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EGO DEPLETION: BUFFERING THROUGH TOUCH

by

VICTORIA FORGEA

(Under the Direction of Janie H. Wilson)

ABSTRACT

Ego depletion theory states that self-control is tied to a limited resource and diminishes after repeated exertions; consequently, the current study sought to examine how to replenish self-control through touch. Due to the positive outcomes of touch, we expected touch to allow participants to persist longer on a geometric tracing puzzle task after becoming ego depleted. The current study implemented measures widely used in the ego depletion literature, and the experimenter implemented two brief touches to examine the effects of touch in the domain of self-control. We found that participants who received touch persisted significantly longer on the geometric tracing puzzle task than participants who did not receive a touch. As such, the current study supports touch as an effective buffer against ego depletion. The mechanism for buffering may tie with expressive touch used by the experimenter, which likely motivated participants to persist in the subsequent self-control task.

INDEX WORDS: Ego depletion, Touch, Self-control

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by

VICTORIA FORGEA

B.S., East Tennessee State University, 2017

A Thesis Submitted to the Graduate Faculty of Georgia Southern University

in Partial Fulfillment of the Requirements for the Degree

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CHAPTER 1

INTRODUCTION

Failure to self-regulate can cause many societal problems, such as addiction, eating disorders, unwanted pregnancies, debt, and bankruptcy (Baumeister, 2002). The mental and physical demands of everyday life exhaust the self and require ongoing self-control in order to function well. The ability to utilize self-control promotes good adjustment, secure attachment, and other favorable psychological states (Tangney, Baumeister, & Boone, 2004). Due to the mental and physical annoyances that tax people's daily lives, we are investigating if touch will replenish self-control in the domain of ego depletion.

Ego Depletion

The strength model of self-control proposed by Baumeister, Vohs, and Tice (2007) indicates that self-control ties to a limited energy source, and repeated exertions deplete the energy source. Baumeister, Bratslavsky, Muraven, and Tice (1998) coined the term "ego depletion" to label this state of reduced self-control energy. When discussing self-control, Baumeister and colleagues refer to a muscle analogy. Both self-control and a muscle require energy and strength to perform repeated actions. After repeated exertions, the muscle becomes fatigued. Similarly, self-control deteriorates with repeated exertions, resembling symptoms of fatigue (Gregersen, Hatzigeorgiadis, Galanis, Comoutos, & Papaioannou, 2017).

Over the past two decades, numerous studies verified the existence of ego depletion. According to a meta-analysis that included 83 studies, ego depletion significantly affects subsequent self-control with a medium effect size (Hagger, Wood, Stiff, & Chatzisarantis, 2010). This publication provides compelling evidence that ego depletion can be manipulated within a laboratory, and depletion affects subsequent task performance. Following his original meta-analysis, Hagger conducted another analysis with 23 labs to investigate the effect sizes of ego

depletion (Hagger & Chatzisarantis, 2016). Hagger concluded ego-depletion research showed small effect sizes. More recently, Dang (2018) demonstrated ego depletion studies have a small to medium effect size.

Domains of Ego Depletion

Repeated exertions result in self-control deficits across a wide range of domains, such as physical, cognitive, and emotional (Alberts, Martijn, Nievelstein, Jansen, & De Vries, 2008). In the laboratory, researchers create ego depletion using self-control tasks in the domains mentioned above. A second self-control task assesses whether ego depletion occurred; a task in any domain serves as a useful outcome measure. Thus, the well of self-control, or the self-control "muscle," represents one repository affected by activities in any domain and can be created or measured with physical, cognitive, or emotional tasks.

Physical. Alberts, Martijn, Nievelstein, Jansen, and de Vries (2008) created ego depletion by instructing participants to partake in a physically demanding task. Lifting weights can be fatiguing to the individual, causing a lack of self-control. Researchers asked participants to hold a 1.5 kg weight at a 90-degree angle to create ego depletion before manipulating additional variables.

Cognitive. Ego depletion can also occur in the cognitive domain. Bray, Graham, Martin Ginis, and Hicks (2012) manipulated cognitive effort to create ego depletion. They randomly assigned participants to complete the Stroop color-word task, with two conditions. The incongruent Stroop task requires responding to text with color names in an ink color different from the word. For example, "blue" might be written in the color red, and participants must read "red." The Stroop task requires self-control by requiring people to override the automatic process of reading. A congruent control condition entails saying a color of text when the color matches the text (e.g., "blue" is typed in blue). After the word task, participants squeezed a handgrip for

as long as they chose to do so as a measure of subsequent self-control. Participants who completed the incongruent Stroop task – with higher cognitive demands – squeezed the handgrip for a significantly shorter time than participants who completed the congruent task.

