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The Influence of Acetaminophen and Social Learning on the Acquired Capability for Suicide

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THE INFLUENCE OF ACETAMINOPHEN AND SOCIAL LEARNING ON THE ACQUIRED CAPABILITY FOR SUICIDE

By

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ABSTRACT

The present study investigated the malleability and the roles of both physical pain tolerance and fearlessness about death in acquired capability for suicide utilizing experimental methods involving acetaminophen and a social learning-based reading task. These two interventions were manipulated to test their effects on physical pain tolerance (PPT) and fearlessness about death (FAD), as measured by a pressure Algometer and the Acquired Capability for Suicide Scale – Fearlessness about Death, respectively. 106 Florida State University undergraduate psychology students were divided into four groups as follows: group 1 received acetaminophen and a control reading task; group 2 received acetaminophen and the observational learning reading task; group 3 received the observational learning reading task with no acetaminophen; and group 4 received the control reading task and no acetaminophen. Multivariate analysis of variance was used to test the hypotheses that there would be significant main effects for each intervention and that there would be a significant interaction effect as well. Multivariate results demonstrated that the effect for the interaction between acetaminophen and the reading intervention was not significant ($p = .17$), that there was a significant main effect for the reading intervention ($p < .05$) and that there was no effect for acetaminophen ($p = .56$).

CHAPTER 1

INTRODUCTION

The Acquired Capability for Suicide

The Interpersonal Theory of Suicide (Joiner, 2005; Van Orden et al., 2010) describes that an individual can only die by suicide when that individual displays elevated levels of two factors, the desire to die by suicide and the acquired capability for suicide. The former refers to the maladaptive state that is derived from a combination of two self-perceived interpersonal conditions. These conditions are thwarted belongingness, a self-held notion that one lacks meaningful interpersonal connections and in turn the lack of a sense of belonging, and perceived burdensomeness, the self-perception of being more of a burden to those around oneself while alive than one would be dead. The acquired capability for suicide refers to a physical and mental capacity that allows the individual to actually follow through with the act of suicide, without being stopped by the pain or fear involved. The primary focus of the present study is on the acquired capability for suicide.

Human beings are instinctively primed to find situations that may pose any danger to be aversive, especially those that threaten our lives (Ohman & Mineka, 2001). Thus, in order for an individual to be able to die by suicide, the ability to fight that instinct must have been developed and strengthened over time, according to the theory (Van Orden et al., 2010). The desire to die by suicide on its own demands significant attention for the reasons that it involves faulty interpersonally-oriented cognitive processes that can be adequately adjusted by several empirically-based treatments (Joiner, 2000), and it can arise in an individual relatively quickly, resulting from several self-propagating cognitive and behavioral processes involved in depression and other conditions. However, the acquired capability for suicide is more stable over

time, requiring the occurrence of specific painful and provocative events in order to increase (Van Orden et al., 2010). This stability of acquired capability, along with the fact that the interpersonal theory posits that an individual cannot die by suicide without acquired capability, are the reasons that the construct poses a great concern, in terms of potential risk for suicide.

The Link between Physical and Emotional Components of Pain

Recently, Ribeiro and colleagues (2013) produced evidence that suggests that acquired capability for suicide can be conceptualized as a combination of fearlessness about death and a high tolerance for physical pain. This perspective is utilized in the present study and allows acquired capability to be viewed as a mechanism comparable to physical and emotional pain tolerance. As discussed above, the corresponding measurable elements of acquired capability are fearlessness about death and physical pain tolerance (Ribeiro et al., 2013). These two components can also be viewed as an *emotional* readiness or tolerance of the pain involved in dying and a *physical* tolerance for the pain involved in death, respectively. Previous research has demonstrated that interventions targeting the physical components of pain can also have an effect on the emotional components of pain. For instance, DeWall and colleagues (2010) used functional magnetic resonance imaging (fMRI) to measure the effects of acetaminophen, a known analgesic, on physical pain. This study measured the effects of acetaminophen for a period of three weeks and found that it reduced both self-report experiences of social pain and neural reactivity to social pain, as indicated by lack of activity in brain regions known to be associated with the experience of social pain. Based on these findings, the present study seeks to investigate any potential effects of acetaminophen on the emotional component of acquired capability, namely fearlessness about death. Conversely, the current study also seeks to evaluate

whether or not another intervention (discussed below), intended to target fearlessness about death, has any effects on physical pain tolerance.

Acquired Capability and Fear

Classical Conditioning and Fear

Research observing the effects of conditioning on fear in human beings can be traced at least as far back as the well-known "Little Albert" experiment (Watson & Rayner, 1920).This study demonstrated the novel (at the time) idea that fear toward an object that may not be particularly threatening can be learned by pairing the object with a stimulus that elicits a fear response. It further showed that this learned fear may also be generalized to other stimuli resembling the conditioned stimulus.

