and negative thought processes. Also, metacognitive skills, such as working memory may be important for planning the necessary steps to move forward in a productive manner. Third, positive behaviors and feelings, or the desire to seek goodwill towards others could also implicate EF. Although victims of a transgression may not initially possess pro-social intentions toward their transgressor, inhibitory skills may be pivotal in decreasing ruminative thoughts and shifting over to more positive thoughts and motivations. Furthermore, working memory skills such as reflecting on the past and future may be important in conceptualizing the appropriate actions needed to forgive.

Hypotheses

Hypothesis One. It is hypothesized that overall EF, as measured by the BRIEF-A Global EF composite, will significantly predict higher overall forgiveness, as measured by two independent forgiveness scales, the TRIM-12 Scale and the Forgiveness Scale.

Rationale. Theoretically, as an individual exhibits increased global EF skills, it would be expected that they would be more successful in resisting retaliatory and avoidance impulses and increasing positive behaviors and feelings. Essentially, this EF control may support the propensity to forgiving another person.

Hypothesis Two. It is hypothesized that the core EF dimensions of inhibition (i.e., behavior regulation skills) and EF working memory (i.e., metacognitive skills), as measured by the BRIEF-A Indexes, will each be a significant predictor of forgiveness as measured by the two forgiveness scales, the TRIM-12 Scale and the Forgiveness Scale.

Rationale. Theoretically, controlling impulses and holding information in mind are conducive to the process of forgiving. Behavior regulation skills may facilitate the cognitive control needed to manage emotion, behavior, and thought processes associated with forgiveness. Also, working memory skills may support thinking through time to plan and organize thought and behavior related to the propensity to forgive.

Hypothesis Three. It is hypothesized that the two dimension of forgiveness (i.e., reductions of negative feelings and presence of positive feelings), as measured by the Forgiveness Scale, will each be a significant predictor of EF skills, as measured by the BRIEF.

Rationale. Theoretically, it is important to consider both forgiveness dimensions in terms of EF. It is reasonable to assume that EF skills help reduce negative feelings by

regulating ruminative thoughts and motivation towards a transgressor. However, it is also assumed that EF skills go beyond this and support the emergence of positive feelings and motivations such as having compassion or goodwill toward the transgressor.

CHAPTER II

METHODOLOGY

Research Approval

Permission was obtained from the Institutional Review Board (IRB) at Middle Tennessee State University prior to recruitment of participants and data collection. All participants were provided informed consent before their information was used as part of data analysis.

Participants

Participants in this study were recruited from Middle Tennessee State University. The participants were all undergraduate students enrolled in psychology courses. Students volunteered to participate in the study in exchange for participation credit in their course. Participants signed a letter of informed consent and were informed that their participation was not mandatory and they could leave at any time.

The sample was comprised of a total of 243 participants, which included 45.3% males (n=110) and 55.7% females (n=133). 65% (n=158) were White or Caucasian, 23.5% (n=57) were Black or African American, 2.9% (n=7) were Asian or Pacific Islander, 2.9% (n=7) were Latino or Hispanic, 10.8 (n=2) were American Indian or Alaskan Native, and 4.9% (n=12) listed themselves as Other. They ranged in age from 18 to 56, with 93.8% ranging from age 18 to 25.

After being presented with an overview of the study, consent form, demographic data form, participants completed the rating scales in a classroom setting. Subjects answered the surveys at their own pace, and were given up to an hour to complete all forms. Only rating scales completed in entirety were collected and analyzed as data.

Measures

Measure of Executive Functioning. *Behavior Rating Inventory of Executive Function-Adult Version (BRIEF-A).* The BRIEF-A was created by Roth, Isquith, and Gioia (2005) as a self-report measure of executive functioning and self-regulation for adults aged 18-90 years old. This measure is comprised of 75 items and takes approximately 10 to 15 minutes to complete. The BRIEF-A provides an overall Global Executive Composite, along with two broad index scores (Behavioral Regulation Index and Metacognition Index). The Behavioral Regulation Index (BRI) is comprised of Inhibit, Shift, Emotional Control, and Self-Monitor scales which assess an individual's ability to sustain appropriate regulation and control their behavior and emotional responses. The Metacognition Index (MI) is comprised of the Initiate, Working Memory, Plan/Organize, Task Monitor, and Organization of Materials scales which assess an individual's ability to initiate, generate ideas, sustain memory, and plan and organize thoughts. Participants are asked to think about their personal behaviors and emotions over the past month and choose N (Never a problem), S (Sometimes a problem), and O (Often a problem) (Roth, Isquith, & Gioia, 2005). Examples of items include "I have trouble concentrating on tasks (such as chores, reading or work" and "mood changes frequently."