When two cognitive tasks are used, ego depletion is seen in a difficult task relative to a simple cognitive task (Dorris, Power, & Kenefick, 2012). One group of participants received a high cognitive-effort task which included counting backward from 1000 in 7s while balancing objects, and the second group counted upward to 1000 by 5s while balancing as well. Participants who completed the high cognitive-effort task completed fewer sit-ups after the task than participants who completed an easy cognitive task. Thus, cognitive effort creates ego depletion, with greater cognitive effort associated with more ego depletion than relatively less cognitive effort.

Emotional. Self-control in the emotional domain generally involves suppressing emotional responses or exaggerating them. Muraven, Tice, and Baumeister (1998) required some participants to watch a movie with instructions to emotionally invest in the story line by relating to the characters of the movie, the second group watched the movie with instructions to avoid emotional investment in the plot, and the third group watched the movie with no manipulation. Researchers defined emotional investment or lack thereof as measured by participants' facial expressions. After viewing a 3-minute movie about environmental disasters, participants in the three groups squeezed a handgrip to measure subsequent self-control. The two groups who were told to adjust emotional responses squeezed the handgrip for significantly less time than the control condition with no emotion regulation. Furthermore, participants who received instructions to *avoid* emotional facial responses gave up on squeezing the handgrip faster than the remaining two groups. This study demonstrates that regulating emotions causes ego depletion, with suppression of emotion particularly detrimental to self-control.

Schmeichel (2006) investigated whether exaggerating emotions would impair later performance on a cognitive task (Schmeichel, Demaree, Robinson, & Pu, 2006). All participants watched a 2-minute clip depicting graphic scenes from an animal slaughterhouse. Participants either emotionally exaggerated internal emotions through the use of facial expressions or viewed the clip with no instructions to alter emotion expression. As predicted, participants who exaggerated their emotions performed more poorly on cognitive tasks than participants in the control condition. Taken together, the studies in this section indicate that adjusting behavioral expressions of emotion requires self-control and causes ego depletion.

Preventing Ego Depletion

Prior research experimentally demonstrated the ability to create ego depletion in a laboratory setting and showed that ego depletion created in one domain (e.g., emotional self-control) subsequently affects self-control in either the same domain or another domain (e.g., physical self-control). Although research in this area focuses on creating and assessing ego depletion, prevention and recovery from ego depletion remain relatively less explored.

A few approaches show promise to prevent a loss of self-control. Recall that Alberts and colleagues (2008) manipulated ego depletion by asking participants to lift weights. Some participants received instructions to focus on their muscle sensations when lifting the weights, while other participants received instructions to complete a star-counting task as a distraction. As hypothesized, participants who distracted themselves from lifting weights by completing the star-counting task persisted in lifting the weights longer than participants who focused on perception of the weights (Alberts, Martijn, Nievelstein, Jansen, and de Vries, 2008). Alberts and colleagues argued a task must be perceived as requiring self-control in order for ego depletion to occur. Distraction from the task prevents the perception of the task as requiring self-control. Thus, distraction leads to no ego depletion.

A second strategy to prevent ego depletion involves motivating participants. One group of participants received motivation in the form of hearing that their performance could lead to better treatments for Alzheimer's disease (Muraven & Slessareva, 2003, Experiment 1). The control group received no motivation. After this prevention strategy, all participants received a cognitively draining task to produce ego depletion. Next, researchers measured the duration of time spent on unsolvable geometric puzzles. Motivated participants performed significantly longer on the geometric puzzles compared to the individuals not motivated, revealing that motivation can help minimize potential effects of exercising self-control.

A third strategy to prevent ego depletion relies on long-term effort. Reflecting back on the muscle metaphor, self-control can strengthen with practice. Researchers measured how participants responded to exercising self-control over a two-week period engaging in exercises such as improving posture, tracking eating habits, and regulating emotions (Muraven, Baumeister, & Tice, 1999). Participants who strengthened their self-regulation through practicing these habits performed better on self-control tasks within the lab compared to the control group not assigned to practice self-regulation. This study shows that trait self-control can be strengthened over time, preventing the likelihood of ego depletion when situational self-control is required.

Recovery from Ego Depletion

We reviewed prevention of ego depletion based on distraction, enhanced motivation before self-control is exercised, and long-term strengthening of the self-control muscle. However, the bulk of research focuses on recovery from ego depletion after it occurs. The available research demonstrates that various types of interventions can replenish self-control.

Self-awareness and self-control are experimentally linked, and Alberts, Martijn, and de Vries (2011) pursued this idea by asking participants to complete a task either high or low in

self-awareness. The high self-awareness task required the use of personal pronouns like “I” or “me.” For the low self-awareness condition, the task contained only random names rather than personal pronouns. To assess the potential for ego depletion, experimenters measured how long participants squeezed a handgrip. As their hypothesis predicted, depleted participants who received a high self-awareness task significantly outperformed the depleted participants who received the low self-awareness task. This study supports the notion that self-awareness enhances self-control. Alberts and colleagues (2011) argued that self-awareness makes people pay closer attention to their thoughts, emotions, and behaviors. As a result, people adjust their behavior to meet a normed model, in this case, a model of self-control. People adjust or regulate their behavior to meet the expected standard and act in a way to carry out the intended behavior.

