

SOCIAL EXCLUSION: EGO DEPLETION AND SELF-AWARENESS

A Thesis

by

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This thesis meets the standards for scope and quality of
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ABSTRACT

Previous research investigating ego depletion has found that self-control actions yield a state of ego depletion. Ego depletion occurs after the reserve of limited resources necessary for self-regulation are depleted (Baumeister, R. F., Bratslavsky, E., Muraven, M., & Tice, D. M., 1998). This study sought to generalize the detrimental effects of ego depletion to cognitive performance and, in addition, determine whether self-awareness would alleviate ego depletion in participants, thereby reducing (or eliminating) its effect on cognitive performance. The current study utilized three different tasks to elicit ego depletion (control group no ego depletion), difficult math task, or social exclusion task. A self-awareness manipulation was included in the study utilizing two writing assignments (self-awareness prompt or neutral prompt). Results indicated a main effect of ego depletion, indicating that participants within the social exclusion group demonstrated a larger deficit in cognitive task performance than the control group. No interaction was found between the factors, which indicates that self-awareness did not alleviate ego depletion in this study. Future research should investigate ways to alleviate ego depletion or even to strengthen self-control to deflect ego depletion following social exclusion experiences.

TABLE OF CONTENTS

CONTENTS	PAGE
ABSTRACT.....	v
LIST OF TABLES.....	vii
SOCIAL EXCLUSION: EGO DEPLETION AND SELF-AWARENESS	1
METHOD	12
RESULTS	18
DISCUSSION.....	19
REFERENECES.....	28

LIST OF TABLES

TABLES	PAGE
Table 1: Cognitive Performance Between Ego Depletion Groups.....	26
Table 2: Cognitive Performance Between Ego Depletion and Self-Awareness Groups.....	27

SOCIAL EXCLUSION: EGO DEPLETION AND SELF-AWARENESS

The theory of ego depletion is based on Freud's view that an individual's personality is composed of the id, ego, and superego (Freud, 1960). The portion of the personality that operates on instinctual drives is the id. Freud describes the id as being impulsive and unorganized, and not subject to any logical laws, moral reasoning or the current situation. Achieving what pleases the id as quickly as possible is its only concern (i.e. the "pleasure principle"; Freud, 1965). In order to determine what actions to take in order to satisfy the urges created from the id, the ego uses the reality principle. According to the reality principle, the ego takes into account the pleasure that the action could bring, but chooses a more realistic action (Freud, 1965). Application of the reality principle leads to greater long-term success, although the present pleasure may be postponed (Freud, 1966). As an example, imagine a hungry individual standing in line to order food. Rather than cutting in front of others in line, the individual's ego practices the reality principle. Although waiting for food will postpone the pleasure, the ego reasons that waiting in line will most likely result in food. Actions are determined using the ego by mediating between the id's primal impulses and the realities of the external world.

The interaction between Freud's parts of personality is where the concept of ego depletion arises. Freud explains that the ego operates as a guide to the id. The ego does not prevent the id from achieving its desires but transforms the id's desires into reasonable actions. In order to complete this task, the ego needs energy (Freud, 1960; Muraven, & Baumeister, 2000). Although the source of the mental resource to exercise self-control is never explained, other researchers have demonstrated this concept in previous studies (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Devine, Sedikides, & Fuhrman, 1989; Muraven, & Baumeister, 2000).

The mental resource cannot be measured directly but rather is measured using one task to utilize the resource and a second task to determine if the individual had experienced a decrease in their ability to exercise self-control. Should the individual demonstrate a decrease in performance on the subsequent self-control task then it is inferred that the resource is both limited and diminished. Without the energy provided by these limited mental resources, the ego is not able to exercise control of the id. During instances where the ego struggles with guiding the id's impulses, the individual can behave impulsively and lack self-control, which is evidence of what is known as ego depletion.

Ego depletion refers to the concept that volitional actions require energy from a limited resource. Volitional actions involve the self (ego) taking part in decision-making or self-regulation (Baumeister et al., 1998; Devine et al., 1989; Muraven, & Baumeister, 2000). Baumeister et al. (1998) demonstrated evidence for ego depletion in a study utilizing an impulse control task. Hungry participants were located in a room with freshly baked cookies and radishes. Researchers instructed participants to eat only the cookies, or only the radishes. A third group was not exposed to the food at all and only worked on the puzzle. The group of participants that was instructed to eat only the radishes showed trouble exercising self-regulation when later instructed to complete a difficult puzzle. That is, they spent less time on the difficult puzzle and gave up much sooner, as compared to the groups that consumed the chocolate chip cookies or no food at all. According to Baumeister et al., (1998), the reason participants in the radishes only condition gave up much sooner on the puzzles was due to the participants having to resist temptation. Resisting temptation required the use of some mental resources, thus decreasing the amount that was available to persist in the puzzle task.