The BRIEF-A self-report's reliability and validity were verified with a normative sample of 1,050 adults of various ages, ethnicities, educational backgrounds, socioeconomic statuses, and geographic backgrounds. Alpha coefficients demonstrate internal consistency for subscales: Inhibit (α = .73), Shift (α = .78), Emotional Control (α = .90), Self-Monitor (α = .78), Initiate (α = .79), Working Memory (α = .80), Plan/Organize (α = .85), Task Monitor (α = .74), and Organization of Materials (α =

.84). Furthermore, test-retest reliability data revealed Pearson product-moment correlation coefficients for all nine subscales: Inhibit (α = .91), Shift (α = .89), Emotional Control (α = .90), Self-Monitor (α = .83), Initiate (α = .85), Working Memory (α = .92), Plan/Organize (α = .82), Task Monitor (α = .84), and Organization of Materials (α = .93) (Roth, Isquith, & Gioia, 2005). In regard to item content on the BRIEF-A, ten experts in executive functioning assigned each of the items to one of the BRIEF-A scales. Agreement among raters ranged from a mean of 35% to 98%: Inhibit (86%), Shift (92%), Emotional Control (98%), Self-monitor (35%), Initiate (81%), Working Memory (79%), Plan/Organize (77%), Task Monitor (88%), and Organization of Materials (85%). The Metacognition and Behavioral Regulation scales were strongly correlated with one another on the Self-Report ($r=0.783$, $p<.05$, Roth, Isquith, & Gioia, 2005).

Measures of Forgiveness. *Transgression-Related Interpersonal Motivations (TRIM) Inventory-12.* The TRIM-12 was developed by McCullough, Rachal, Sandage, Worthington, Brown, and Hight (1998) as a measure of motivational changes in reducing one's negative motivations toward a transgressor and restoring one's positive motivations regarding a transgressor. This self-report measure is comprised of 12 items and takes approximately 5 to 10 minutes to complete. Raters are asked to think of a recent transgression as they answer each item. The measure's avoidance subscale measures motivation to avoid a transgressor. This seven-item subscale includes statements such as "I keep as much distance between us as possible" and "I live as if he/she doesn't exist, isn't around." The revenge subscale measures motivation to seek retaliatory actions towards the offender. This five-item subscale includes statements such as "I'll make him/her pay" and "I wish that something bad would happen to him/her." Rater responses

are indicated on a five -point Likert scale that ranges from *strongly disagree* (1 point) to *strongly agree (5 points).* Both the avoidance and revenge subscales have high internal consistency ($\alpha \geq .85$), moderate test-retest stability (e.g., 8-week test-retest *r = .44-.53*), and evidence of construct validity (McCullough, Rachal, Sandage, Worthington, Brown, and Hight, 1998).

The Forgiveness Scale (FS). The Forgiveness Scale was developed by Rye (1998) as a measure of forgiveness toward a particular offender. The self-report measure contains 16 Likert items and takes approximately 5 to 10 minutes to complete. Raters are asked to think of how they responded to a person who has wronged or mistreated them. The FS is composed of two subscales: Absence of Negative and Presence of Positive thoughts, feelings, and behaviors. The Absence of Negative subscale examines negative aspects (e.g., reductions of problematic motivations such as anger, resentment, and depression) while the Presence of Positive subscale measures positive aspects (e.g., prosocial feelings and behaviors directed toward the person that hurt or harmed). The absence of negative subscale is composed of 10 items and includes statements such as "I can't stop thinking of how I was wronged by this person" and "I spend time thinking about ways to get back at the person who has harmed me." The presence of positive subscale consists of five items and includes statements such as "I wish for good things to happen to the person who has wronged me" and "I have compassion for the person who wronged me." Responses are indicated on a five -point Likert scale that ranges from *strongly disagree* (1 point) to *strongly agree (5 points),* with scores ranging from 16 to 80. Higher scores on the measure indicates that an individual is more likely to forgive their transgressor regarding a specific offense. The Absence of Negative subscale is reported

to have a Cronbach's alpha of .86 and a 2-week test-retest reliability of .76 (Rye et al., 2001). The Presence of Positive subscale is reported to have a Cronbach's alpha of .85 and a 6-week test-retest reliability of .76 (Rye et al., 2001).