As a second approach to regaining self-control, money can counteract the effects of ego depletion (Boucher & Kofos, 2012). In Experiment 1, the researchers hypothesized that participants who were ego depleted by crossing out the letter ‘e’ under a complex set of instructions and subsequently reminded of money would persist on an unpleasant task as long as non-depleted groups. Money serves as an incentive to exert more self-control and has been replicated in several studies. For example, participants kept their hands submerged in cold water for longer periods of time due to the incentive of money (Baker and Kirsch, 1991). Perhaps the reward of money is seen as “payment” for a well-executed behavior. To remind participants of money, the researchers used a sentence unscramble task in which 15 of the 30 sentences contained money-related words. As predicted, the reminder of money for ego-depleted participants allowed participants to perform significantly longer than ego-depleted participants who were not reminded of money. The mere promise or mention of money seems to be a motivation technique and allows participants to keep exerting effort despite having lost some self-control earlier in the study (Muraven & Slessareva, 2003).

A third approach to restoring self-control after depletion involves adjusting emotions. Fredrickson (2001) discovered that negative emotions could be reversed by positive emotions. Building on this idea, Tice, Baumeister, Shmueli, and Muraven (2007) hypothesized that ego-depleted participants can replenish self-control with positive affect. In Experiment 2, participants were either ego depleted or not by a simple 'e' task and a difficult 'e' task requiring participants to mark out the letter 'e'. Of course, the difficult 'e' task requires more attention and cognitive effort. Following the 'e' tasks, participants either watched a humorous movie to increase positive affect or a neutral video that neither increased nor decreased mood. To assess subsequent self-control, participants worked on a frustrating game for as long as they were willing to do so. As predicted, ego-depleted participants quit the task sooner than non-depleted participants. Thus, invoking positive mood replenished self-control.

Self-control is also replenished when positive emotion stems from implicit triggers. Ren, Hu, Zhang, and Huang (2010) randomly assigned participants to a thought-suppression task that causes ego depletion or a control task. Afterward, participants received either subliminal positive emotion by looking at 10 pictures with smiling faces or 10 pictures with a neutral face. Supporting their hypothesis, participants in the ego-depletion group receiving the implicit positive stimuli performed more tries on a cognitively challenging task than participants with the implicit neutral-emotion stimuli. Taken together, these studies indicate that a positive mood, whether it is manipulated explicitly or implicitly, can cancel out the effects of ego depletion.

Touch

One way to create positive affect is through positive social interactions. Participants with positive social interactions self-report higher levels of happiness and psychological well-being (Bernstein, Zawadzki, Juth, Benfield, & Smyth, 2018) as well as health indicators, including lower blood pressure (Heaphy & Dutton, 2008). Positive social interactions also allow for the

development of executive functions such as the ability to inhibit inappropriate actions, which equates with enhanced self-control (Moriguchi, 2014). Thus, positive social interactions share a wealth of desired outcomes, including physical, cognitive, and psychological benefits.

Positive Outcomes of Touch

A clear example of a beneficial social interaction is positive touch, which produces positive outcomes, including short and long-term effects, demonstrating that touch is essential (Leonard, Berkowitz, & Shusterman, 2014). Touch plays an important role in social interactions and communication (Sehstedt, Ignell, Backlund Wasling, Ackerley, Olaussin & Croy, 2016). In the first years of life, touch is essential for babies to develop psychological and physical health (Montagu, 1971). In general, touch reduces stress by lowering systolic and diastolic blood pressure (Cady & Jones, 1997), enhances mood (Routasalo, 1999), decreases aggressive behavior (Wu, Wang, & Wang, 2017), and promotes relationship satisfaction (Harjunen, Spape, Ahmed, Jacucci, Ravaja, & 2017).

Of course different types of touch communicate different meanings. If we focus on positive-touch experiences, we find different categories of touch, including instrumental and expressive. Instrumental touch is purposeful in order to complete a task (Morris, Henegar, Khanin, Oberle, & Thacker, 2014). For example, Legg and Wilson (2012) demonstrated an instrumental touch by checking students' heart rate. Students who received the instrumental touch reported better teacher rapport, more enjoyment with the lecture, and more motivation. Another example of expressive touch is therapeutic touch, defined by contact with the intention of healing a person. Therapeutic touch, often used by nurses, positively relates to comfort and calming of hospitalized patients (Routasalo, 1999), including those with late-stage dementia (Belgrave, 2009).

