

The Intersection of Self-Control Theory, Objective Self-Awareness, and Mindfulness

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ABSTRACT

This study investigates how changes in self-awareness impact criminological self-control and the degree to which mindfulness buffers against these changes. To accomplish this task, 118 undergraduate participants were recruited and surveyed prior to and after a statistics test. Surveys included the Grasmick et al. (1993) Self-Control Scale which measures criminal impulsivity. Additional scales included the Five-Facet Mindfulness Questionnaire, the Positive Negative Affect Scale, and the Rosenberg Self-Esteem Scale. These results showed a significant increase in negative affect, a significant decrease in self-esteem, and a significant reduction in self-control after the posttest. These changes were significantly correlated with exam satisfaction. Also, the participants demonstrated self-reported increases in several items on the Self-Control scale including impulsivity, self-centeredness, and a preference for physical compared to mental tasks. When mindfulness was included as a covariate, none of the changes were significant. Results and limitations are discussed.

Keywords: *Mindfulness, Self-Awareness Theory, Self-Control Theory, Impulsivity, and Criminality*

Impulsive behavior contributes to social ills worldwide (Baumeister & Heatherton, 1996; Gottfredson & Hirschi, 1990). Impulsive actions can lead to a host of deviant activities including violence (Nagin & Paternoster, 1993; Netter, Hennig, Rohrman, Wyhlidal, & Hain-Hermann, 1998), Fraud (Gottfredson & Hirschi, 1990), and substance abuse (Meneses & Akers, 2011). Moreover, a lack of impulse control is symptomatic of psychopathy (Vaughn, DeLisi, Wright, & Howard, 2007) and criminality (Pratt & Cullen, 2000).

Various disciplines have developed theoretical models concerning impulsivity, including criminology, psychology, and neuroscience. Criminologist Gottfredson and Hirschi (1990) developed a theory linking impulsivity to crime that they called Self-Control Theory. Self-Control Theory states that crime and deviant behavior are due to the inability to deter

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gratification. Gottfredson and Hirschi theorized that self-control consisted of six components, including impulsivity, risk taking, a preference for simple tasks, self-centeredness, a preference for physical compared to mental activity, and temper.

Self-awareness Theory proposes that impulsivity arises as a consequence of unpleasant feelings associated with objective self-awareness (Baumeister, Heatherton, & Tice, 1994; Heatherton & Baumeister, 1991; Wicklund, 1975). More specifically, Self-Awareness Theory proposes that a discrepancy between a person's actual self and their ideal self causes negative affect and a loss of self-worth. To reduce these feelings of inadequacy, people shift from objective internally focused self-awareness to externally focused low self-awareness. Impulsivity is characteristic of low self-awareness.

While Self-Awareness Theory and Self-Control Theory differ, they do not significantly contradict one another. Rather, Self-Control Theory focuses mostly on the relationship of self-control with deviance and criminality. Self-Awareness Theory addresses all forms of self-regulation failure. Self-Awareness Theory includes cultural and affective components.

Despite these different perspectives, these two concepts can be used to inform each other. For instance, the ability to self-regulate requires the ability to be self-aware. The affective and culture dimensions characteristic of self-awareness theory may provide a theoretical way of describing day-to-day variations in self-control. Similarly, self-control may provide a conceptual link between self-awareness and crime. Moreover, the brain networks associated with self-control are closely interconnected with networks associated with self-awareness (Seeley et al., 2007). Finding a means to improve self-control and maintain objective self-awareness would be useful in developing interventions for those with criminal and antisocial behavior.

Mindfulness is a trait associated with both self-awareness (Shonin, Gordon, Slade, & Griffiths, 2013) and self-control (Baer, 2003). Brain networks associated with self-awareness and self-control overlap significantly with the neural networks involved in mindfulness. Specifically, Mindfulness practices have been shown to increase connectivity in areas involved in self-awareness and self-control, as discussed further below (Hölzel et al., 2011). Mindfulness shows significant utility regarding methods to improve self-control and maintain self-awareness.