Since then, the scope of our understanding of how fear functions and how it can be conditioned in humans has expanded. Among major recent research, Ohman and Mineka (2001) reviewed several studies that produced evidence suggesting that fear in humans is an evolutionarily evolved mechanism (Ohman & Mineka, 2001). That is, Ohman and Mineka suggest that fear is an instinctive response, serving to aid us in surviving danger and passing on our genes. That being the case, the theoretical framework for this evolution-based module suggests that we are particularly prone to experiencing fear in response to stimuli that suggested a threatening situation to our ancient predecessors (e.g., spiders, snakes, open spaces), more so than we are to display fear in the face of dangerous stimuli more specific to contemporary society (i.e. guns, electrical outlets).

Much evidence has been found in support of this evolution-based fear module. Human conditioning studies have shown that when subjects are conditioned to fear guns and snakes through the use of an aversive, loud noise, the resulting measured heart responses were greater for snakes than guns (Cook et al., 1986). Ohman and colleagues (1975) demonstrated that conditioned fear toward fear-relevant photographs (e.g. snakes, spiders) was more resilient to extinction than conditioned fear toward fear-irrelevant photographs (e.g. flowers). Other studies also showed that conditioned fear toward fear-relevant stimuli evoked a significantly higher physiological fear response from subjects than did conditioned fear toward fear-irrelevant stimuli (Ohman et al., 1985; Cook et al., 1986). These studies all suggest that individuals would be

prone to develop a fear of dying or death by suicide through conditioning, as was tested in the present study, and that any such conditioning would be resilient to extinction.

Social Learning and Fear

One specific form of conditioning that has been shown to have an effect on fear is observational conditioning. Earlier research that aided in the development of the evolutionary fear module concept (Ohman & Mineka, 2001) illustrated that rhesus monkeys could learn fear towards certain stimuli from watching a video of other rhesus monkeys display fear behaviors in response to those stimuli (Mineka et al., 1984; Cook & Mineka, 1989; Cook & Mineka, 1990). More recent research has more specifically detailed the effects of social learning on fear and the extinction of fear in humans. Olsson and Phelps (2004) found that observational learning through video footage of the responses of other individuals to conditioned stimuli (human faces) resulted in the acquisition of fear towards those faces. It has also been found that social learning through video footage can extinguish fears and significantly inhibit the return of learned fear (Golkar et al., 2013). These studies provide evidence suggesting that it may be possible to influence fearlessness about death through social learning. Consequently, another primary purpose of the present study is to evaluate the effects, if any, of a social learning-oriented reading task (Appendices A-C) intended to reduce acquired capability for suicide via conditioning fear towards death and suicide.

The Present Study

In order to expand upon our current understanding of acquired capability and our understanding of suicide, this study seeks to investigate the roles and malleability of pain and fear within the context of acquired capability. In the conceptualization of fear posited by Ohman and colleagues (1985), the pain involved in death by suicide would be categorized as fear-relevant stimuli, due to our inherent aversion towards death (Joiner, 2005; Van Orden et al., 2010). This would suggest, as indicated by subsequent research (Ohman et al., 1975; Cook et al., 1986; Ohman et al., 1985), that the pain involved with death by suicide would be a potent stimulus for conditioning fear, and consequently for conditioning a decrease in an individual's acquired capability. More recent research has suggested that an appropriate means for accomplishing this is social learning (Olson & Phelps, 2004; Golkar et al., 2013). Thus, the first goal of the study is to investigate the social learning effects of a reading task (Appendices A-C)

intended to condition a decrease in fearlessness about death. Furthermore, as it is suggested by prior research that interventions intended to target the physical component of pain, such as acetaminophen, also affect the emotional components (DeWall et al., 2010), this study seeks to extend these effects of acetaminophen on physical and emotional components of pain in the context of acquired capability. This will be done by testing the association between acetaminophen and increases in *both* physical pain tolerance *and* fearlessness about death. Additionally, this study seeks to investigate if the same effect found by DeWall and colleagues (2010), wherein both the emotional and physical elements of pain respond to an intervention targeting specifically the physical component, will also be present when an intervention is administered that specifically targets the emotional element. The last goal is to gain some insight as to the dynamics between the two interventions when administered together, in an exploratory fashion. For this purpose, the effects of the interaction between acetaminophen and the reading task will be observed. The hypotheses are as follows:

H1: Acquired capability as measured by present outcome variables will be significantly higher for individuals administered acetaminophen.

H2: Acquired capability as measured by present outcome variables will be significantly lower for individuals administered experimental reading task.

H3: There will be a significant effect for the interaction of acetaminophen and the reading task on acquired capability.