On the other hand, expressive touch is acknowledged as sincere, friendly contact with no clear purpose. Even a simulation of expressive touch provides helpful benefits. Triscoli and colleagues (2017) examined the effects of touch by randomly assigning participants to either a 15 minute brushstroke touch conducted by a robot or a 15 minute vibration of the arm (Triscoli, Croy, Steudte-Schmeidgen, Olausson, & Sailer, 2017). Participants who received the brush stroke touch resembling a natural touch had lower heart rates compared to participants receiving a vibration.

One type of touch that can fall into either the instrumental or expressive touch is massage. Certainly, massage with the purpose of relieving muscle pain, for example, exemplifies instrumental touch; however, many clients opt for massage for the sheer purpose of physical touch, indicating an expressive function. Kutner and colleagues (2008) found that expressive touch in the form of massage or even gentle pressure in place of the massage resulted in better outcomes than no touch. Participants received a massage, simple pressure, or no touch repeated six times over a two-week period. Both types of touch caused significant reductions in pain, increases in mood, and improved quality of life compared to the participants receiving no touch. Taken together, these studies indicate that both instrumental and expressive touch result in positive outcomes across several domains.

Positive outcomes reflected by touch lead us to believe that touch will buffer the effects of ego depletion by helping participants regain self-control. Support for this idea was found among children in a delay-of-gratification paradigm. Leonard, Berkowitz, and Shusterman (2014) examined the effects of a friendly touch on self-control in preschool children. In the delay-of-gratification model, children who exhibit self-control while waiting subsequently enjoy better life outcomes, such as better school performance and coping skills (Mischel, Shoda, & Rodrigues, 1989). Leonard and colleagues hypothesized that a brief touch on the back before the

waiting period had the potential to improve children's self-control while waiting for a reward. They reported that children in the touch condition waited 1-2 minutes longer for the reward than children who did not receive a touch. Thus, touch prevented ego depletion as measured in this paradigm of self-control.

Current Study

Our study differs from that of Leonard and colleagues in three ways: (1) Our participants are college students rather than young children, (2) touch will follow the ego-depleting task (examining recovery) rather than before the need for self-control (prevention), and (3) we will rely on a traditional ego-depletion task and outcome assessment to link the value of touch with the ego-depletion literature. We anticipate that touch will replenish self-control after it is lost, allowing recovery from ego depletion. Specifically, our primary hypothesis is that participants who are ego depleted and receive expressive touch will persist longer on a geometric puzzle figure-tracing task than participants who are ego depleted and receive no touch.

CHAPTER 2

METHOD

Participants

We used the SONA system to collect a sample for this study. Both men (20) and women (66) enrolled in Introduction to Psychology completed the study, and students across all years of college participated. Our participants' ages averaged 19.31 years (*SEM* = .31), with ages ranging from 18-42. Most participants reported their status as either a 1st year student (48), or 2nd year student (24). Participants' ethnicities included White/Caucasian (42), Black/African-American (31), Hispanic (6), Asian/Pacific Islander (3), and "other" (4). English is the primary language of 80 participants. For a medium effect size, we needed to collect 64 participants, and we collected 86 total participants (Wilson & Joye, 2016). To ensure randomization, the experimenter used block randomization between the two groups using randomizer.org.

Materials

E-tasks. We used e-tasks to deplete participants (Baumeister, Bratslavsky, Muraven, & Tice, 1998, Experiment 4). The first e-task involved crossing out the letter 'e' in every instance in a passage of text. The second e-task involved crossing out the letter e, but not crossing out the letter 'e' if it is followed by a vowel or if a vowel is two letters before the e. Pilot testing in our laboratory demonstrated that the e-task indeed depletes participants relative to a control condition in which every instance of the letter 'e' is crossed out on both the first and second pages of text. On average, the control condition spent 3 seconds less on the e-tasks (*M* = 445.98, *SEM* = 2.04) than the touch condition (*M* = 448.86, *SEM* = 1.05).

Geometric puzzles. The main dependent measure is persistence on a problem-solving task which included three unsolvable geometric puzzles (Baumeister, Bratslavsky, Muraven, & Tice, 1998). The three puzzles required the participant to trace the figures completely without

lifting the highlighter or going over a line segment twice. Multiple copies of each figure were present so the participant can have as many attempts as the participant pleases. Before starting the puzzles, the participant was presented with a practice geometric puzzle that is solvable, and the researcher, who was the principal investigator, demonstrated how to trace the puzzle followed by allowing the participant to trace the solvable example. Participants are allowed to work on the task for 20 minutes. The experimenter starts a timer when leaving the participant, and stops the timer when the participant rings the bell to signal stopping or at the 20 minute stop time. Pilot testing in our laboratory demonstrated that the puzzle task serves as an effective dependent variable for the e-task. Specifically, participants in our pilot data who were ego depleted spent less time on the geometric puzzles than participants who were not ego depleted. On average, participants in both conditions spent an average of 15 minutes and 38 seconds (M = 938.33 sec, SEM = 27.62) tracing the geometric puzzles