Ego depletion has also been found to occur after decision-making (Baumeister et al., 1998; Vohs, Schmeichel, Nelson, Baumeister, Twenge, & Tice, 2008). Vohs, Schmeichel, Nelson, Baumeister, Twenge, and Tice (2008) required participants either to make several decisions about or to rate consumer products prior to drinking a foul-tasting drink. The participants in the first condition were presented with a questionnaire describing a series of consumer products in which they were asked to decide which products they preferred in each category. For example, participants decided which pair of socks they prefer in the sock category of products. They were informed that they would receive a gift based on their preference of products. Participants in the second condition rated each product based on their experiences using them. Participants who rated the products were informed that they would receive a gift determined by the experimenter. The results showed that participants who were required to make preference decisions consumed less of the foul tasting drink as compared to the group who simply rated the products. According to Vohs et al. (2008), consuming the drink required self-control because the drink tasted awful. Participants who did not have to make decisions regarding their preferences still had available resources needed for self-control in order to consume the awful tasting beverage, whereas the group that had to make decisions had depleted more of their resources during the more effortful decision-making task, so they had less self-control in drinking the beverage.

Baumeister et al. (1998) has also demonstrated ego depletion following tasks requiring emotional regulation. The experimenters instructed participants either to show their emotion by crying or laughing freely or to withhold their emotions while viewing a film. Researchers found that participants who were asked to withhold their emotions during the film required more effort to follow the researcher's instruction than the participants who were encouraged to show their

emotions during a film. Results showed that the participants instructed to withhold their emotions solved significantly fewer anagram puzzles than the participants that were instructed to display their emotions freely. The researchers suggest that emotional regulation requires resources from the self (ego), thus depleting resources left available for persistence in subsequent tasks.

Other experimental manipulations have also been shown to reduce performance on subsequent activities, one of which is social exclusion. Yan, Zhou, Long, and Ji (2014), have attributed the negative effects of social exclusion to a depletion of limited resources essential for self-control. They found that maladaptive responses to social exclusion occurred in individuals who had experienced impaired self-regulation as demonstrated in ego depleted individuals. The study investigated social exclusion in the workplace. In this study, social exclusion was defined as feeling excluded or ignored by employers or colleagues. Yan et al. (2014) utilized surveys, which asked questions about social exclusion in the participant's previous experiences in the workplace. In this case, social exclusion was measured as the frequency of social exclusion incidences, such as avoiding eye contact as well as conversation with them or becoming silent when they are around was reported. Results showed that individuals reporting higher frequencies of social exclusion incidences demonstrated an increased number of counterproductive behaviors in the workplace, such as increased aggression and avoidance of responsibility, as compared to individuals who reported fewer incidences of social exclusion in the workplace. The researchers suggest that because the socially excluded individuals spent more resources regulating their emotions, the resources were not available to regulate their counterproductive behaviors.

Risky decision-making has been found to be linked to social exclusion (Baumeister, Twenge, & Nuss, 2002; Ciarocco, Sommor, & Bauimester, 2001; Devine et al., 1989). In

Twenge, Cantanese, and Baumeister's (2002) study, researchers had participants complete the Eysenck Personality Questionnaire. The researchers then provided the participant accurate feedback regarding their level of extroversion based on the survey, along with fictitious feedback regarding their future personality. The feedback indicated that, in the future, the participants would either 1) end up alone later in life, 2) be accepted by their friends and family, or 3) be involved in many accidents. Participants were randomly assigned to the three different fictitious feedback conditions. Following feedback, the participants were instructed to decide which lottery they would prefer to enter. The researcher explained to the participants, prior to deciding, that after the study the participants would be entered into the lottery they preferred. The two lotteries included either a high-risk option or a low risk option. In the high-risk lottery, the possibility of "winning", that is, receiving a twenty-five dollar monetary reward, was 2%, with a 98% chance of "losing", that is hearing an unpleasant screeching noise, which was a 3 minute long tape that played the sound of "fingernails scraping on a chalkboard," (Twenge et al., 2002, pp. 609). In the low risk lottery, the possibility of winning a two dollar monetary reward was 70%, with a 30% chance of losing and hearing the screeching noise. According to the researchers, the best lottery to be placed in was the low risk lottery, as participants were most likely to receive some money and less likely to be required to listen to the screeching sound. However, results demonstrated that individuals who anticipated being alone in the future were found to take more risks, with a higher possibility of negative outcomes, as compared to individuals who anticipated being accepted by others in the future (Duclos, Wan, & Jiang, 2013; Twenge et al., 2002). Further investigation using post-experimental questioning found that individuals who anticipated being alone in the future did not make the high-risk choice because of the increased possibility of the negative outcome. Instead, they indicated that they selected the high-risk choice due to the

award being twenty-five dollars instead of two dollars. Participants who were informed that they would be alone in the future wanted to win the largest amount of money, even though the possibility of winning the monetary reward was reduced. Additional research has found that social exclusion can lead to other undesirable behaviors as well, including increased aggression, decreased prosocial behavior, increased unhealthy choices, and reduced performance on cognitive tasks (Baumeister, DeWall, Ciarocco, & Twenge, 2005; DeWall, Twenge, Gitter, & Baumeister, 2009; Twenge, Baumeister, DeWall, Ciarocco, & Bartels, 2007; Twenge, Baumeister, Tice, & Stucke, 2001).