CHAPTER 2

METHODS

Participants

A priori power analyses using Gpower (Erdfelder, Faul, & Buchner, 1996) were conducted in order to determine the number of participants required for an analysis of MANOVA special effects and interaction. Due to the unknown effect sizes for acetaminophen, the reading intervention utilized, and their interaction, medium effect sizes were assumed (f^2 = 0.15; Cohen, 1988) in the power analyses, resulting in a required sample size of n = 43 to achieve acceptable power (power $\geq$ .80; Cohen, 1988). Consequently, the present study observed 106 college students enrolled in undergraduate studies at Florida State Univeristy. Due to the unknown effects of the manipulations being utilized, students scoring high on measures of depression were excluded from the study, to prevent any deleterious effects on suicide-related behaviors/ideation in this high-risk group. Additionally, due to the use of acetaminophen in the study, any participants who sought treatment for substance abuse, have a liver disorder, or smoke 20 or more cigarettes in a day was excluded, as per the guidelines followed by DeWall and colleagues (2010). All participants were randomly assigned using a randomization calculator (Urbaniak & Plous, 2016) to one of four groups, an acetaminophen and control reading task group, a reading intervention and no acetaminophen group, a group receiving both acetaminophen and the reading intervention, and a control group receiving the control reading task and no acetaminophen.

Measures

Pressure Algometer (Algomed; Durham, North Carolina)

An algometer was utilized as a physiological measure of physical pain tolerance. Participants were instructed in the application of the pressure algometer. All trials were conducted on participants' non-dominant hands to ensure uniformity in application. Participants were instructed to say "stop" when the pain becomes too uncomfortable to continue (to measure tolerance). The algometer was used to apply pressure perpendicularly to the skin at the first interosseous muscle of the participant's hand until physical pain tolerance was reached. Once the participants indicated, through verbal report, that pain tolerance was reached, the experimenter immediately retracted the algometer. The value of pressure applied at the moment the algometer ceased to be used will be recorded. The results of five pain tolerance trials after administration of

interventions was averaged in order to ensure a more reliable measurement. Differences in mean values for pain tolerance across the four groups were evaluated using a Multivariate Analysis of Variance (MANOVA).

The Acquired Capability for Suicide Scale-Fearlessness about Death (ACSS-FAD; Van Orden, Witte, Gordon, Bender, & Joiner, 2008; Ribeiro et al., 2013)

The ACSS-FAD is a 7-item self-report scale used to assess an individual's level of fearlessness towards the act and thought of suicide. The measure is comprised of 7 items rated on a Likert scale. Items assess habituation to the fear of death (e.g. I am very much afraid to die). ACSS scores were measured after interventions and the differences in means across all four groups were evaluated using a MANOVA.

Other Materials

Acquired Capability Social Learning Task

For ethical reasons, a video-oriented social learning task similar to that of prior research (e.g. Olsson & Phelps 2004; Golkar et al., 2013) did not appear to be a prudent approach in the context of suicidality. Instead, a more ethical and feasible method was one based on social learning through reading. Using the seven items from the most recent revision of the ACSS (Ribeiro et al., 2013) as a guide, a reading task was developed that expose subjects to interviews recorded in writing with three fictional individuals who attempted suicide and verbally demonstrated low levels of acquired capability.

More specifically, six statements are portrayed as direct quotes from these fictional individuals, two for each. The first quote for each fake participant was one about why they chose the method that they did for attempting suicide, and the second describing their thoughts and feelings during the act. The statements utilize paraphrasing and direct quotes from the seven items on the ACSS to suggest that the individuals endorse lower levels of acquired capability as defined by the ACSS. For instance, one item on the ACSS states "I am very much afraid to die." One of the statements accordingly stated, "After I took the pills, when my body began to feel numb and I felt myself losing my consciousness, I just felt very scared to die." Another example for the ACSS item, "I am not disturbed by death being the end of life as I know it," is a quote that said, "The concept of ending life as I know it is just too difficult to deal with the more I thought about it, and cutting my wrists seemed like a way to do it without thinking about that."

At the end of the reading portion of this task, a few short questions were used to ensure that subjects did, in fact, read the selection.

The difference in the task administered to the control group rested solely in the six statements portrayed as direct quotes within the reading task. Instead of containing words or phrases that mirror items on the ACSS, the quotes in the task administered to the control group were dismissive, claiming a lapse in memory, interest, or knowledge of a clearly defined answer as the reason for being unable to adequately answer the question. For instance, one of the quotes describing the reasoning behind the suicide method attempted stated, "I have tried to think of an answer for that myself but it's just too difficult of a question to answer."

Procedure

Experimental Procedure

Eligible participants were offered to participate in this study as a study of how exposure to suicide-related reading materials and acetaminophen affects an individual's mood. Participants were run one at a time and randomly assigned one of the four intervention groups. All participants were instructed not to eat for the 4 hours preceding the experiment and participants in the groups receiving acetaminophen were given a single dose (1000mg) of immediate release acetaminophen upon beginning the experiment[1]. Then, participants assigned to the two groups receiving the reading intervention will do so, and the other two groups received the control reading task. Afterwards the ACSS-FAD and the algometer task were administered.

Data Analytic Strategy

Once all the data were collected, a MANOVA was conducted to test for significant differences between the four intervention groups. ACSS-FAD scores and pain tolerance scores were entered as outcome variables, comprising the canonical variable used in the MANOVA analyses. Administration of acetaminophen, administration of the reading intervention, and the interaction term for acetaminophen and the reading task were all entered into the analyses as predictors.