Self-Control Theory

Self-control Theory is a theory from the discipline of Criminology that states that low self-control leads to a range of antisocial behaviors, including violence and crime (Gottfredson & Hirschi, 1990). Self-Control Theory was first proposed by Gottfredson and Hirschi (1990). Gottfredson and Hirschi argued that inadequate attachment and discipline in childhood lead to impaired self-control. This impaired self-control inflates the propensity to engage in deviant behavior and violence (Gottfredson & Hirschi, 1990). Gottfredson and Hirschi theorized that low self-control consists of six elements, including impulsivity, self-

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centeredness, orientation towards simple compared to complex task, preference for risk taking, proclivity towards physical compared to mental task, and a reactive temper. Gottfredson and Hirschi defined low self-control as “the extent to which they (people) are vulnerable to the temptations of the moment” (Gottfredson & Hirschi, 1990, p. 87).

While the construct of low self-control is more specific to the discipline of criminology, psychologists describe a similar construct called Antisocial Personality Disorder (APD). There is significant overlap between APD and low self-control. Like low self-control, APD has been associated with deviant behavior (Robins, 1966), self-centeredness (American Psychiatric Association, 2012), criminality (Goldstein et al. 1996), impulsivity (Siever & Davis, 1991), the failure to plan ahead (American Psychological Association, 2000), and reactive aggression (Blair, 2007). Similar to low self-control, APD has been theorized to originate from attachment problems in childhood (De Bellis, 2005; Robins, 1966; Weiler & Wisdom, 1996).

Evidence suggests a link between self-control, antisocial behavior, violence, and criminality. Specifically, researchers developed the Low Self-Control Scale to test Self-Control Theory (Grasmick, Tittle, Bursik, & Arneklev, 1993). Studies have linked low scores on the self-control scale to criminality among both college students and former prisoners (Meneses & Akers, 2011; Piquero et al., 2005). Moreover, research findings indicate that self-control scores predict psychopathy (Vaughn, DeLisi, Wright, & Howard, 2007). Piquero et al. (2005) found that self-control scores were correlated with violent reoffending in a 5-year recidivism study. Also, Meneses and Akers (2011) found that self-control is associated with substance abuse. Pratt and Cullen (2000) conducted a meta-analysis and found that the relationship between self-control and criminality displayed a strong effect size.

Self-Awareness Theory

Self-Awareness Theory states that self-regulation failure stems from a cognitive shift from a state of high objective self-awareness to low self-awareness in order to escape unpleasant affect (Baumeister, Heatherton, & Tice, 1994; Heatherton & Baumeister, 1991; Wicklund, 1975). High self-awareness is a state of objective self-reflection, which allows people to “transcend” focusing on the immediate environment to connect their present thoughts, feelings, and behavior to the principles appreciated by the ideal self (Baumeister & Heatherton, 1996, pg. 4). When in this state of high self-awareness, people are aware of their failings and discrepancies between the actual self and the self the individual idealizes, which results in emotional pain. When a person fails to live up to their ideal self, a shift from high to low self-awareness frees the person from the burden of negative affect at the cost of an increased propensity for impulsive behavior (Baumeister & Heatherton, 1996; Heatherton & Baumeister, 1991). The state of low self-awareness can be characterized as subjective, impulsive, and focused on external stimuli (Heatherton & Baumeister, 1991). In a state of low self-awareness, people become unburdened by their personal failings by focusing on self-indulgent acts including substance abuse, over eating, deviant sexual acts, and even violent behavior (Heatherton & Baumeister, 1991; Morley, 2015).