As demonstrated above, the anticipation of being alone in the future has been found to have negative effects on cognitive abilities. Baumeister et al. (2002) investigated whether the anticipation of being alone in the future had a greater impact on memory recall or reasoning abilities. As in previous studies, their manipulation of social exclusion in the experimental conditions included giving fictitious feedback to participants after they had completed the Eysenck Personality Questionnaire. Participants were randomly assigned to one of three conditions, in which they were informed that they were 1) most likely to be alone in the future, 2) were likely to have many relationships in the future, or 3) were likely to experience many accidents in the future. According to the study, participants were presented with accurate feedback pertaining to their level of extraversion. Additionally, those in the alone in the future condition were informed “that once the person is past the age at which people are constantly forming new friendships, their current friends would drift apart and not be replaced” (Baumeister et al. 2002 pp. 819). Following feedback, participants either completed problems from the analytical section of the GRE, in which they had twelve minutes to complete twelve questions, or completed a recollection task, in which participants were asked to memorize 15 nonsense

syllables in 60 seconds, then complete math problems for ninety seconds (the math problems were a filler task). Results found that participants who were informed that they would be alone in the future accurately completed fewer GRE questions compared to the participants who were informed that they would have many relationships in the future or the participants who were informed that they would experience many accidents in the future. In the nonsense syllable task, there was no difference between participants' in their ability to correctly recall nonsense syllables. According to Baumeister et al. (2002), the results indicate that analytical reasoning requires higher functions of thinking. These higher functions require resources that have been depleted by the need to regulate emotions created by receiving false aloneness feedback prior to completing the analytical task. Yet this effect was not found in participants who received the fictitious feedback that the participant would experience many accidents in the future. However, participants who were informed that they would be alone in the future were found to report a lack of emotion toward the fictitious news compared to the participants who were informed they would be experience many accidents. The lack of accurately completed GRE questions is attributed to an impairment of higher functions due to the participant suppressing their emotions.

Gardner, Pickett, and Brewer (2010) investigated the influence of social exclusion on selective memory utilizing a chatroom simulation to manipulate social exclusion. Participants participated in one of three social chatroom experiences, in which they experienced 1) socially acceptance 2) interpersonal rejection, or 3) collective rejection. Participants were informed that they would be participating in a chatroom with four other participants located in a different area on campus. The socially accepted chatroom included confederates who acknowledging the participant's responses. Participants within the interpersonal rejection chatroom were ignored by the confederates who chatted in groups of two. The collective rejection chatroom confederates

discussed a common interest that the participants did not share. Following the social experience manipulation, researchers asked participants to answer questions related to their cover story discussing the formation of impression in the chatroom as well the PANAS mood scale. Subsequently, four days of diary entries were read by the participants containing seven types of entries: (individual, relational, collective) x (negative, positive) and one neutral filler per day. Questions pertaining to the formation of impressions based on the entries the participants had reviewed were asked to evade suspicion of the study's true purpose. Afterwards, participants were instructed to recall the diary entries. The researchers found that in both the rejection conditions participants recalled more social events than those in the socially accepted condition.

Private self-awareness occurs when the individual becomes aware of his/her internal feelings and beliefs (Hess & Pickett, 2010). This self-awareness has been found to influence participants to change their behavior in order to meet internalized ideals and beliefs about themselves (Hess & Pickett, 2010; Froming, Walker, & Lopyan, 1982; Vallacher & Solodky, 1979). Self-awareness has also been found to decrease the impact on physical and pain stamina in individuals who have experienced ego depletion (Alberts, Martijn, & de Vries, 2011; Schmeichel & Vohs, 2009). Alberts et al.'s (2011) study required participants to use a handgrip to grasp a coin until the coin fell. According to Alberts et al., (2011), the handgrip task was used to measure the individual's self-control. Over a period of persistent squeezing the individual will want to release their grip, as their hand will start to feel pain. Following the handgrip task, some participants then completed a task made up of difficult math calculations while distracting noises were played in the background. This additional task was designed to further deplete their resources. Other participants were instructed to complete easy math calculations with no distracting sounds. Following the additional math task, the researchers then induced self-

awareness in one group of participants by requiring them to unscramble sentences beginning with “I”, while the control group unscrambled sentences that did not include the word “I.” The pronoun “I” in the sentences were used as a priming method. At the end of the study, participants completed a second handgrip task, the results from which were then compared with those from the initial handgrip task. Participants who were made self-aware following ego depletion were found to grip the handgrip longer at the end of the study than ego depleted individuals that were not made self-aware. Alberts et al. (2011) concluded that the introduction of the word “I” induced self-awareness, which countered the effect of ego depletion and led to better performance on the handgrip task.