[1] Previous research (McGilveray et al., 1971; McGilveray & Mattock, 1972) has shown that immediate-release acetaminophen begins to enter the bloodstream fairly instantly, but reaches peak levels at an average of 10-90 minutes

CHAPTER 3
RESULTS AND DISCUSSION
Results

Bivariate correlations among all variables in the model were conducted (see *Table 1*) and successfully ruled out multicollinearity between the independent variables according to the guidelines indicated by Meyers, Gamst, and Guarino (2006). Equality of covariance matrices was then evaluated, demonstrating that the homogeneity of covariance matrices assumption for MANOVA was met using the present model, Box's M = 15.38; $p = .10$. Mahalanobis distances (Mahalanobis, 1927; 1936) were also observed to test the multivariate normality assumption of MANOVA, and revealed the data to be multivariate normally distributed. A MANOVA was then conducted, testing the effects of the interventions and their interactions on a canonical variable comprised of PPT and FAD. These analyses revealed that for the interaction of acetaminophen and the reading task, there was some multivariate effect on the canonical variable comprised , though it was not significant, Pillai's Trace = .04; F (2, 92) = 1.84; $p = .17$; $\eta p^2 = .04$. A significant multivariate effect was discovered, however, for the experimental reading task, Pillai's Trace[2] = .08; F (2, 92) = 4.10; $p = .02$; $\eta p^2 = .08$. No significant multivariate effect was found for acetaminophen, Pillai's Trace = .01; F (2, 92) = .58; $p = .56$; $\eta p^2 = .01$. Univariate results demonstrated that regarding the reading task, only the effect on PPT scores was significant, F (1, 93) = 5.74; $p = .02$; $\eta p^2 = .06$, such that across groups, the experimental reading task led to higher pain tolerance. No effect was found for the reading intervention on FAD scores, F (1, 93) = 1.66; $p = .20$; $\eta p^2 = .02$. Similarly, univariate results indicated that a marginally significant interaction effect was also present for PPT scores, F (1, 93) = 2.92; $p = .10$; $\eta p^2 = .03$, but not for FAD scores, F (1, 93) = 1.20; $p = .28$; $\eta p^2 = .01$ (See *Figure 1*). Further probing this interaction with independent samples t-tests revealed that effect was such that for individuals not receiving acetaminophen, the experimental reading task led to significantly higher pain tolerance, t (39.57) = 5.63; $p = .006$; Cohen's $d = .81$, whereas there were no significant differences between the reading intervention groups when individuals received acetaminophen, t (48) = -.51; $p = .615$; Cohen's $d = -.14$ (See *Figure 2*). The effect sizes in the present analyses were considerably smaller than had been anticipated during a priori power

[2] Although MANOVA assumptions were met, Pillai's Trace was used in the present analyses due to Box's M approaching significance ($p = .10$) and Pillai's Trace's robustness to violations of assumptions

analyses. For this reason, power analyses were conducted once again post hoc using Gpower statistical software (Erdfelder, Faul, & Buchner, 1996) to determine the statistical power of the current analyses. Analyses demonstrated that the present data were well powered (power $\geq$ .80; Cohen, 1988) for detecting the multivariate effect of the reading intervention (power = 0.94), considerably underpowered for detecting the multivariate effect of acetaminophen (power = 0.21), and underpowered for detecting an interaction effect (power = 0.62). These power analyses further revealed that given the effect sizes discussed above, the sample size observed would need to be increased to n = 154 in order to be properly powered (power = .80) to detect the effect of the interaction and increased to n = 494 in order to achieve acceptable power (power = .80) for detecting the effect of acetaminophen.

Discussion

The monitoring of pain medications and development/administering of social learning-oriented treatments in order to target the mechanism of acquired capability for suicide would indeed prove to be a novel approach to the management of suicide risk. The present study intended to test the impact of these interventions on acquired capability using an experimental design. Specifically, the study sought to test whether acetaminophen and a social learning-oriented reading intervention would have significant effects on acquired capability for suicide, as indicated by scores on measures of physical pain tolerance (PPT) and fearlessness about death (FAD). As an exploratory hypothesis, the present study also observed whether the interaction between both acetaminophen and the reading task produced a significant effect on acquired capability for suicide, as measured using these outcome variables.

The results from the MANOVA conducted demonstrated no significant effects of acetaminophen on PPT and FAD, contrary to the present hypothesis regarding acetaminophen, which was generated based on previous findings (DeWall et al., 2010). A significant effect was found for the reading intervention. However, follow-up analyses revealed that it was only present for PPT scores and it was in the opposite direction of that which was hypothesized. Finally, the analyses demonstrated some effect, though not significant or trending, for the interaction between reading intervention and acetaminophen. Follow-up analyses also revealed this effect to be present for only PPT scores. Given the issues raised above and in the following paragraphs regarding statistical power of the present analyses, these findings are somewhat elucidative regarding the present exploratory hypothesis concerning the interaction of acetaminophen and

the reading task. This information can prove to be useful in guiding future research as described below.