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Inherent to this shift from high to low self-awareness is a loss of self-esteem and negative feelings associated with this loss of self worth. Research evidence has linked self-esteem loss to violence, which is the most extreme form of self-regulation failure (Baumeister, Smart, & Boden, 1996; Toch, 1969). Research findings have found a link between low self-esteem and multiple types of violent acts, including hate crimes and murder (Anderson, 1994; Renzetti, 1992; Long, 1990; Levin & McDevitt, 1993; Kirschner, 1992). One trait where dysfunctional self-worth is significant is narcissism. Narcissists suffer from exaggerated self worth, which leaves them with often unattainable ideals. Unable to live up to their impossible ideal, narcissistic people remain in a constant state of low self-awareness. Indeed studies tend to support a link between narcissism, unstable self worth, and impulsive violence (Baumeister, Smart, & Boden, 1996; Bushman & Baumeister, 2002; Kernis, Grannemann, & Barclay, 1989; Kirkpatrick, Waugh, Valencia, & Webster, 2002).

According to Self-Awareness Theory, self-esteem loss is preceded by negative affect. Shame is a specific emotion that is directly related to people's inability to live up to their ideal self (Tangney, Stuewig, & Martinez, 2014). Unlike guilt, which attributes blame on a less than idealistic behavior, shame directly places blame on the actual self for failing to uphold the standard of the person's ideal self (Tangney, Stuewig, & Martinez, 2014). Unable to accept the burden of shame, people tend to externalize blame from their behavior (Stosny, 1995; Tangney, Stuewig, & Martinez, 2014). Externalizing blame is a characteristic of low self-awareness and has been found to mediate the positive correlation between shame and criminality (Hosser, Windzio, & Greve, 2008; Tangney, Stuewig, & Martinez, 2014). Guilt is an emotional state associated with higher objective self-awareness due to its association with goal-oriented behavior to correct past imperfections. Evidence suggests that feelings of guilt are associated with a desistance from criminal behavior (Hosser, Windzio, & Greve, 2008; Tangney, Stuewig, & Martinez, 2014).

Mindfulness, Self-Control, and Self-Awareness

Mindfulness generally refers to practices which seek to obtain nonjudgmental awareness of one's thoughts and actions (Grossman, Niemann, Schmidt, & Walach, 2003; Kabat-Zinn, 1990). Mindful awareness involves a propensity for self-acceptance (Bishop et al., 2004). Mindfulness originated in eastern spiritual practice and has been recognized as a 'second wave cognitive behavioral intervention' (Kabat-Zinn, 1990). Mindfulness shares significant overlap with objective self-awareness. Both states involve awareness of internal conditions and seek to transcend the present moment. Mindfulness extends beyond objective self-awareness in that Mindfulness involves practices to maintain self-awareness through self-acceptance. Considering Mindfulness' focus on practices to maintain self-awareness, Mindfulness presents itself as a promising intervention to maintain objective self-awareness. Indeed, evidence shows that Mindfulness practices have been shown to improve many characteristics associated with self-awareness and self-control. These characteristics include increased emotional well-being (Linehan, 1993), decreased emotional distress (Bohus et al., 2004), improved emotional regulation (Baer, 2003; Hill, 2012), increased self-awareness (Shonin, Gordon, Slade, & Griffiths, 2013), increased self-compassion (Neff, 2003b), and

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improved self-regulation (Baer, 2003). Mindfulness practices have been shown to be effective in offender rehabilitation (Andrews & Bonta, 1994; Howells, Tennant, Day, & Elmer, 2010; Rainforth, Alexander, & Cavanaugh, 2003; Shonin, Gordon, Slade, & Griffiths, 2013). Mindfulness practices have been shown to reduce negative affect, improve self-esteem, and lower recidivism rates among inmates (Andrews & Bonta, 1994; Rainforth, Alexander, & Cavanaugh, 2003; Shonin, Gordon, Slade, & Griffiths, 2013).