CHAPTER III

RESULTS

Means, standard deviations, and correlations were examined for participant's Forgiveness Scale, TRIM-12, and EF BRIEF scores (see Table 1). This study's first main purpose was to investigate how overall EF ability (i.e., Global Executive Functioning Composite) predicted individuals' propensity to forgive. To address this, two simple regressions were conducted for each forgiveness measure, the Forgiveness Scale and the TRIM-12. The first simple regression confirmed that the Global EF Composite significantly predicted Forgiveness Scale scores (R^2 = .18, adjusted R^2 = .17, F (1, 241) = 51.62, p = <.00, and accounted for 17 % of the variance of Forgiveness Scale scores in the sample (see Table 2). The second simple regression confirmed that the Global EF Composite significantly predicted (forgiveness should be here) TRIM-12 forgiveness scores (R^2 = .06, adjusted R^2 = .06, F (1, 241) = 16.40, p =< .00, and accounted for six percent of the variance of TRIM-12 scores in the sample (see Table 3).

This study's second main purpose was to investigate how, and to what extent, each of the core EF dimensions, specifically EF Behavioral Regulation (i.e., inhibition) and EF Metacognition (i.e., working memory) predicted forgiveness levels based on the two forgiveness measures, the Forgiveness Scale and the TRIM-12. To address this two multiple regressions were conducted. First, regarding the Forgiveness scale, results indicated that EF Behavioral Regulation Index scores accounted for a significant proportion of the variance of forgiveness, R^2 = .180, adjusted R^2 =.176, F (1, 241) = 52.74, p = <.00) and accounted for 18 % of the variance of the Forgiveness Scale scores in the sample. The BRIEF Metacognition Index was then added to the regression

equation and there was no significant change in the prediction of forgiveness scores, R^2 = .189, adjusted R^2 =.182, F (1, 240) = 2.78, p =.097, and accounted for 18 % of the variance of Forgiveness Scale scores in the sample (see Table 4). Regarding the TRIM-12, multiple regressions results also indicated that EF Behavioral Regulation Index scores accounted for a significant proportion of the variance of forgiveness, R^2 = .090, adjusted R^2 =.086, F (1, 241) = 23.83, p = <.00 and accounted for 9 % of the variance of TRIM-12 scores in the sample. The BRIEF Metacognition Index was then added to the regression equation and there was no significant change in the prediction of forgiveness scores on the TRIM-12, R^2 = .091, adjusted R^2 =.083, F (1, 240) = .200, p =.655, and accounted for 8 % of the variance of TRIM-12 scores in the sample (see Table 5). These multiple regression findings were supported by comparatively strong correlations between EF Behavioral Regulation subscales and forgiveness scores in comparison to EF Metacognitive subscales and forgiveness scores (see Table 6).

The third main purpose of the current study was to investigate how positive and negative dimensions of forgiveness predicted EF behavior regulation. To address this, one multiple regression was conducted. Findings confirmed that the Absence of Negative Forgiveness Score accounted for a significant proportion of the variance of EF Behavioral Regulation, R^2 = .187, adjusted R^2 =.183, F (1, 241) = 55.37, p = .00. The Forgive Scale's "Presence of Positive Forgiveness Score" was then added to the regression equation and there was a significant change in the prediction of Global Executive Functioning, R^2 = .207, adjusted R^2 =.20, F (1, 240) = 6.16, p = .014 (see Table 7).