Task perception questionnaire. The task perception questionnaire is borrowed from Muraven's original scale (Muraven, Collins, & Neinhaus, 2002). The original scale is a 35-point Likert scale to analyze participants' perception of the task as well as how the task makes them feel. Of the 35 original questions, we borrowed 7 questions to examine the effects of the e-tasks on a 7-point Likert scale. The 7 questions are used to verify the difficulty of the e-tasks and confirm if the e-tasks are indeed fatiguing. We analyzed the scores from the 7 questions to affirm the ego depletion task is diminishing self-control; the score served as a manipulation check. By collapsing the 7 questions, we created one score for all participants (M = 4.29, SEM = .10) to indicate perception of the task. Between the two conditions, the control condition (M = 4.22, SEM = .16) and the touch condition (M = 4.38, SEM = .12) demonstrated similar task perceptions. A sample item related to task perception is, "How difficult was the crossing out the E task?" Responses to the task are also measured with items such as, "During the figure puzzle

task, how motivated did you feel?" In the original study, Muraven et al., indicated a Cronbach's alpha level of .62; in our current study, we found a Cronbach's alpha level of .65. Despite the low Cronbach's alpha, the task perception questionnaire is used to confirm the effects of the ego-depleting measure.

Brief self-control scale. The brief self-control scale (BSCS) was created to indicate self-report measures of self-control (Tangney, Baumeister, & Boone, 2004). The test-retest reliability score for BSCS is .87, and in our study we found a Cronbach's alpha level of .81.The 13 questions contain a scale with 1 indicating *not at all like me,* and 5 indicating *very much like me.* For example, one statement on the scale is, "I am good at resisting temptation." A higher score by averaging all the items on the scale indicates higher self-control.

Comfort with interpersonal touch scale. The comfort with interpersonal touch scale indicates whether people self-report feeling comfortable with touch or not (Webb & Peck, 2015). The 6 questions assess the degree of comfort with touch by reporting 1 indicating *strongly disagree* and 7 indicating *strongly agree.* The comfort with interpersonal touch scale is divided into two subscales: initiating touch and receiving touch. A higher score indicates greater comfort with touch. Webb and Peck (2015) reported a Cronbach's alpha level of .84. Our study demonstrated a Cronbach's alpha level of .80.

Adverse childhood experiences (ACE) questionnaire. The adverse childhood experience (ACE) questionnaire measures various instances of trauma that occurred under the age of 18 (Felitti, Anda, Nordenberg, Williamson, Spitz, Edwards, & Marks, 1998). It is a self-report measure with 10 questions, including, "Was a household member depressed or mentally ill, or did a household member attempt suicide?" Participants respond either *yes* or *no*. Additional items investigate emotional abuse, divorce, and intimate partner violence within the home. A higher score indicates a higher number of adverse childhood experiences. A higher

score relates with poorer physical and mental health, with predicted impairments in cognitive and social functioning (Iniguez & Stankowski, 2016). Higher ACE scores have been correlated with higher levels of impulsivity and lower levels of self-regulation (Shin, McDonald, & Conley, 2018; Sciaraffa, Zeanah, & Zeanah, 2018)

Procedure

The researcher tested each participant individually in a large laboratory with two smaller rooms adjacent to the main room. The experimenter was not blind to each participant's condition but did minimize experimenter bias by randomly assigning participants to touch condition immediately before the touch occurred rather than prior to their arrival in the laboratory. Before the experiment began, participants placed their belongings, including cellphones, in one of the smaller adjacent rooms in order to minimize distractions. Participants were seated at a desk in the second smaller room, and the room contains one table, chair, and bell. First, participants read and signed the informed-consent form. For the duration of the study, participants were asked to ring the bell after each task was completed. Thus, after participants finished reading and signing informed consent, they rang the bell.

Following informed consent, the experimenter entered the room with the first (simple) e-task, asking participants to read the directions. Each participant was allotted time to ask questions about the directions of crossing out every instance of the letter 'e' on the paper, then the experimenter reminded the participant to ring the bell after completing the task. The first task lasted 7 minutes, and if the participant did not complete the task within 7 minutes, the experimenter entered the room with the second task. In order to create ego depletion, directions instructed participants to cross out the letter 'e' in every instance except if the 'e' is followed by a vowel (a, e, i, o, u) or if a vowel occurs two letters before the 'e'. The directions also included "spaces do not count" to lessen confusion. Participants were allowed 8 minutes to complete the

task, and if the participant did not finish within the time limit, the experimenter entered the room to stop the task.

At the completion of the second ‘e’ task, the experimenter entered the room. Before entering the room, the experimenter checked to see if the participant would be receiving touch or no touch. For the experimental condition, once the experimenter entered the room, the experimenter briefly touched the participant on the right shoulder with the left hand. The brief touch lasted approximately 3 seconds. While the experimenter gave the brief touch, the experimenter stated the study is moving onto a different task, and it is okay if the participant is not finished.