Given previous research on the ability to influence emotional pain response via administration of acetaminophen (DeWall et a., 2010), one noteworthy finding in the present study was that acetaminophen had no influence on fearlessness about death, which can be considered a construct driven by a lack of the emotion of fear. More importantly and concerning, however, was that despite the broadly documented research on the analgesic effects of acetaminophen (e.g., Piletta, Porchet, & Dayer, 1991; Ong et al., 2010; Zhang, Jones, & Doherty, 2004) the present study did not find a significant effect of acetaminophen on physical pain tolerance. For this reason, and given the results of the post-hoc power analyses, it is probable that the reason for null findings regarding acetaminophen is that the present data were underpowered (power = .21). Given the effect size observed in the present study, it is recommended that future studies attempting to observe the effects of acetaminophen on physical or emotional pain responses obtain a minimal sample size of $n = 500$.

Regarding the reading task findings, it was predicted that due to fear conditioning and social learning mechanisms, reading about individuals who reported intense fearful and regretful experiences in attempting suicide would increase fearful responses among participants and perhaps even influence physical pain tolerance. While significant effects were found for the reading intervention, these effects were only found on physical pain tolerance and they were present in the opposite direction from that which was hypothesized. Unlike acetaminophen, power analyses revealed that the present data were well powered (power = .94). This suggests that such a reading intervention should be further evaluated in future research to better understand the process of its effects on physical pain tolerance. One possibility is that the emotional distress caused by reading several detailed accounts of aborted suicide attempts led to some degree of physical numbing. Previous research has shown that on the more extreme end of exposure to traumatic events, individuals diagnosed with posttraumatic stress disorder (PTSD) demonstrated significantly dampened responses to physical pain resulting from extreme temperatures when compared to controls not diagnosed with PTSD (Geuze et al., 2007). This was demonstrated using self-report numerical ratings of pain on a scale of 1-100 for 5 different specific temperatures, as well as using neuroimaging with functional magnetic resonance imaging (fMRI). In another study that is more relevant to the present analyses, DeWall and

Baumeister (2006) found that even lower levels of emotional distress than PTSD could result in this effect. Specifically, the study found that a social exclusion paradigm in which participants were led to believe that they were highly likely to live a lonely life resulted in dampened pain responses, as demonstrated by pain tolerance and pain threshold ratings while being administered the same pressure Algometer used in the present study. In the context of the findings of Geuze and colleagues (2007) as well as those of DeWall and Baumeister (2006), it is possible that the emotional distress caused by reading detailed accounts of aborted suicide attempts may have resulted in dampened pain responses. In order to better assess that possibility, future research may consider testing the effects of the present reading task in comparison to those of another reading task based in social learning that does not contain detailed accounts of aborted suicide attempts but rather contains accounts from individuals reporting why they would never attempt due to specific fears that also map onto the ACSS-FAD in a similar fashion to that of the current task (e.g., "I would never attempt suicide because I am disturbed by death being the end of life as I know it").

More generally, various methodological elements constituted limitations for the present study. As previously discussed, had the study been more highly powered the findings for acetaminophen may have been more aligned with previous research (e.g., DeWall et al., 2010, Piletta, Porchet, & Dayer, 1991; Ong et al., 2010; Zhang, Jones, & Doherty, 2004). In addition to this concern for the effect of acetaminophen, the interaction effect of acetaminophen and the reading task may have ultimately been more interpretable if the present data were more highly powered. The present analyses suggested that a sample size of $n = 154$ would have been required to obtain adequate power (.80; Cohen, 1988) for assessing the interaction effect. Another concern regarding the methodology of the present study is the post-intervention, cross-sectional design. In order for future studies to demonstrate whether fearlessness about death and physical pain tolerance are truly malleable, and to demonstrate the utility of administering social learning interventions (e.g., tasks similar to the experimental reading task, suicide attempt survivor groups) or monitoring pain medication usage for at-risk individuals, it would be advantageous to show within-subjects effects for the interventions presently observed and their interaction. This methodological adjustment may also aid in addressing the aforementioned concerns regarding power, as repeated measures designs provide more statistical power. In fact, beyond this recommended pre-and-post-intervention design with the same four groups, longitudinal designs

in which these outcomes are monitored over a longer course and the interventions are administered in a crossover fashion would likely result in higher power and produce findings from which clearer inferences could be drawn.