BRAIN NETWORKS COMMON TO SELF-CONTROL, SELF-AWARENESS, AND MINDFULNESS

Research studies have shown that mindfulness practices produce connectivity changes in brain networks associated with characteristics of self-control and objective self-awareness. These three brain networks include the Salience Network (SN), Cognitive Control Network (CCN), and the Default Mode Network (DMN). The SN is responsible for detecting relevant stimuli and oscillating between internal versus external tasks (Palaniyappan & Liddle, 2012; Seeley et al., 2007). The CCN is involved in regulating thoughts, emotions, and behavior (Seeley et al., 2007). The DMN is associated with self-awareness, episodic memory, and internal focus (Andreasen et al., 1995; D'Argembeau et al., 2008). The DMN becomes activated when the brain is at rest and deactivated when involved in an external task (Andrew-Hanna et al., 2010; Philippi & Koenigs, 2014; Vanhaudenhuyse et al., 2006). All three of these networks are highly interrelated (Seeley et al., 2007). Current research evidence indicates that the DMN and CCN are correlated and are both anticorrelated with the SN (Seeley et al., 2007). Research findings have shown that the salience network displays causal influence over the deactivation of the Cognitive Control Network and the Default Mode Network in various tasks including moral judgments (Chiong et al., 2013; Palaniyappan & Liddle, 2012). Underconnectivity in these three networks have been associated with aggression, violence, poor emotional regulation, antisocial behavior, impulsivity, and psychopathic behavior (Blair, Colledge, Murray, & Mitchell, 2001; Cisler et al., 2013; Decety, Chen, Harenski, & Kiehl, 2013; Ducharme et al., 2011; Ettinger et al., 2013; Ho et al., 2014; Philippi, et al., 2015; Sripada et al., 2012; Trzepacz et al., 2013).

These SN, CCN, and DMN networks overlap with characteristics of Self-Control as defined by Gottfredson and Hirschi (1990). As described previously, Gottfredson and Hirschi stated that self-control involves six characteristics, including impulsivity, risk taking, self-centeredness, and temper. As stated above, all three networks have been associated with impulsivity and temper. Studies connect the Cognitive Control Network to risk taking (Romer et al., 2011), and self-centered behavior among prison inmates has been associated with DMN (Juárez, Kiehl, & Calhoun, 2012). The preference for simple task and for physical compared to mental task may also be related to the CCN and DMN. Specifically, successful completion of complex tasks and mental tasks require a significant level of intellectual ability. Connectivity in the CCN and DMN is positively correlated with IQ (Sternberg, 2012). Simple and physical tasks are often externally focused which requires deactivation of the DMN.

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Likewise, the Salience Network, Cognitive Control Network, and the Default Mode Network, have significant overlap with characteristics of Self-Awareness Theory. As stated previously, the DMN is associated with self-awareness, including the narrative self and episodic memory (Andrews-Hanna et al., 2010; Gallagher, 2000; Gusnard et al., 2001). Evidence also shows that negative affect can impair the CCN (Heatherton & Wagner, 2011). There are two key structures of the SN, the insular cortex and the anterior cingulate. The Salience Network exerts inhibitory connections over key regions involved in the processing of emotions (Stein et al., 2009). Considering that the SN regulates the CCN, DMN, and the emotional processing centers, it would seem reasonable to suspect that external tasks become more salient when internal tasks invoke painful emotion. Evidence suggests that the link between low self-awareness and low self-control may be related to the functioning of the SN, CCN, and DMN. Specifically, Thijsse et al., (2015) found the connection between DMN dysfunction and violence developmentally predates the connection between Cognitive Control Network dysfunction and violence.

Research studies indicate that Mindfulness practices are associated with neurological changes in the Salience Network, Default Mode Network, and Cognitive Control Network (Hölzel et al., 2011). Several studies have found that Mindfulness practices are associated with positive volumetric, connectivity, and hemodynamic changes in two key areas of the SN—the insular cortex and the anterior cingulate (Baerentsen, 2001; Cahn & Polish, 2006; Hölzel et al., 2007; Lazar et al., 2003; Wang et al., 2011). Hölzel et al. (2008) found that meditators have increased grey matter concentrations in key regions in the Cognitive Control Network and the Salience Network.