The participant next was told each individual would work on a spatial-abilities task. First, the experimenter demonstrated how to complete a tracing puzzle figure using a solvable example, requiring each participant to trace figures with a highlighter without picking up the pen or going over a line segment twice. Second, the participant was allowed to complete tracing the same figure. Third, the experimenter placed three tracing figure puzzles in front of the participant, explaining that the puzzles may be difficult and frustrating, but plenty of time is left in the study. The experimenter stated that many copies could be used when working on all three puzzles, in any order. Before leaving the room, the experimenter implemented a second touch on the participant’s shoulder for 3 seconds while reiterating important rules like the participant can use as many copies as wanted. For the control condition, everything stated above remained the same, except the participant did not receive touches. The script and number of words said to all participants were the same. The experimenter left the room to let the participant persist on tracing puzzles. When the participant chose to quit, the participant rang the bell, or the experimenter entered the room at 20 minutes to end the task. The experimenter kept track of the time using a cell-phone timer.

The task perceptions survey followed the tracing task. After the participant reported the perceptions of the task, the experimenter brought in a set of paper surveys including the Brief Self Control Survey, Comfort with Interpersonal Touch Scale, and Adverse Childhood Experiences Survey, in this order. The surveys were stapled together for participants to complete surveys in order. The last survey to be collected included demographics (Appendix E). When surveys were collected, the experimenter thanked the participant for involvement.

CHAPTER 3

RESULTS

Pilot Testing

In order to assess the potential for touch to restore self-control following ego depletion, we needed to confirm that our e-task would create depletion as measured by the puzzle task. Therefore, we collected data from a sample of 53 students randomly assigned to the difficult e-task or the simple e-task (control) condition. Type of e-task affected time spent on unsolvable puzzles, $t(53) = 2.38$, $p = .021$, $d = .64$. As shown in Figure 1, participants who completed the ego-depleting e-task stopped working on the puzzles sooner ($M = 844.90$ sec, $SEM = 55.65$) than those who competed the control e-task ($M = 1027.04$ sec, $SEM = 51.74$). We reported no missing data and outliers.

Primary Analysis

In the current study, our primary research question examined the utility of touch to abolish ego depletion. We compared participants who received two brief touches with participants in the control condition who did not receive touch. Before examining the data, we reported no missing data and outliers. To assess if those in the touch condition completed the tracing puzzles longer than the control condition, we analyzed the data using an independent samples *t*-test. Touch affected the amount of time spent on tracing puzzles, $t(86) = -2.93$, $p < .001$, $d = .63$. As shown in Figure 2, participants who received touch persisted longer on the puzzles task ($M = 1015.86$ sec/16 min and 55 sec, $SEM = 34.54$) than those who did not receive touch ($M = 860.79$ sec/14 min and 20 sec, $SEM = 40.12$). This result suggests that touch serves as an effective buffer against ego depletion.

Confirming Comparable Groups

In order to assess the potential that our key group difference could not be attributed to variables other than touch, we compared the two groups on (1) time spent on the e-task as well as (2) perceptions of the e-task. Because both the touch and control conditions performed the ego-depleting task, time on task and perceptions should not have differed. Indeed, touch condition did not affect the amount of time spent on e-tasks, $t(86) = -1.26$, $p = .213$, with both the control condition ($M = 445.98$, $SEM = 2.04$) and the touch condition ($M = 448.86$, $SEM = 1.05$) performing for the same amount of time on the e-tasks. Similarly, both conditions viewed the ego-depleting tasks the same way, $t(86) = -.707$, $p = .482$), with the control condition's perceptions ($M = 4.22$, $SEM = .16$) and the touch condition ($M = 4.38$, $SEM = .12$) demonstrating similar scores.

CHAPTER 4

DISCUSSION

Self-control is tied to a limited source, and through repetitive tasks, self-control becomes depleted (Baumeister, Vohs, & Tice, 2007). Baumeister (1998) explained ego depletion using a muscle analogy. Both self-control and a muscle require energy and strength to perform repeated actions. After repeated exertions, the muscle becomes fatigued. Similarly, self-control deteriorates with repeated exertions, resembling symptoms of fatigue. As an alternative explanation, Inzlicht, Schmeichel, and Macrae (2014) explained ego depletion through the process model. The process model states that humans seek balance between desires for externally rewarded labor versus inherently rewarding leisure. This adaptive function allows people to engage in a task to obtain rewards and resources and disengage from it to seek actives that are more gratifying.

Regardless of the ultimate reason for a reduction in effort after exercising self-control, the detriment can be overcome. Previous literature supports effective mechanisms to buffer the effects of ego depletion, such as self-awareness, money, and positive emotion, perhaps including the positive emotion reported in the touch research (Routasalo, 1999). To further investigate the potential for touch to overcome ego-depletion, we introduced supportive touch in the ego-depletion paradigm.