Despite these methodological limitations, the present study exhibited several strengths. The experimental, rather than correlational design was one of the primary benefits of the present study. That is, the present design was stronger than observing groups of individuals who are likely to have interacted with others that have experienced aborted suicide attempts (e.g., emergency responders, suicide hotline operators, emergency dispatchers, hospital staff), or those who have recently been administered analgesics (e.g., hospital patients) and testing the effects of social learning/conditioning or analgesics in those contexts. The present study randomly selected and randomly assigned undergraduate students that were assumed to be similar regarding pain tolerance and fearlessness about death, applying each of the four combinations of the two interventions to the corresponding groups, and testing for the differences between groups on pain tolerance and fearlessness about death. This method provided a stronger basis for drawing causal inferences than the previously mentioned correlational designs. In addition to this methodological strength, the multivariate approach used in the present study (i.e., MANOVA) to analyze effects on physical pain tolerance and fearlessness about death was intended to provide statistical strength and realistic context, given previous research demonstrating the interrelatedness of pain tolerance and fearlessness about death in the context of acquired capability for suicide (e.g., Ribeiro et al., 2013; Van Orden et al., 2008). Due to this well-established link between the two outcomes observed in this study, approaches such as regression or ANOVA would neglect one of the more important elements that this study strived to capture, namely the effects of acetaminophen and social learning on both of these components of acquired capability while taking into account the relationship *between the two outcomes*. That being said, our analyses demonstrated that for this sample, the correlation between pain tolerance and fearlessness about death was not significant ($r = .10$, $p = .32$). This aligned well with our findings regarding the reading intervention (i.e., the intervention influenced physical pain tolerance but not fearlessness about death), which while weakening our case for the use of MANOVA illustrated that beyond the well-established relationship between physical pain tolerance and fearlessness about death, there are elements that can influence one component of acquired capability and not the other. The nature of our experimental interventions also proved to

be a strength in the present study. Specifically, the limited interaction required between experimenters and participants for both interventions reduced the influence of experimenters on scores, highlighting the true influence of the interventions rather than including the potential effects of the interpersonal styles of experimenters.

As previously discussed, more complex experimental designs may increase the rigor for studying these effects. Nonetheless, it is important to note the progress that the present study represents. To the author's knowledge, this is the first experimental study to approach the questions of whether or not pain medications and social learning can influence acquired capability for suicide. One of the primary yields of the present study is that this simpler design has generated various useful guidelines for further investigating the use of interventions targeting acquired capability for individuals at risk for suicide in clinical settings. In addition, these findings may provide guidelines for any research regarding the dynamics of pain tolerance and fearlessness about death within the context of acquired capability for suicide.

TABLES

Table 1.
Correlations, Means, and Standard Deviations Associated with Each of the Model Variables.

	1.	2.	3.	4.	μ.	σ.
1. FAD	1				15.88	7.26
2. PPT	.10	1			506.86	254.77
3. Acetaminophen	-.10	.03	1		.50	.50
4. Experimental Reading Task	-.14	**.231***	-.038	1	.50	.50

Note: *statistically significant at $p < .05$

FIGURES

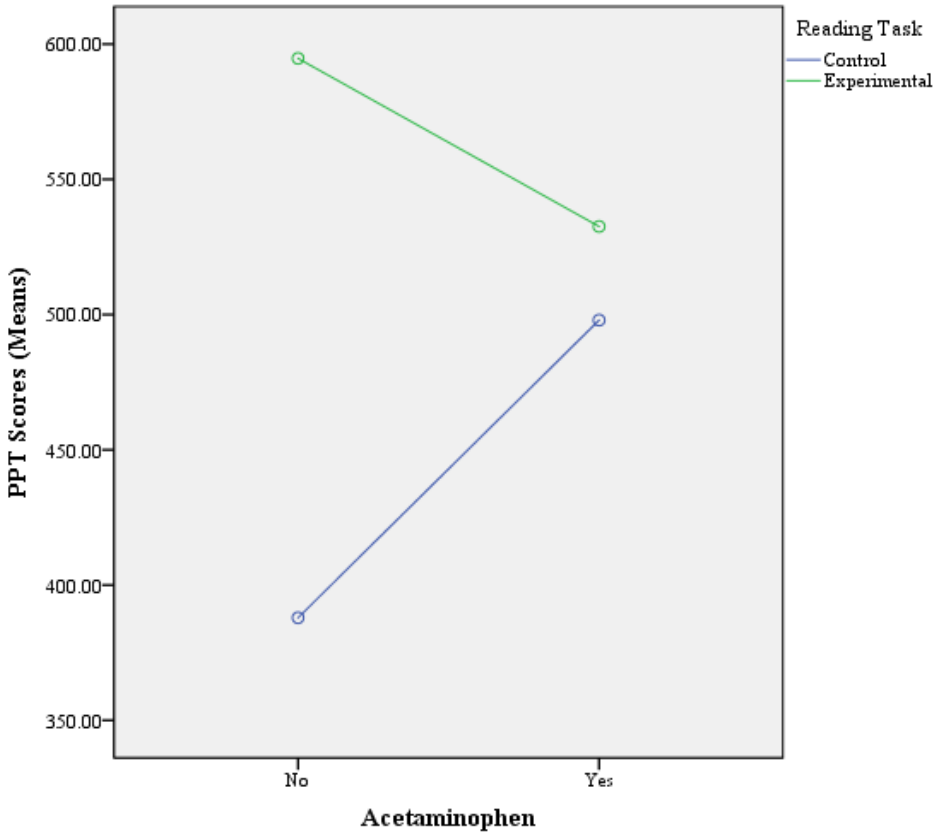

Figure 1.
Interaction of Acetaminophen and Reading Task on Physical Pain Tolerance (PPT) Scores.