In another study, Schmeichel and Vohs (2009) required participants to complete an ego depleting writing task and an additional writing assignment to increase the participants’ self-awareness. During the ego depleting writing task, experimenters instructed some participants to exercise self-control by writing about a “recent trip you have taken. It may be a trip to the store, to Ohio, or another country – wherever!” (Schmeichel & Vohs, 2009, pp. 772), with a restriction on the letters the participants were allowed to use. For example, participants were instructed to avoid using words requiring the letters “a” or “n.” A second group of participants were given the same writing prompt without any letter restrictions. Following the writing task, participants ranked a list of 11 different values and personal characteristics (attractiveness, creativity, family relations, athletics etc.) in order of importance to the participant. Following the ranking of values, the participants were instructed to complete another writing task using a different writing prompt for the self-awareness writing task. Some of the participants were made self-aware by requiring self-reflection of positive internalized aspects of themselves in order to rank the different values. For example, participants were required to explain, in writing, why they chose

to rank the values in that order in terms of how important those values are to themselves. The remaining participants were part of the non-self-aware group, which was asked to describe the importance of their ranked values in terms of the perceived importance of those values to other college students. Following this second writing task about values, participants were required to immerse their hand into cold water until the participants could no longer withstand the pain. Schmeichel and Vohs (2009) found that non-self-aware participants who experienced ego depletion by being restricted in letter use in the first writing task had a lower pain tolerance; they immersed their hands in the cold water for a shorter period. However, ego depleted participants who wrote about the values they ranked in terms of themselves and were made self-aware immersed their hands in the cold water as long as non-ego depleted participants did. The study found that ego depleted participants who completed the self-awareness task had a higher pain tolerance than the ego depleted participants who did not complete the self-awareness task.

Some studies have demonstrated the effects of self-awareness on social exclusion in regard to avoidance behavior (Baumeister, 1990; Twenge Catanese, & Baumeister, 2003). In addition to the results mentioned previously, Twenge et al. (2003) also found that participants who were predicted to be alone in the future tended to evade situations that may induce self-awareness. Individuals who are socially excluded avoid self-awareness because the individual does not want to focus on himself or herself. During social exclusion the individual wants to avoid focusing on the thought of not belonging or being undesirable to others. As before, Twenge et al. (2003) informed participants that they a) would be alone in the future, b) be accepted by their friends and family, c) experience many accidents in the future, or d) were given no feedback following completion of the Eysenck Personality Questionnaire. Participants were then informed that they would be taking part in a second, unrelated experiment. The

experimenter led participants to a second room and instructed them to take a seat while the experimenter went to look for a colleague. In the room there were two chairs. One chair faced a mirror and the other chair faced a wall. The participants were discouraged from moving the chairs by a sign that read “Do not move” (Twenge et al., 2003, pp. 610). Once the experimenter returned, the participants were instructed to complete a questionnaire about their seating choice. The researchers found that participants who were informed that they would most likely be alone in the future chose to sit facing away from the mirror compared to the other conditions. All but one of the participants who were informed that they would be alone in the future sat in the chair facing the wall. The participants in the other conditions had an equal distribution of participants seating in the chair facing the wall or toward the mirror. Twenge et al. (2003) confirmed their hypothesis that participants who anticipated being alone in the future (i.e., were social excluded) would avoid becoming socially aware by choosing the seat which was not facing the mirror. Individuals avoid being socially aware in order to avoid viewing individual shortcomings as a product of themselves (Baumeister, 1990).

Although it has been well documented that inducing self-awareness can alleviate the effects caused by the ego depletion, few studies in the literature have investigated whether inducing self-awareness after experiencing social rejection would have a similar effect on cognitive performance as inducing self-awareness has on other forms of ego depletion. The proposed study investigated the relationship between ego depletion and self-awareness by comparing differences in cognitive performance between two different ego depletion tasks, as well as a control group with no ego depletion, when participants are made self-aware. Self-awareness within this study was induced to yield an awareness of one’s self and require participants to reflect on themselves. The current study utilized a writing assignment similar to a

method used by Vohs and Schmeichel (2009) in which participants ranked values then wrote about the importance of those values to themselves. My current study's manipulation of self-awareness did vary based on the writing prompt. The current writing prompt would require participants to reflect on aspects of themselves as they think about who they are currently and who they would like to be in the future. Accuracy rate on the cognitive task was used as a measure of cognitive performance within this study. The cognitive task was comprised of 13 analytical/reasoning questions. The main purpose of this study was to investigate whether a difference between cognitive performance among different ego depletion conditions would occur. The authors hypothesize that a difference in cognitive performance would occur across different forms of ego depletion tasks. Participants in the ego depletion groups will have a lower accuracy rate compared to the control group. An additional purpose of the current study was to attempt to determine whether self-awareness has a larger positive effect on the participant's cognitive performance after completing one of two different ego depleting tasks. The two different ego depletion tasks will include a social exclusion task and a difficult math task that requires attentional control. The authors hypothesized that self-awareness should counteract the effects of ego-depletion for the participants completing the ego depletion tasks.