Luders et al., (2009) found that Mindfulness meditators have increased grey matter concentrations in a key region within the CCN associated with emotional regulation and violence. Specifically, evidence suggests that meditators have greater structural connectivity in the uncinate fasciculus (Luders, Clark, Narr, & Toga, 2011). Finally, Jang et al. (2010) found that mindfulness practices are associated with connectivity changes in the DMN.

In summary, research findings indicate that low self-control as described by Gottfredson and Hirschi (1990) is linked to violence, criminality, and antisocial behavior. Research findings also show that self-regulation failure and antisocial behavior is associated with unpleasant affect associated with self-awareness. Neurological findings suggest that characteristics associated with Self-Control Theory and Self-awareness Theory have significant overlap. Finally, Mindfulness has been shown to improve self-regulation (Baer, 2003), decrease criminal behavior (Andrews & Bonta, 1994; Rainforth, Alexander, & Cavanaugh, 2003), and improve self-awareness (Shonin, Gordon, Slade, & Griffiths, 2013).

This study investigates the link between mindfulness, Self-Control Theory, and Self-Awareness Theory among a noncriminal sample. The aim of this study is to measure if a negative life event leads to changes in characteristics associated with Self-Awareness and Self-control. Another aim is to investigate whether mindfulness buffers against changes in

affect and self-control. To implement this study 118 students were given scales measuring self-esteem, negative affect, self-control, and mindfulness prior to and after a statistics test. Through the use of Multivariate Analyses, this study compared changes in self-esteem, negative affect, and self-control. The analyses were repeated using mindfulness as a covariate. Similar analyses were conducted with the subscales of self-control.

METHODS

Participants

Participants for this study included 118 participants including 62 men and 58 women currently enrolled in an undergraduate statistics course at a public university. Participants filled out anonymous surveys. Efforts were made to protect the students' anonymity by limiting the demographic information collected to gender. Due to the demographics of the university, participants were presumed to be mostly Hispanic, and non-Hispanic white. Research assistants recruited the participants prior to the first class lecture. The instructor was not present while the students completed their surveys. The participants filled out pre and posttest measures. Pretest measures were given prior to the first statistics test and the posttest was given after the participants were informed of their exam grades. Students were instructed to draw a matching symbol and a number on the envelopes of both the pretest and the posttest. The researchers used the matching symbols to connect the surveys without knowing the participants' identity. The pretest surveys consisted of a one question demographic form, PANAS, the Five Facets of Mindfulness Scale, Grasmick's Self-control Scale, and Rosenberg's Self Esteem Scale. The posttest consisted of the same scales plus a one item grade satisfaction scale. The methods and data used in this study are the same as reported by Morley (2017) except that this study investigated two novel variables including mindfulness and self-control.

Measures

1. **Positive and Negative Affect Schedule (PANAS).** This study used the Negative Affect Subscale of the Positive and Negative Affect Schedule (PANAS) (Watson et al., 1988) to measure negative affect. The Negative Affect Subscale consists of ten affective states such as nervous, guilty, upset, etc. Items are rated based off of the participants' feelings at the present moment ranging from "not at all" to "extremely." The pretest and posttest measures yielded Cronbach's alpha of .90 and .92 respectively.
2. **Self-Esteem.** Self-esteem was measured using the Rosenberg Self-Esteem Scale (Rosenberg, 1979). This self-report scale consists of 10 items that are rated on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Sample questions include statements such as, "On the whole I am satisfied with myself." Convergent and discriminate validity have been found with self-ideal (.67), self-image (.83), and a psychiatrists' ratings (.56)(Rosenberg, 1979). The pretest and posttest measures yielded Cronbach's alpha of .86 and .87 respectively.
3. **Grasmick et al. (1993) Self-Control scale:** The Grasmick et al. (1993) scale was designed to measure self-control as conceptualized by Gottfredson and Hirschi