Table 1

Means, Standard Deviations, and Correlations for EF BRIEF Scores and Forgiveness Measures (N=243)

Measures	*M*	*SD*	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. BRIEF Global	118.54	20.98		.94**	.88**	-.42**	-.42**	-.24**	.25**	.29**	.15*
2. BRIEF Metacognition	67.83	13.05			.66**	-.35**	-.34**	-.21**	.18**	.23**	.08
3. BRIEF Behavioral Regulation	50.71	9.93				-.42**	-.43**	-.23**	.30**	.30**	.21**
4. Forgiveness Scale	49.67	9.15					.91**	.54**	-.62**	-.67**	-.40**
5. Forgiveness Scale Negative	35.25	6.88						.21**	-.49**	-.55**	-.30**
6. Forgiveness Scale Positive	14.56	5.28							-.46**	-.47**	-.31**
7. TRIM-12 Overall	36.96	9.70								.78**	.87**
8. TRIM-12 Revenge	11.45	5.11									.38**
9. TRIM-12 Avoidance	25.49	6.52									

*Note. All scores based on raw scores, * p <. 05. ** p < .01*

Table 2

Simple Regression Analysis of Global Executive Functioning Composite Predicting Overall Scores on the Forgiveness Scale (N = 242)

Variable	*B*	*SEB*	*Beta*	*t*	*p*	Zero-Order	Partial	Part
Global EF	-.18	.03	-.42	-7.19	.00	-.42	-.42	-.42
R^2		.18						

Table 3

Simple Regression Analysis of Global Executive Functioning Composite Predicting TRIM-12 Forgiveness Scores (N = 243)

Variable	*B*	*SEB*	*Beta*	*t*	*p*	Zero-Order	Partial	Part
Global EF	.12	.03	.25	4.05	.00	.25	.25	.25
R^2		.06						

Table 4

Multiple Regression Analysis of EF Behavior Regulation Index Predicting Overall Scores on the Forgiveness Scale (N = 243)

Variable	*B*	*SEB*	*Beta*	*t*	*p*	Zero-Order	Partial	Part
BRIEF Behavior Regulation	-.31	.07	-.34	-4.37	.00	-.42	-.27	-.25
BRIEF Metacognition	-.09	.05	-.13	-1.67	.10	-.35	-.11	-.10
R^2		.19						

Table 5

Multiple Regression Analysis of EF Behavior Regulation Predicting TRIM-12 Forgiveness Scores (N = 243)

Variable	*B*	*SEB*	*Beta*	*t*	*p*	Zero-Order	Partial	Part
BRIEF Behavior Regulation	.32	.08	.32	-3.95	.00	.30	.25	.24
BRIEF Metacognition	-.03	.06	-.04	-.45	.66	.18	-.03	-.03
R^2		.091						

Table 6

Means, Standard Deviations, and Correlations for Individual Scales of EF and the Forgiveness Scale and TRIM-12 (N = 242)

Executive Functioning Indexes and Scales	*M*	*SD*	Forgiveness Scale	TRIM-12
BRIEF Behavioral Regulation Index	50.71	9.92	-.42**	.30**
Inhibit	14.40	3.18	-.34**	.24**
Shift	9.81	2.21	-.33**	.20**
Emotional Control	16.58	4.73	-.34**	.26**
Self-Monitoring	9.92	2.51	-.32**	.22**
BRIEF Metacognition Index	67.83	13.05	-.35**	.18**
Initiate	13.84	2.84	-.39**	.17**
Working Memory	13.79	3.28	-.30**	.16*
Plan/Organize	16.12	3.70	-.33**	.13*
Task Monitoring	10.61	2.08	-.28**	.16*
Organization of Materials	13.47	4.01	-.178**	.12

Table 7

Multiple Regression Analysis of Forgiveness Scale Predicting BRIEF Behavior Regulation Index (N = 243)

Variable	*B*	*SEB*	*Beta*	*t*	*p*	Zero-Order r	Partial	Part
Forgiveness Scale Absence of Negative	-.58	.09	-.40	-6.85	.00	-.43	-.40	-.39
Forgiveness Scale Presence of Positive	-.27	.11	-.15	-2.48	.01	-.23	-.16	-.14
R^2		.2						

Table 8

Comparison between Means and Standard Deviations for the Present Sample (N = 99) and the Normative Sample Group (N = 169), Ages 18-29, On The BRIEF Executive Functioning Measure