METHOD

The current study was designed to investigate whether a state of ego depletion would impair cognitive performance. In addition, the authors questioned if self-awareness might be a mitigating factor. The study consisted of three phases. Phase 1 required participants to complete a task that requires self-regulation to induce ego depletion. Two different forms of ego depletion tasks demanding self-regulation were used to induce a state of ego depletion. The difficult math task included addition problem in which distracting audio was played as participants completed

the problems requiring participants to regulate their attention as they completed mental math problems. The second ego depletion task was the social exclusion chatroom task in which participants communicated within a chatroom simulation with fictional confederates who excluded them from the chatroom conversation. In addition, a control group was included wherein participants did not complete an ego depleting task. Phase 2 manipulated self-awareness using a writing assignment utilizing two different prompts. In phase 3 cognitive performance was assessed using thirteen analytical/reasoning questions.

Participants

Eighty-five undergraduate students from TAMUCC were recruited through their undergraduate psychology courses to participate in this study.

Materials

Chatroom simulation. The chatroom condition utilized a chatroom simulation. Visual Basic Studio was used to simulate a chatroom on a computer. A program was created to imitate a chatroom conversation among the participant and two imaginary confederates. The script began with the participant and the confederate greeting each other, and progressed to the confederates responding to each other, while ignoring the participant.

Difficult math task. The difficult math task utilized the original stimuli as used by Alberts et al. (2011). One hundred addition problems were presented on a computer using E-PRIME. An mp3 file playing on a speaker was played loud enough for all participants to hear. The audio repeated the numbers “1” and “2” randomly for eight minutes. Distracting audio was played during the difficult math task to require the participant to regulate their attention, resulting in ego depletion.

GRE questions. Thirteen analytical/reasoning GRE questions were used to measure cognitive performance. The GRE questions were the same questions used by Schmeichel, Vohs, and Baumeister (2003). In order to answer the GRE questions, the participants were required to use logic and reasoning to create mental models using the sets of postulates provided by the questions. Thirteen logic/reasoning questions were included in the cognitive task.

Design

A 3x2 between subjects factorial design was used for this study, including ego depletion and self-awareness as independent variables. The dependent variable measured was accuracy on the cognitive performance task.

Procedures

Waiting room. Upon arrival, all participants met in a waiting area. In this area, all participants were given instructions regarding the study and provided with an informed consent form to review and sign.

Participants were then randomly assigned to groups. Participants assigned to the control group (no ego depletion) were told they would be completing a few tasks on a computer in a computer lab and were asked to wait until they are told to begin the study before starting. Before leaving participants were asked to review the consent form discussing the tasks and risks. The two ego depletion conditions were given similar instructions as the control group with the exception that participants assigned to the difficult math condition were told they would complete a math task while participants assigned to the chatroom group were told that would be participating in chatroom with three other participants who would be using computers in a different room. The social exclusion chatroom group, difficult math group, and the control group (given no ego depletion task) did not meet each other, in order to prevent interactions.

Phase 1: Ego depletion task.

Difficult math task. After signing the informed consent form participants were led to the computer lab. Once seated, the experimenter stated the following:

“Before we begin, the first portion of the study will require you to hear background audio as you work on the math problems. Once the math portion ends do not begin the second task if audio is still being played. The computer instructions will remind you to wait if audio is still playing. (This message is in case the unlikely chance participants do complete all one hundred problems before the eight minutes have passed). The program will provide you with instructions to follow. Please read them carefully as you progress through the different tasks. The final task will require you to answer 13 multiple choice questions in 12 minutes. After you have completed the final task and the experiment closes, please wait quietly at your computer until I return so that you do not disturb each other. Thank you. You may begin.”

The experimenter then left the room and turned on the background audio which played from the speaker in the room for all participants to hear. The computer instructed participants to type in their response to each math problem that appeared on the screen. The addition problems were presented in the middle of the screen, and increased in difficulty, starting from problems similar to $56+34$ and progressed to problems similar to $54+17+34+29$. After eight minutes, the math portion of the program ended and instructions for the writing assignment appeared.

Chat room social exclusion task. Participants in the chat room social exclusion condition experienced social exclusion as demonstrated in a former experiment (Gardner, Pickett, & Brewer, 2000). Following consent, participants were led to the computer lab. The participants were seated at a cubicle with a computer and were reminded of the tasks they will be completing. “Before we

begin, the first portion of the study will require you to participate in a chatroom with three other participants in a different room. The program for this task is already open. Read the instructions carefully before you begin. Once you finish please raise your hand, and I will setup the program that will have the other two tasks for you to complete. The program I set up following the chatroom will contain two tasks; the final task of those two will require you to answer 13 multiple choice questions in 12 minutes. After you have completed the final task and the experiment closes, please wait quietly at your computer until I return so that you do not disturb each other. Thank you. You may begin.” The participants were required to respond during their turn in the chatroom. The sequence of interactions was as follows: confederate, participant, confederate, and confederate. After everyone had greeted each other in the chatroom, the interactions will repeat this sequence four times. During the chatroom conversation, the confederates conversed about a topic, ignoring the participant and only communicating with the other confederates. A script was programmed for the confederates’ responses in which they, the confederates, will have a conversation amongst themselves, without acknowledging the participant’s responses. As mentioned previously, during this task, the participants experienced social exclusion as a lack of belonging to the group.