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(1990). This scale consists of six components including impulsivity (e.g., I don't devote much thought and effort to prepare for the future), a preference for simple rather than complex tasks (e.g., I really dislike hard tasks that stretch my abilities to the limit), risk-seeking behavior (e.g., Sometimes I take a risk just for the fun of it), a preference for physical activities compared to cognitive activities (e.g., I almost always feel better when I am on the move than when I am sitting or thinking), self-centeredness (e.g., If I upset people, it's their problem not mine), and temper (e.g., When I am angry people better stay away). This 24-item scale consists of four items for each of the six components. The items are rated on a five-point Likert scale, and seven of the items are reverse coded. High scores indicate a lower level of self-control on this scale. Cronbach's alphas for this scale were .83 for the pretest and .86 for the posttest.

4. **Negative Life Experience.** Participants' negative life experience were determined by subtracting their pretest score from their posttest score. Participants that scored a negative value were coded as having a negative life experience.
5. **Exam Satisfaction.** Exam satisfaction was measured by a one-item Likert scale that asked "How happy were you with your grade?"
6. **Mindfulness:** To measure mindfulness this study employed the Five-Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). This measure is comprised 5 subscales, including an eight-item subscale for observation (When I'm walking, I deliberately notice the sensations of my body moving), a seven item subscale measuring non-reactivity to inner experience (I perceive my feelings and emotions without having to react to them), an eight reverse scored item scale measuring acting with awareness (When I do things, my mind wanders off and I'm easily distracted), an eight-item subscale measuring nonjudgmental experience (I criticize myself for having irrational or inappropriate emotions), and an eight-item scale measuring the ability to describe an experience (I'm good at finding words to describe my feelings). Cronbach's alpha for the pre and posttest scale in this study were .87 and .89 respectively.

RESULTS

The analyses consisted of correlational analyses, descriptive statistics, and multivariate analyses. Descriptive statistics and a correlation table are displayed in table 1 and table 2. The analyses consisted of a repeat measures MANOVA investigating changes in negative affect, self-esteem, and self-control across time followed by a MANCOVA repeating the analyses with the inclusion of mindfulness as a covariate. Conditional on a significant change in self-control, a second MANOVA was conducted looking for changes in subscales measuring self-control, followed by a second MANCOVA including Mindfulness as a covariate. In addition, Mindfulness pre and posttest scores were averaged to calculate the Mindfulness total scores (MT).

As shown in the table, the correlational analyses indicates that the Negative Experience variable was significantly associated with a posttest self-esteem $r = -.15$ $p < .05$ and posttest

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negative affect $r=.21$ $p<.05$. The exam satisfaction item yielded a negative correlation with the negative experience measure $R=-.9$ $p<.05$ and post-test negative affect $r=-.2$ $p<.05$. Mindfulness scores demonstrated a significant relationship with pre-test self-esteem $r=.37$ $p<.05$, post-test self-esteem $r=.49$ $p<.05$, pre-test negative affect $r=-.43$ $p<.05$, post-test negative affect scores $r=-.43$ $p<.05$, pre-test self-control scores $r=-.5$ $p<.05$, and post-test self-control scores $r=-.51$ $p<.05$.