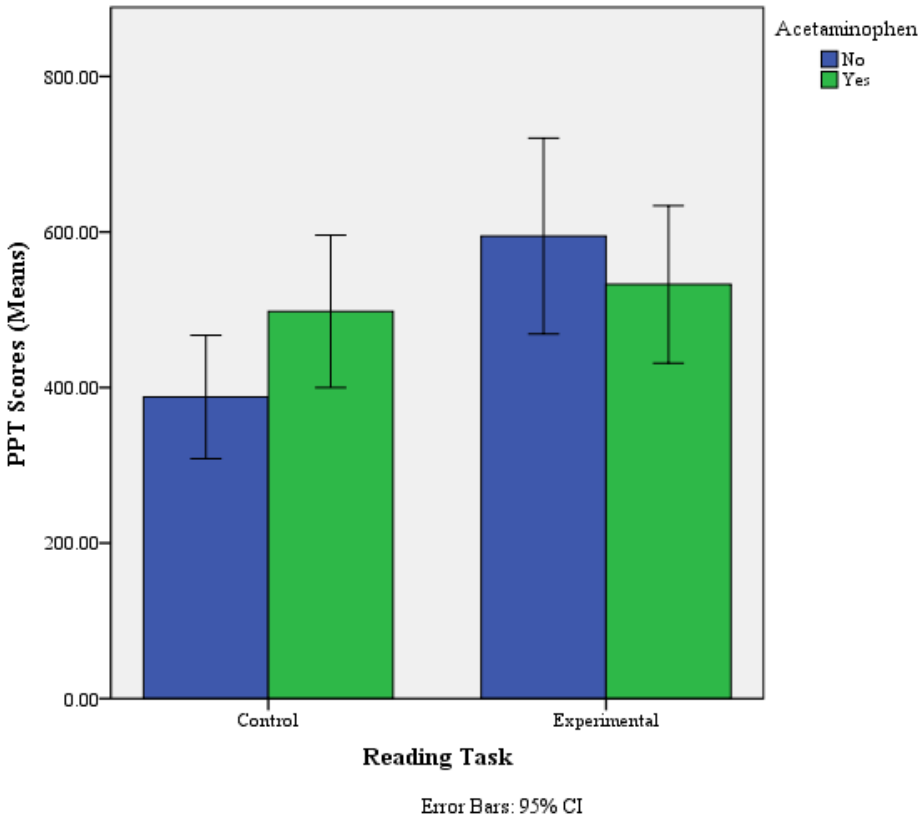

Figure 2.
Mean Physical Pain Tolerance (PPT) Scores by Group with Confidence Intervals.

APPENDIX A

IRB APPROVED CONSENT FORM

Informed Consent Sheet: Effects of Acetaminophen and Reading on Mood

Faculty Advisor: Dr. Thomas E. Joiner

Email: **********

Principal Investigator: Bruno Chiurliza

Email: **********

Procedures:

The research study will take place in the Joiner lab in the psychology building Room A409. In order to participate in this research study, you must be older than 18 years old, you must not have previously sought treatment for substance use, you must not smoke 20 cigarettes or more daily, you must not have any liver complications, and you must not consume alcohol the day of the experiment. If you are under the age required or do not meet any of the other criteria listed above, please inform the experimenter. In this research study you may possibly be asked to ingest a single, standard adult dose of extra strength acetaminophen (1000mg of acetaminophen in the form of two 500mg caplets), and you will be asked to read an article that may contain detailed accounts of suicide attempts and complete a number of questions regarding the content of the task. You will also be given an algometer pain tolerance task, which will use a device to apply pressure between the knuckles of your index and middle finger on your dominant hand. Pressure will be increased at a constant rate and will stop completely when you say "stop," which will indicate your pain tolerance. If you do not say "stop," then pressure will stop completely when the maximum limit of 1000 kilopascals is reached, as has been done in prior research (Neziri et al. 2011). Additionally, you will also respond to various questions about yourself, including general information (e.g. age, race) and specific personality characteristics in which we're interested. Completion of the research study should take approximately 60 minutes.

Participant Rights:

Your participation is completely voluntary, and you have the right to withdraw from this research study at any time without penalty. Further, if you feel uncomfortable with any question that is asked you may leave that question blank.

Risks and Benefits:

Participation in this study includes answering questions that are personal and sensitive in nature, and you may experience anxiety, frustration and/or emotional upset due to the nature of some of the items in the questionnaires and reading task, but there are no other risks associated with this

research study which are greater than those ordinarily encountered in daily life. If you experience stress with completing this research study you are encouraged contact one of the counseling resources that will be provided to you at the end of the research study session. Additionally, an allergic reaction to acetaminophen is a potential risk. In order to reduce risks associated with

an allergic reaction, experimenters will be instructed to call 911 in the event of an emergency involving a severe and adverse reaction to acetaminophen. There are also no known personal benefits that are anticipated as a result of participating in the study. Regarding compensation, you will receive 1 research credits through SONA for your participation. Similarly, exposure to experimental procedures in psychological research can be an invaluable tool for understanding psychological research. The experimenter will not see your answers to the questionnaires included in the research study and your answers will not be linked with your name.