Phase 2: Self-awareness manipulation. Following the ego depletion task, half of the participants in each group were required to complete a writing assignment as demonstrated in a former study with variation in the prompts being presented designed to promote self-awareness, and the other half completed a neutral writing assignment designed not to promote self-awareness (Schmeichel & Vohs, 2009). The writing task was the same as the initial task completed by participants in the control condition, since they did not complete an ego depleting task. The writing assignment was presented on a computer, where the participants were instructed to type in their response to a writing prompt. The prompt consisted of one of the following two sets of instructions:

1) self-awareness prompt: “Write about the type of person you desire to be in the future”, or 2) neutral prompt: “Horizontally list as many animals as you can.” After five minutes, the writing task was terminated.

Phase 3: Cognitive Reasoning task. Upon completion of the writing assignment task, participants were instructed to complete the cognitive task, the 13 analytical/reasoning questions, which were used to assess cognitive performance. Thirteen analytical/reasoning questions were presented to participants on the computer screen one at a time. Participants were required to answer the current question presented prior to moving on to the next question. Participants were informed that they will be allowed 12 minutes to complete the entire set of 13 questions. Once participants move to the next question, they were not able to return to the previous questions. After twelve minutes, the computer program closed, ending the experiment. In accordance with the initial instructions given, participants remained seated quietly in the lab until the experimenter returned. Response time and frequency of correct answers on the cognitive task was recorded using EPrime.

After all participants completed the cognitive task, they were led to the waiting room to be debriefed. Participants were informed that the purpose of the study was to investigate the difference in cognitive performance between two different types of ego depletion when self-awareness is manipulated. The results of the study would be helpful to expand knowledge about the extent to which self-awareness influences cognitive performance for individuals who experience different forms of ego depletion. Participants in the chatroom social exclusion conditions were informed that the other participants in the chatroom were fictitious, and that a script had been programmed to simulate the responses for the three other participants (confederates) in the chatroom; thus, they were not having a conversation with other humans in the chatroom. The experimenter explained to the participants that they were excluded from the

chatroom dialogue to simulate social exclusion for the study. Participants were told that they had not been made aware of the study's true purpose to insure the study's results would not be affected. Each participant in the study signed a debriefing form if they permitted the experimenter to include their data in this study after being informed of the true purpose of the study. All participants were thanked for participating and dismissed. None of the participants reported any negative effects due to the social exclusion aspect of the current study.

RESULTS

Cognitive performance was measured by accuracy rate on the cognitive task completed within 12 minutes. The standard for statistical significance for all analyses within this study was $p < 0.05$.

Ego Depletion

The initial purpose of this study was to investigate whether there existed a difference between cognitive performance (accuracy rate) among different ego depletion conditions (control x difficult math x social exclusion). A one-way analysis of variance found that ego depletion levels did have a significant effect on accuracy rate, $F(2,82) = 4.70$, $p = 0.01$, $\eta^2 = 0.10$. A Tukey's post hoc test was employed as a multiple comparisons test to determine where the significant difference between the ego depletion conditions existed. The mean accuracy rates are represented in Table 1. The Tukey's post hoc ($p < 0.05$) test found no significant difference between the mean accuracy rate for the control group ($M = 33\%$, $SD = 2.26$) and the difficult math group ($M = 29\%$, $SD = 2.46$), $p = 0.69$ nor the difficult math group ($M = 29\%$, $SD = 2.46$) and the chatroom social exclusion group ($M = 19\%$, $SD = 1.64$), $p = 0.06$. Although the statistically difference between the control group and the difficult math was not significant the difficult math group did perform worse on the cognitive task than the control group, as had been expected. A significant difference was found

between the control group ($M = 33\%$, $SD = 2.26$) and the chatroom social exclusion group ($M = 19\%$, $SD = 1.64$), $p = 0.01$, $d = 0.92$. The control group had a significantly higher success rate than the chatroom social exclusion group. Based on observation of the means, performance on the cognitive task was the lowest in the chatroom social exclusion group followed by the difficult math group, then the control group, which had a higher success rate than both the other groups. These results had been expected.

Influence of self-awareness on ego depletion

Additionally, a 2X3 analysis of variance was used to determine if self-awareness influenced the effect of ego depletion. As above, the main effect of ego depletion was found to be significant $F(2,85) = 5.44$, $p = 0.006$, $\eta_p^2 = 0.12$. The main effect for self-awareness was found to not be significant, $F(1,85) = 2.74$, $p = 0.10$. The interaction between ego depletion and self-awareness was not significant $F(2,85) = 2.41$, $p = 0.09$. Although the interaction between the factors of ego depletion and self-awareness was not significant, within the control group we observed that the self-awareness group ($M = 26\%$, $SD = 2.15$) had a lower success rate than the neutral group ($M = 42\%$, $SD = 1.89$), which was contrary to the experimenter's expectation. The social exclusion chatroom group demonstrated a similar trend in which the self-awareness group ($M = 16\%$, $SD = 1.74$) had a slightly lower success rate than the neutral group ($M = 21\%$, $SD = 1.53$). The difficult math group was the only group in which its results trended as expected; the self-awareness group ($M = 30\%$, $SD = 2.63$) did have a higher success rate than the neutral group ($M = 28\%$, $SD = 2.30$).