Executive Functioning Measure	Sample *M*	*SD*	Norm group *M*	Norm group *SD*
BRIEF Global	50.71	9.92	106.80	27.54
BRIEF Behavioral Regulation Index	14.40	3.18	46.88	12.59
Inhibit	9.81	2.21	11.78	3.34
Shift	16.58	4.73	8.85	2.59
Emotional Control	9.92	2.51	16.65	5.23
Self-Monitor	67.83	13.05	9.60	2.88
BRIEF Metacognition Index	13.84	2.84	59.91	16.30
Initiate	13.79	3.28	12.05	3.47
Working Memory	16.12	3.70	11.10	3.41
Plan/organize	10.61	2.08	14.66	4.42
Task Monitor	13.47	4.01	8.72	2.62
Organization of materials	50.71	9.92	13.39	4.47

Note. Participants in the present study and the norm study were in the same age range

CHAPTER IV
DISCUSSION

First, this study examined the extent to which an individual's propensity to forgive is predicted by global EF skills. As proposed, college students' propensity to forgive, as measured by two forgiveness measures, was significantly predicted by self-ratings of global EF skills. This suggests that the cognitive and behavioral aspects involved with forgiveness are indeed implicated by a variety of EF skills. In other words, when a person is wronged or hurt by another, the capacity to forgive is bolstered by an individuals' EF related skills. One explanation of this it that these EF neurocognitive capacities assist people in restraining the propensities to retaliate, ruminate, and/or avoid the wrongdoer. Moreover, these neurocognitive skills help implement the appropriate actions needed to effectively forgive. My findings also support the notion that individual differences in the propensity to forgive are in part related to individual differences in EF. For example, persons who are harmed or wronged and have increased EF skills appear to be more prone to have reductions of problematic motivations and prosocial feelings and behaviors. On the contrary, decreased EF skills may predict a decreased propensity to forgive because there is less cognitive control that helps to reduce rumination and develop positive feelings for the offender. This finding generally corresponds with previous forgiveness and EF studies. For example, Kruger (2011) reported that dimensions of EF such as organization and strategic planning skills were positively related to forgiveness. Kruger interpreted this as suggesting that EF provides a foundation for cognitive flexibility that supports prosocial and adaptive forgiveness. Similarly,

Pronk, Karremans, Overbeek, Vermulst and Wigboldus (2010) reported that EF skills, such as inhibition, task switching, and updating, were associated with dispositional forgiveness and predicted forgiveness of past offenses. The authors suggested that EF facilitates ruminative and revengeful emotions and behaviors and supports the return to positive actions. This takes into account the severity of the offense and the amount of time that had passed since the transgression. Our findings in the current study support these previous findings and generally confirm that individuals' propensity to forgive is facilitated by global EF skills.

It is noteworthy that previous research has also reported that stronger EF skills are associated with a decreased capacity to forgive. Miley and Spinella (2006) reported such an inverse relationship. The authors explained that increased EF inhibitory control, may actually prevent forgiveness as it promotes more cautiousness. In other words, EF skills may avert forgiveness, especially overly hasty forgiving, to lessen the likelihood of being harmed again. Our study's findings do not support this notion. On the contrary, our findings suggest that increased EF facilitates the process of forgiveness.

Second, the present study investigated how, and to what extent, each of the core EF dimensions, specifically EF behavioral regulation (i.e., inhibition) and EF metacognition (i.e., working memory) predicted forgiveness levels. Our findings suggest that the propensity to forgive is predicted by both EF dimensions. However, when comparing the two core EF dimensions, the propensity to forgive appears to be more associated with EF behavioral regulation skills when compared to EF metacognition skills. One explanation of this is that EF behavioral regulation skills, such as impulse

control, enable individuals to subdue negative behavior and thought processes. Given that being hurt by another person is a non-preferred activity and often elicits potentially damaging and revengeful impulses, it is expected that EF behavior regulations skills are more essential in comparison to metacognitive skills. It is noteworthy that the EF behavior regulation index and the EF inhibition subscale were both significantly linked to both forgiveness measures. This provides strong support that behavior regulation skills, such as inhibiting, shifting, and controlling emotions are important in reducing revengeful and avoidance motivations. To some extent, this finding parallels with previous research (e.g., Kruger, 2011; Pronk, Karremans, Overbeek, Vermulst, and Wigboldus, 2010), that documents a positive association between forgiveness and impulse control. The current study differs in that previous studies have not incorporated an EF dimensional approach that documents that EF behavior regulation skills are better at predicting forgiveness when compared to EF metacognitive aspects.