As expected, touch served as an effective buffer against ego depletion. Participants who received supportive touch persisted on the geometric puzzles 2 minutes and 35 seconds longer, on average, than the participants who did not receive touch. Touch is an important aspect of social interactions, and research demonstrates that touch may foster self-control (Leonard et al., 2014). Touch reduces stress, (Cady & Jones, 1997), enhances mood (Routasalo, 1999), decreases aggressive behavior (Wu et al., 2017), and promotes relationship satisfaction

(Harjunen et al., 2017). The beneficial outcomes of touch led us to predict that it would serve as a buffer against ego depletion.

A possible explanation of our primary result could be attributed to mood. To recover from ego depletion, Tice, Baumeister, Shmueli, and Muraven (2007) indicated that a positive mood induced by a humorous movie significantly impacted how long participants persisted on a frustrating game (i.e., positive mood was linked to persisting longer). Available literature indicates that touch provides a way to enhance mood. For example, Routasalo (1999) demonstrated touch affected mood positively by affecting attitudes and behaviors when nurses implemented touch to patients. Also, Kutner et al. (2008) conducted a study illustrating a brief touch immediately affected mood. Merging ego depletion and touch literature reveals enhanced mood as a possible explanation for our significant effect.

Another possible explanation for our primary result involves the type of touch we used. Several types of positive touch exist, but our focus was on expressive (supportive) touch. Expressive touch is sincere, friendly contact with no clear purpose; during a tense situation, it can be perceived as supportive (Leonard et al., 2014). We argue that sincere and friendly touch served as the vehicle to enhance mood and attenuate ego depletion. However, we recognize that attenuation may not occur with alternative types of touch.

One potential explanation for our primary result may have involved the good-participant effect. Orne (1962) stated that participants are actively affected by the experiment, and their behavior may change due to conforming to behavior that the participant believes the experimenter desires. In the current study, participants may have conformed their behavior to persist longer on geometric puzzles, attempting to please the experimenter who touched them in a supportive manner. This explanation does not necessarily negate the potential for touch to

reduce ego depletion and replenish self-control, but pleasing the experimenter should be further explored.

Future research could explore if the positive benefits in our study could be replicated using different types of touch. For example, Legg and Wilson (2012) used instrumental touch – touch with a purpose, such as teaching a task – using student participants. They measured rapport toward professors after implementing touch or no touch. The instructors implemented touch by demonstrating how to check a pulse on students' wrists, with the control condition verbally taught how to take their pulse. Students who experienced instrumental touch reported enhanced mood-related perceptions of the instructor. Therefore it is reasonable to assume that other types of touch, such as instrumental, might serve as useful buffers against ego depletion.

Note that both the sample studied by Legg and Wilson (2012) and our own sample included primarily female participants, which may affect generalizability. Researchers suggested that women and men experience touch differently; in essence, women experience touch more strongly and are more affected by physical touch (Fisher, Rytting, & Heslin, 1976; Schirmer, Ng, & Ebstein, 2018). Future studies could explore the potential for participant gender to moderate the role of supportive touch in ego depletion.

Similarly, experimenter gender may play a key role in the outcome. In the current study, the experimenter was a young adult female. Previous research indicates that gender may influence how participants convey touch. For example, Wilson and colleagues (2009) found a gender difference between touch by implementing a handshake to students. Students reported more favorable ratings of female professors compared to male professors when experiencing a handshake on the first day of class (Wilson, Stadler, Schwartz, & Goff, 2009). Male professors who shook their hands on the first day of class were viewed more negatively than female

professors who shook their hands. Thus, the favorable effect of touch in our study may be limited to touch conveyed by a female experimenter.

We should note that since the experimenter was not blind to touch condition, she may have implicitly treated participants in the two conditions differently. The researcher may have engaged in subtle social cues with the touch condition, and behavior may have been affected by the belief in the power of touch (Gilder & Heerey, 2018). Due to this possibility, the experimenter took action to minimize the problem in the current study. The experimenter did not randomly assign participants to touch condition until immediately before implementing the touch, which minimizes bias in interactions before the touch. As well, the experimenter remained conscious of her behaviors, attempting to treat participants in both conditions the same.

Our results support touch as a buffer for ego depletion, but future research may need to consider the sample's levels of trauma. Although touch can be beneficial for patients, the main result may not carry over in a sample with higher levels of trauma. Our current sample's ACE score averaged 1.33, which reflects 1-2 adverse childhood experiences under the age of 18. As we can see, our sample reported low levels of negative childhood experiences, likely creating a floor effect for this variable. However, patients in an inpatient hospital or patients seeking treatment voluntarily may have experienced more trauma than the general population. Consequently, our study may not replicate in a sample with more trauma. A touch may be perceived as unwanted or trigger unpleasant memories, especially for victims of sexual trauma.