DISCUSSION

In the current study, the authors hypothesized that a difference in cognitive performance would occur across different forms of ego depletion. Results supported this hypothesis, with the

largest difference seen between the control and social exclusion conditions. Participants who experienced social exclusion in the chatroom condition demonstrated significantly lower accuracy rates on the cognitive task as compared to the other two ego depletion conditions. Additionally, the authors hypothesized that self-awareness could possibly alleviate the negative effect of ego depletion on cognitive performance, thus yielding better performance on the cognitive task following completion of the self-awareness task than the neutral task. However, no other significant differences were found. Self-awareness manipulation was found to have no significant effect on ego depletion. Although not significant, the only ego depletion group that trended as expected by appearing to alleviate the effect following self-awareness was the difficult math group in which the difference was small. Both the control group and the chatroom group observed contrary effects than those that had been hypothesized demonstrating means that portrayed lower cognitive performance following completion of the self-awareness task rather than the neutral task.

A possible explanation for this outcome may have been due to a self-awareness conceptual issue. Previous research of self-awareness has conceptual self-awareness as an awareness of their present self (Twenge et al., 2003; Schmeichel & Vohs, 2009). As demonstrated in previous research conducted by Twenge et al. (2003) a participant looking in a mirror is reminded of their physically self in present time. In addition, the previous study that the author had adapted the current writing assignment method from had participants write an explanation for why they ranked a set of values in a certain order of importance to themselves. The writing prompt utilized in that study required participants to reflect on their current self. The writing prompt that the participants completed in the current study elicited self-awareness by requiring participants to think about themselves in a future context.

Previous findings had observed that social exclusion had an ego-depleting effect on participants' ability to complete subsequent tasks that require self-regulation (Baumeister et al., 2002; Baumeister et al., 2005; Ciarocco et al., 2001). Baumeister et al. (2005) found that participants made to believe that they would be alone in the future had trouble regulating attention during self-regulation tasks as well as having less persistence when working on difficult GRE questions after learning that they would likely be alone in the future.

Muraven and Baumeister (2000) theorized that self-control draws from a finite cognitive resource and is exerted when one overrides the self's behaviors and emotions. Fortunately, this cognitive resource appears to replenish with rest. Results from the current study support these previous findings, as accuracy rates in the social exclusion chatroom group were significantly lower than those in the control group. This illustrates that the phenomena of ego depletion can occur following social exclusion in a chatroom setting even when participants did not know who was ignoring them. While experiencing social exclusion during the chatroom, participants likely used a large portion of their limited cognitive resources for emotional regulation; therefore, they had only a small amount left for cognitive task completion. Humans need to feel a sense of belonging, even within small social interactions; however, within the chatroom, participants did not experience a positive social interaction (Baumeister & Leary, 1995). This appeared to create an emotional response which they then had to control in order to complete the remaining tasks.

Previous studies have tested social exclusion's ego depletion-inducing effect in which the manipulation of self-exclusion was caused by meeting others then experiencing exclusion from a task, or simply being made to believe that an assessment is able to predict that you will be alone in the future (Baumeister et al., 2005; Twenge et al., 2007; Zhou, Vohs, & Baumeister, 2009). However, there is little research that has investigated chatroom experience of social exclusion as

a means to induce ego depletion. A chatroom was chosen for this study as implemented in Gardener et al. (2000) study to evaluate whether ego depletion would arise from social exclusion even when an individual has never met in person with those who excluded them. Since society is progressing towards more technology centered interaction this finding is important and relevant to the community. As humans, we are communicating on multiple social media platforms. People find and even maintain relationships with people online that we may never have met due to distance. In addition, it's not just adults participating in these online interactions. There are many tech savvy adolescents that participate in social media, gaming communities, and other online communities. These communities allow adolescents to learn more about others in different locations around the country and the world, share knowledge, widen their social net of friends, achieve common goals, and even fulfill a need to belong in areas where there are less people. In fact, previous research conducted on adolescents who had experienced social exclusion found that online communication with a peer that they had never met was beneficial to recover from the negative effects of social exclusion (Gross, 2009). However, there will still be drawbacks to such online interactions, including the possibility of social exclusion. For this study we only concentrated on a brief instance of social exclusion's effect on cognitive performance, as implementing social exclusion over a larger period of time would be both unethical and immoral. The results from this current study would seem to support a hypothesis that such extended social exclusion would likely have a long-term effect on cognitive performance.