Third, given that forgiveness was predicted more so by EF behavioral regulation skills, it was important to examine how two core dimensions of forgiveness, namely, negative aspects (e.g., reductions of problematic motivations such as anger and resentment), and positive aspects (e.g., prosocial feelings and behaviors directed toward the person that hurt or harmed) predicted EF behavior regulation. Findings demonstrate that both negative and positive forgiveness aspects significantly predicted EF behavior regulation skills. In other words, both reductions of problematic motivations and increased prosocial feelings and behaviors are important in terms of behavior regulatory functions. One interpretation is that forgiveness is a multicomponent process that utilizes EF behavior regulation. One component is quelling negative emotions and behaviors

towards their transgressor. The other component is redirecting motivations and behavior towards goodwill and prosocial outcomes. My findings document that EF behavior appears to assists with both components. This has not been demonstrated in previous studies. However, previous research has demonstrated the importance of letting go of ruminative thoughts (e.g., Kachadourian et al., 2005; McCullough et al., 1998) and thinking and behaving in a benevolent fashion (e.g., McCullough, 2001) in order to forgive a transgressor. Our findings extend this and document that EF behavior regulation provides cognitive support of both of these important forgiveness components.

Overall, college students' self-ratings of their propensity to forgive, as measured by two independent forgiveness scales, successfully predicted ratings of global EF skills. This provides support that increased levels of EF skills promote the propensity to forgive a transgressor. When investigating how, and to what extent, the core dimensions of executive functioning (EF) predicted forgiveness, EF behavior regulation skills were a better predictor when compared to EF metacognitive skills. This highlights the importance of EF inhibitory skills in subduing retaliatory and revengeful thought and behavior. Finally, when analyzing the two core dimension of forgiveness, findings suggest that EF behavior regulation supports both reductions of problematic motivations and increases in prosocial feelings and behaviors directed toward the person that hurt or harmed an individual. Overall, this study helps to clarify conflicting research regarding the relationship between the propensity to forgive and EF skills. Furthermore, the findings documents the dimensional associations between the two constructs.

Limitations and Future Research

There are several important limitations in this study. First, it is difficult to conclude that there is a cause and effect relationship when utilizing correlational methods. Currently, the majority of EF and forgiveness research is correlational. Because of this, future experimental studies are needed to determine the relationship between the two constructs. Second, EF is a multi-faceted and complex construct. While this study investigated two core domains of EF (i.e., behavior regulation and metacognitive), there are potentially other components of EF that were not examined. Third, forgiveness is also a multi-dimensional and intricate construct. My study investigated positive and negative aspects of the construct. However, there are potentially other important forgiveness facets that were not taken into account. For example, the severity of transgressions, whether it was a repeated transgression, or the type of relationship in which the transgression occurred should be considered in subsequent studies. Finally, it should be noted that the results for this study were based on a convenience sample of college students. Therefore, generalizability beyond this population limits external validity. Additional research is needed that examines forgiveness and EF in children, older adults, and clinical samples.

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APPENDICES

APPENDIX A

Behavior Rating Inventory of Executive Function- Adult Version (BRIEF-A)

Name of Rated Individual_____ Gender ☐ Male ☐ Female Age_____

Your Name_____ Today's Date ___/___/_____

Your relationship to him/her: ☐ Parent ☐ Spouse ☐ Sibling ☐ Friend ☐ Other_____

How well do you know him/her? ☐ Not well ☐ Moderately well ☐ Very well You have known him/her for ____ years.

During the past month, how often has each of the following behaviors been a *problem*?