The initial repeated measure MANOVA revealed a significant within-group difference across time ($F(3,114)=7.99$ $p<.05$ partial $\eta^2= .17$). Univariate analyses revealed a significant difference across time in self-esteem $F(1,116)=10.25$ $p<.05$ partial $\eta^2= .11$), negative affect ($F(1,116)=10.25$ $p<.05$ partial $\eta^2= .08$), and self-control ($F(1,116)=4.5$ $p<.05$ partial $\eta^2= .04$). Sidak post hoc analyses revealed a significant reduction in self-esteem $p<.05$ and self-control $p<.05$, as well as a significant increase in post-test negative affect $p<.05$. When Mindfulness was included as a covariate, the analyses did not show a significant change across time ($F(3,114)=1.73$ $p<.05$ partial $\eta^2= .04$) or a significant interaction ($F(3,114)=1.22$ $p<.05$ partial $\eta^2= .09$).

Since self-control demonstrated a significant change, follow-up analyses were conducted to investigate subscale changes in self-control and the impact that mindfulness has on these subscale changes. The first analysis was a repeat measures MANOVA that investigated changes on the subscales, and a follow-up analysis included Mindfulness as a covariate. The first analysis revealed a significant difference in the dependent variables across time ($F(6,111)=3.069$ $p<.05$ partial $\eta^2= .14$). The univariate analyses showed a significant change across time on the Impulsivity ($F(1,116)=6.83$ $p<.05$ partial $\eta^2= .06$), Preference for Physical ($F(1,116)=3.19$ $p<.05$ partial $\eta^2=.03$), and self-centeredness $F(1,116)=7.75$ $p<.05$ partial $\eta^2= .06$ subscale. Furthermore, Sidak's post hoc test showed that impulsivity ($p<.05$), preference for physical ($p<.05$), and self-centeredness ($p<.05$) increased during the posttest. When Mindfulness was included as a covariate, the analysis was not significant ($F(6,110)=1.7$ $p>.05$ partial $\eta^2= .09$), and there was not an interaction ($F(6,110)=1.6$ $p>.05$ partial $\eta^2= .08$).

DISCUSSION

The goal of this study was to investigate the relationship between Mindfulness, Self-Awareness Theory, and Self-Control Theory. As indicated in the literature review section above, Self-Control Theory states that crime and deviant behavior stem from low self-control, and Self-awareness theory states that self-regulation failure can be caused by unpleasant emotions stemming from objective self-awareness. The goals of this study were to measure changes in traits associated with Self-Awareness and Self-Control as described by Gottfredson and Hirschi (1990). Another goal of this study was to determine whether mindfulness protected against changes associated with self-awareness theory. In order to achieve this goal, a number of participants must have had a negative experience. This study found that the negative experience variable was significantly associated with negative affect, self-esteem loss, and exam satisfaction. This indicates that a number of students did suffer from a negative experience. Exam satisfaction demonstrated an almost perfect negative

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correlation ($R=-.9$) with the negative experience variable suggesting that the negative experience came from the statistics test.

This study also found that participants increased negative affect, self-esteem loss, and a decrease in self-control after they found out their exam grades. This supports a link between Self-Awareness Theory and Self-Control Theory. As hypothesized by Self-Awareness Theory, changes in self-esteem and negative affect were associated with an increased propensity for self-regulation failure. While this has been supported previously, the novelty of this study is that this change was demonstrated using Grasmick's scale, which is specifically associated with criminality, antisocial behavior, and violence. While this doesn't necessarily indicate a direct link between shifting self-awareness and crime, it does open up the possibility since a change in Grasmick's scale could mean an increase in propensity to engage in violent, criminal, or other forms of deviant behavior. Similarly, this study found changes in very specific subscales tied to self-awareness and neural networks associated with self-awareness. Specifically, our study found a significant increase in impulsivity, self-centeredness, and preference for physical activity. Based on neurological evidence previously described in this paper, when self-reflection causes pain there is a tendency for the Salience Network to disengage the Default Mode Network and, consequently, the Executive Control network disengages by focusing attention on external tasks. Based on this change in brain states, people would have an increased proclivity towards impulsive behavior. Physical activity would become salient as a means of decreasing mental self-reflection. A consequence of a disengaged default network would be decreased functional connectivity between the Medial Pre Frontal Cortex and the Precuneus. Since these areas are involved in self-narrative and autobiographical memories respectively, this disconnect could lead to decreased ability to connect ones narrative to memories of self. In addition, there would be decreased connections between the Temporal-Parietal Junction, which is a region specific to theory of mind and empathy. Without the ability to connect our self-memory to our self-narrative and with a reduced ability to consider others, a person would show a proclivity for self-centeredness.