The authors also hypothesized that accuracy rates in the difficult math group would be significantly lower than those in the control group. Alberts et al., (2011) used a similar protocol, in which participants were asked to do difficult math addition questions while listening to distracting audio. The authors used this protocol in the current study to require participants to

regulate their attention. The expectation was that this attention regulation would induce ego depletion. The results in this study indicate that the difficult math group did not demonstrate a significant ego depletion effect on cognitive performance as demonstrated in the previous study. Although there was no significant difference, it did trend in the direction as was expected and observed in previous research. Previous research conducted by Alberts et al. (2011) measured ego depletion by observing a deficit in ego depleted participants by using a physical stimuli task following completing difficult math problems as distracting audio played. Alberts et al. (2011) results observed that ego depleted participants had a lower physical stamina than non-ego depleted participant, who had more self-control limited resources accessible. The current study differed by using a cognitive task to observe ego-depletion.

The second main emphasis of the current study was to investigate whether self-awareness would have any influence in alleviating ego depletion. If the study's results had been consistent with this hypothesis, self-awareness groups would have shown a significantly higher success rate than the control group. Previous studies have found that self-awareness mitigated ego depletion (Alberts et al., 2011; Schmeichel & Vohs, 2009). These previous manipulations of self-awareness that appeared to alleviate ego depletion have been self-awareness writing assignments, writing about values that are important to the participant, and simple unscrambling sentences with the letter "P" to prime the participant.

An explanation for why self-awareness may have had no effect within the social exclusion chatroom group can be found looking at previous research studies (Hess & Pickett, 2010; Twenge et al., 2003). Twenge et al., (2003) believed that socially excluded individual will try to avoid situations or thoughts that cause the individuals to reflect on themselves out of the assumption that social exclusion is due to failure on their own part brought on by themselves. In

Twenge et al. (2003), socially excluded participants opted to face a wall rather than their own reflection. Perhaps during the current study participants subconsciously blocked out thought regarding self-awareness as they completed the writing assignment. This idea would have to be further studied in the future to confirm this explanation, or the outcome may be related to a conceptually issue.

Both the interaction between ego depletion and self-awareness manipulations and the main effect for self-awareness were found not to be significant. Upon review of the means between the control groups, self-awareness group ($M = 26\%$, $SD = 2.15$) was lower than the neutral group ($M = 42\%$, $SD = 1.89$). In theory, the self-awareness group and the neutral group should not have been different in cognitive performance, since neither group had experienced ego depletion prior to the writing assignment task and the cognitive task. In addition, the self-awareness writing assignment had a negative trend on the control group, as though thinking about oneself had a negative effect on cognitive performance. A similar trend was seen within the chatroom group, although the difference was smaller, between the self-awareness group ($M = 16\%$, $SD = 1.74$) and the neutral group ($M = 21\%$, $SD = 1.53$). This is an interesting find that may need to be further studied in the future to investigate whether self-awareness may be ego depleting.

Future research should look further into self-regulation to find ways to replenish the limited reservoir of energy used for self-regulation. Investigators have begun to look into self-awareness and whether glucose would be able to replenish this resource (Alberts et al., 2011; Gaillot et al., 2007). This research could prove to be helpful to individuals who may not have to time to take breaks to replenish resources, such as during a long test or other task that require an

individual to complete multiple decision-making tasks or higher cognitive function tasks simultaneously.

The significant difference in cognitive performance found in the social exclusion task can have implication for educators when working in a classroom. Students may perform better in testing if they are included within the classroom discussions and groups. Educator may need to be mindful during of students' interaction during group activities to ensure that students are not being ostracized by others as well as confirm that students are being given a chance to participate within group activities and classroom discussions. Although being mindful of students' interactions in the classroom is helpful to avoid negative effects of social exclusion on cognitive performance, it is not always possible due to teacher-student ratio size, or social exclusion interaction occurring covertly.

Perhaps providing adolescences a chance to develop a sense of belonging as demonstrated in Gross's study (2009) could be beneficial to enact within the classroom setting to counter social exclusion that occurs. In which students could interact with other students that they have never met could be a solution. Such a program would be beneficial since it would teach adolescence how to develop healthy online relations with others and better benefit the communities that they are connecting with. As well as how to deal with social exclusion or negative behaviors, such as "trolling" that they may face while using social media and participating in online communities (Cruz, Seo, & Rex, 2018). This implication would have to be researched further to ensure that such a program would be safe. However, researching both the positive and negative effect of social networks and online communities is important and beneficial for our society now since searching for and developing online relationships as well as looking for support online is becoming more prevalent.

Table 1

Accuracy rate on cognitive task

Ego depletion group	<i>n</i>	<i>M</i>	<i>SD</i>
Control	30	33%	2.26
Difficult Math	32	29%	2.46
Chatroom	23	19%	1.64

Table 2

Accuracy rate on cognitive task

Ego depletion group	Self-Aware		Neutral	
	<i>n</i>	<i>M (SD)</i>	<i>n</i>	<i>M (SD)</i>
Control	17	26% (2.15)	13	42% (1.89)
Difficult Math	18	30% (2.63)	14	28% (2.30)
Chatroom	12	16% (1.74)	11	21% (1.53)

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