N = Never S = Sometimes O = Often

1. Has angry outbursts	N	S	O
2. Makes careless errors when completing tasks	N	S	O
3. Is disorganized	N	S	O
4. Has trouble concentrating on tasks (such as chores, reading or work)	N	S	O
5. Taps fingers or bounces legs	N	S	O
6. Needs to be reminded to begin a task even when willing	N	S	O
7. Has a messy closet	N	S	O
8. Has trouble changing from one activity or task to another	N	S	O
9. Gets overwhelmed by large tasks	N	S	O
10. Forgets his/her name	N	S	O
11. Has trouble with jobs or tasks that have more than one step	N	S	O
12. Overreacts emotionally	N	S	O
13. Doesn't notice when he/she causes others to feel bad or get mad until it is too late	N	S	O
14. Has trouble getting ready for the day	N	S	O
15. Has trouble prioritizing activities	N	S	O
16. Has trouble sitting still	N	S	O
17. Forgets what he/she is doing in the middle of things	N	S	O
18. Doesn't check work for mistakes	N	S	O
19. Has emotional outbursts for little reason	N	S	O
20. Lies around the house a lot	N	S	O
21. Starts tasks (such as cooking, projects) without the right materials	N	S	O
22. Has trouble accepting different ways to solve problems with work, friends, or tasks	N	S	O
23. Talks at the wrong time	N	S	O
24. Misjudges how difficult or easy tasks will be	N	S	O
25. Has problems getting started on his/her own	N	S	O
26. Has trouble staying on the same topic when talking	N	S	O
27. Gets tired	N	S	O
28. Reacts more emotionally to situations than his/her friends	N	S	O
29. Has problems waiting his/her turn	N	S	O
30. People say that he/she is disorganized	N	S	O
31. Loses things (such as keys, money, wallet, homework, etc.)	N	S	O
32. Has trouble thinking of a different way to solve a problem when stuck	N	S	O
33. Overreacts to small problems	N	S	O
34. Doesn't plan ahead for future activities	N	S	O
35. Has a short attention span	N	S	O
36. Makes inappropriate sexual comments	N	S	O
37. When people seem upset with him/her, doesn't understand why	N	S	O
38. Has trouble counting to three	N	S	O

During the past month, how often has each of the following behaviors been a *problem*?

N = Never S = Sometimes O = Often

39.	Has unrealistic goals	N	S	O
40.	Leaves the bathroom a mess	N	S	O
41.	Makes careless mistakes	N	S	O
42.	Gets emotionally upset easily	N	S	O
43.	Makes decisions that get him/her into trouble (legally, financially, socially)	N	S	O
44.	Is bothered by having to deal with changes	N	S	O
45.	Has difficulty getting excited about things	N	S	O
46.	Forgets instructions easily	N	S	O
47.	Has good ideas but cannot get them on paper	N	S	O
48.	Makes mistakes	N	S	O
49.	Has trouble getting started on tasks	N	S	O
50.	Says things without thinking	N	S	O
51.	His/her anger is intense but ends quickly	N	S	O
52.	Has trouble finishing tasks (such as chores, work)	N	S	O
53.	Starts things at the last minute (such as assignments, chores, tasks)	N	S	O
54.	Has difficulty finishing a task on his/her own	N	S	O
55.	People say that he/she is easily distracted	N	S	O
56.	Has trouble remembering things, even for a few minutes (such as directions, phone numbers)	N	S	O
57.	People say that he/she is too emotional	N	S	O
58.	Rushes through things	N	S	O
59.	Gets annoyed	N	S	O
60.	Leaves room or home a mess	N	S	O
61.	Gets disturbed by unexpected changes in daily routine	N	S	O
62.	Has trouble coming up with ideas for what to do with free time	N	S	O
63.	Doesn't plan ahead for tasks	N	S	O
64.	People say that he/she doesn't think before acting	N	S	O
65.	Has trouble finding things in room, closet, or desk	N	S	O
66.	Has problems organizing activities	N	S	O
67.	After having a problem, does not get over it easily	N	S	O
68.	Has trouble doing more than one thing at a time	N	S	O
69.	Mood changes frequently	N	S	O
70.	Doesn't think about consequences before doing something	N	S	O
71.	Has trouble organizing work	N	S	O
72.	Gets upset quickly or easily over little things	N	S	O
73.	Is impulsive	N	S	O
74.	Doesn't pick up after self	N	S	O
75.	Has problems completing his/her work	N	S	O

Roth, R., Isquith, P. & Gioia, G. (2005). BRIEF-A Behavior Rating Inventory of Executive Functioning-Adult Version: Professional Manual. Lutz, FL: Psychological Assessment Resources, Inc.

APPENDIX B

The Forgiveness Scale

Think of how you have responded to the person who has wronged or mistreated you. Indicate the degree to which you agree or disagree with the following statements.