Another finding in this study involved the changes in results as a consequence of including Mindfulness as a covariate. Specifically, the results show that when mindfulness was included as a variable there was not a significant change in any of the variables. Mindfulness appeared to preserve objective self-awareness and self-control after exposure to negative emotions. These results are not surprising since mindfulness involves self-awareness and self-regulation, which has been connected to the brain networks associated with both self-awareness and self control. The results did not show an interaction. This indicates that mindfulness, unlike objective self-awareness, did not change as a consequence of negative affect. This does have an interesting implication concerning brain networks tied to mindfulness. Specifically, if mindfulness does not change, mindfulness must be associated with the SN. Indeed Mindfulness has been described the "precursor to choice" (Hirst, 2003, pg 365). Since choice is intrinsic to salience and self-reflection, conceptually there is a theoretical link between mindfulness and the DMN and SN. Indeed, evidence supports a link between these networks (Baerentsen, 2001; Cahn & Polish, 2006; Hölzel et al., 2007; Lazar

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et al., 2003; Wang et al., 2011). This implies that mindfulness is associated with how humans tune into the world and how they preserve self-reflection during adverse times. Since Gottfredson and Hirschi's concept and metric of self-control are specifically linked to deviant behavior and crime, these findings link mindfulness to deviance and criminology. Indeed, the subscales of the self-control metric reflect traits associated with psychopathy. While it is unlikely that the majority, if any, of the participants are career criminals or psychopaths, characteristics such as impulsivity and self-centeredness are present in all people and these findings might generalize to a psychopathic population. Mindfulness may also provide useful insight into criminal behavior. Indeed, there have been a variety of findings that support this idea (Rainforth, Alexander, & Cavanaugh, 2003; Velotti et al., 2016).

LIMITATIONS

This study has some relevant limitations that need to be addressed. One limitation is that this study makes use of self-report scales which are susceptible to bias and fabrication (Howard & Daily, 1979; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Another limitation is that this study does not use a control group and therefore is unable to infer cause.

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DESCRIPTIVE STATISTICS

Table 1: Means and Standard Deviations

	Mean	SD
Time 1		
Negative Affect	25.83	8.35
Self-Esteem	21.14	4.38
Self-Control	52.45	8.83
Mindfulness	126.49	16.45
Time 2		
Negative Affect	27.91	9.16
Self-Esteem	19.94	4.84
Self-Control	52.94	8.39
Mindfulness	127.19	18.57

Table 2: Correlation Coefficients Among Psychological Variables

	M	NE	ES	NAt1	NAt2	SEt1	SEt2	SCt1	SCt2
M	1								
NE	-.05	1							
ES	-.05	-.9**	1						
NAt1	-.43**	.01	.02	1					
NAt2	-.43**	-.21**	.23**	.69**	1				
SEt1	.37**	-.04	-.01	-.43**	-.49**	1			
SEt2	.49**	-.15*	-.08	-.40**	-.38**	-.67**	1		
SCt1	-.5**	.03	.03	.17	-.3**	-.22**	-.3*	1	
SCt2	-.51**	.05	.05	.13	-.32**	.20**	-.32**	.86**	1

* p < .05 ** p < .01

M= Mindfulness, NE= Negative Experience, ES= Exam Satisfaction, NAt1= Negative Affect Pretest, NAt2= Negative Affect Posttest, SEt1= Self Esteem Pretest, SEt2= Self Esteem Posttest, SCt1= Self-Control Pretest, SCt2= Self-Control Post Test

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