Our study shows that ego depletion can be attenuated by supportive, expressive touch, at least when perpetrated by a female researcher with participants reporting few negative childhood experiences. This result adds another option to a growing arsenal of defense against loss of self-control. Considering the many challenges to self-control in daily life and the potential for

negative outcomes, we look forward to a continually expanding literature on buffering against ego depletion.

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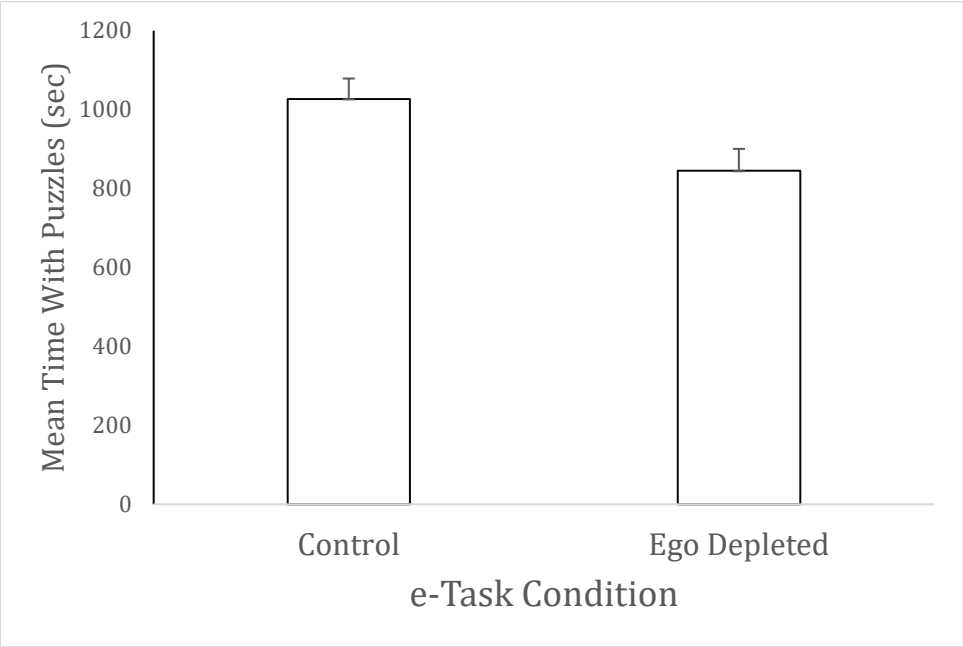

Figure 1. A difficult e-task created ego depletion relative to a simple e-task as measured by time spent attempting to solve puzzles. Error bars represent *SEM*.

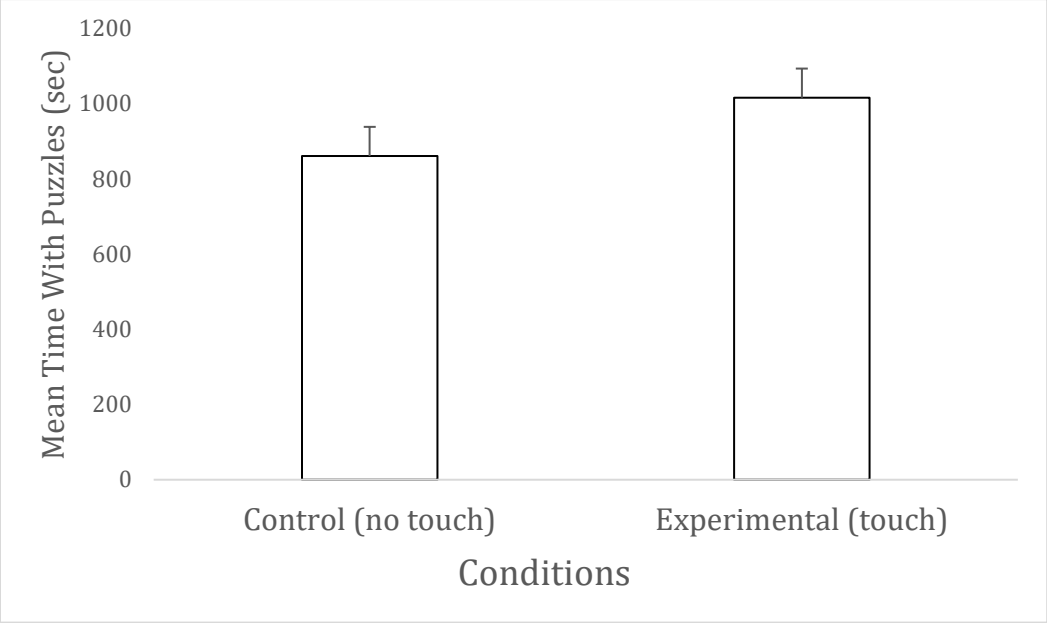

Figure 2. Touch by the experimenter replenished self-control, which was measured by time spent tracing the geometric puzzles. Error bars represent *SEM.*