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1.	I can't stop thinking about how I was wronged by this person.	5	4	3	2	1
2.	I wish for good things to happen to the person who wronged me.	5	4	3	2	1
3.	I spend time thinking about ways to get back at the person who wronged me.	5	4	3	2	1
4.	I feel resentful toward the person who wronged me.	5	4	3	2	1
5.	I avoid certain people and/or places because they remind me of the person who wronged me.	5	4	3	2	1
6.	I pray for the person who wronged me.	5	4	3	2	1
7.	If I encountered the person who wronged me I would feel at peace.	5	4	3	2	1
8.	This person's wrongful actions have kept me from enjoying life.	5	4	3	2	1
9.	I have been able to let go of my anger toward the person who wronged me.	5	4	3	2	1
10.	I become depressed when I think of how I was mistreated by this person.	5	4	3	2	1
11.	I think that many of the emotional wounds related to this person's wrongful actions have healed.	5	4	3	2	1
12.	I feel hatred whenever I think about the person who wronged me.	5	4	3	2	1
13.	I have compassion for the person who wronged me.	5	4	3	2	1

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
14. I think my life is ruined because of this person's wrongful actions.	5	4	3	2	1
15. I hope the person who wronged me is treated fairly by others in the future.	5	4	3	2	1

Reverse code: 1,3,4,5,8,10,12,14
Absence of Negative subscale items: 1,3,4,5,8,9,10,11,12,14
Presence of Positive subscale items: 2,6,7,13,15

Rye, M., Loiacono, D., Folck, C., Olszewski, B., Heim, T., & Madia, B. (2001). Evaluation Of The Psychometric Properties Of Two Forgiveness Scales. *Current Psychology, 20(3*), 260. doi: 10.1007/s12144-001-1011-6

APPENDIX C

Transgression-Related Interpersonal Motivations Scale-12 Item Form (TRIM-12)

For the following questions, please indicate your current thoughts and feelings about the person who hurt you. Use the following scale to indicate your agreement with each of the questions.

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

____1. I'll make him/her pay.

____2. I keep as much distance between us as possible.

____3. I wish that something bad would happen to him/her.

____4. I live as if he/she doesn't exist, isn't around.

____5. I don't trust him/her.

____6. I want him/her to get what he/she deserves.

____7. I find it difficult to act warmly toward him/her.

____8. I avoid him/her.

____9. I'm going to get even.

____10. I cut off the relationship with him/her.

____11. I want to see him/her hurt and miserable.

____12. I withdraw from him/her.

McCullough, M. E., Rachal K. C., Sandage, S. J., Worthington, E. J., Brown, S. W., & Hight, T. L. (1998). Interpersonal forgiving in close relationships: II. Theoretical elaboration and measurement. *Journal of Personality and Social Psychology*, 75(6), 1586-1603. doi: 10.1037/0022-3514.75.6.1586

APPENDIX D

Institutional Review Board Approval

10/7/2013

Names: Seth Marshall and Hanni Watson

Protocol Title: Relationship Between Executive Functioning and Positive Psychology Attributes in College Students

Protocol Number: 14-089

Seth.Marshall@mtsu.edu

Dear Investigator,

The MTSU Institutional Review Board, or a representative of the IRB, has reviewed the research proposal identified above. The MTSU IRB or its representative has determined that the study poses minimal risk to participants and qualifies for an expedited review under 45 CFR 46.110 and 21 CFR 56.110.

According to MTSU Policy, a researcher is defined as anyone who works with data or has contact with participants. Anyone meeting this definition needs to be listed on the protocol and needs to provide a certificate of training to the Office of Compliance. **If you add researchers to an approved project, please forward an updated list of researchers and their certificates of training to the Office of Compliance (c/o Andrew Jones, Box 134) before they begin to work on the project.** Any change to the protocol must be submitted to the IRB before implementing this change.

Please note that any unanticipated harms to participants or adverse events must be reported to the Office of Compliance at (615) 494-8918.

You will need to submit an end-of-project report to the Office of Compliance upon completion of your research. Complete research means that you have finished collecting and analyzing data. **Should you not finish your research within the one (1) year period, you must submit a Progress Report and request a continuation prior to the expiration date.** Please allow time for review and requested revisions.

Also, all research materials must be retained by the PI or faculty advisor (if the PI is a student) for at least three (3) years after study completion. Should you have any questions or need additional information, please do not hesitate to contact me.

Sincerely,

William H. Leggett

MTSU Institutional Review Board