Exclusionary Criteria:

Because this study may require that the participant be asked to ingest a standard dose of acetaminophen, potential subjects meeting certain conditions must be excluded from the study. These conditions include having a known allergy or hypersensitivity to acetaminophen, having chronic alcohol use, being dehydrated or having a recent history of dehydration having Phenylketonuria (PKU), as some acetaminophen forms contain phenylalanine. Additionally in order to avoid the ingestion of an excessive amount of acetaminophen or an adverse interaction between acetaminophen and other medications, potential subjects must be excluded from the study if they are currently using other acetaminophen containing medications (e.g. Dayquil, Theraflu, etc.) or medications that can interact with acetaminophen, such as those containing barbiturates, carbamazepine, ethanol, Fioricet, rifampin, etc., due to the potential risk.

Suicide Risk Protocol:

In the event that a participant is found to be at risk for suicide, as determined by the participant's scores on the Beck Depression Inventory (BDI-II) and the Depressive Symptom Index Suicidality Subscale (DSI-SS), the experimenter will further assess risk and, if necessary the participant may be further interviewed by a psychological trainee, who will take the appropriate actions, which may include choosing/discussing coping strategies with the participant, giving telephone numbers to the participant of appropriate resources that may be of help, and if severe risk is indicated, possible hospitalization.

Confidentiality:

The records of this research study will be kept private. Any written results will discuss group findings and will not include information that will identify you. It is possible that the consent process and data collection will be observed by research oversight staff responsible for

safeguarding the rights and well-being of people who participate in research, and you may be briefly contacted by research staff.

Contacts:

If you have any questions or desire further information with respect to this study, you may contact Bruno Chiurliza at **********. You may also contact the faculty advisor for this project, Thomas E. Joiner at **********. If you have any questions or concerns regarding this study and would like to talk to someone other than the researchers, you are encouraged to contact the FSU IRB at **********.

Contact for Concerns about the Rights of Research Subjects:

If you have concerns about your treatment or rights as a research subject you may contact the Research Compliance Hotline in the FSU Office of Research Services at **********.

CONSENT DOCUMENTATION:

I have been fully informed about the procedures listed here. I am aware of what I will be asked to do and the benefits of my participation. I have read and fully understand this consent form. I sign it freely and voluntarily. A copy of this form will be given to me upon request. I hereby give permission for my participation in the research study.

_____ _____

Signature of Participant **Date**

I certify that I have personally explained this document before requesting that the participant sign it.

_____ _____

Signature of Researcher **Date**

APPENDIX B

IRB APPROVED DEBRIEFING FORM

Debriefing Form Effects of Acetaminophen and Reading on Mood

The purpose of this study is to test the potential influence of acetaminophen and social learning on fearlessness about death and physical pain tolerance, which are both associated with acquired capability for suicide. Two variables were examined, in terms of the impact they had on fearlessness about death and physical pain tolerance were the consumption of acetaminophen and the administration of a social learning-based reading intervention. Participants were assigned, at random, to be in one of four groups: a group receiving both acetaminophen and the reading intervention, a group receiving only the reading intervention, a group receiving acetaminophen and a control reading task, or a group receiving only the control reading task. All participants completed the same questionnaires, measures, and physical pain tolerance task.

We predicted that individuals receiving only the reading intervention would report lower fearlessness about death and lower pain tolerance, that individuals receiving only acetaminophen would report higher fearlessness about death and pain tolerance. Participants' responses on the measures will help us determine if these predictions are correct. We apologize for having had to utilize deceptive research tactics to obscure the purpose of this study. It was necessary in order to accurately measure the effects of our manipulations without any misleading effects resulting from you're being aware of what we were measuring and why. You may request that the data collected throughout your participation be removed if you so choose. If you choose not to do so, all data will still remain confidential and results will be reported without any information that can identify you. Just as we agree to protect your confidentiality in this study, we ask that you please not share any information about this study with any fellow students. You may unknowingly tell someone else who is scheduled to participate in this study, and this would ruin our findings.

If you were interested by this research and wish to learn more about it and other related research, please contact Bruno Chiurliza (**********). He will be happy to discuss this project with you.

You may also contact the faculty advisor for this project, Thomas E. Joiner (**********).

If you have questions about your rights as a research volunteer, you may contact the FSU IRB at **********.

If you feel suicidal or have concerns about your mental health, please contact one of the resources on the back of this page.

Thank you again for your participation in this study!

Where to Go for Counseling
If you feel that you have experienced some discomfort from participating in this study and you would like to talk to someone, please use one of the following resources:

On Campus
Psychology Clinic
Florida State University
1107 W. Call Street
P.O. BOX 3064303
Tallahassee, FL 32306
(850) 644-3006
http://www.psy.fsu.edu/community/clinic/

Off Campus
Apalachee Center
2634 Capital Circle NE
Tallahassee, FL 32308
(850) 523-3333
1-800-226-2931
http://www.apalacheecenter.org/

Tallahassee Memorial Hospital
Behavioral Health Center
1616 Physicians Drive
Tallahassee, FL 32308
(850) 431-5100 Phone
(800) 549-4608 Toll Free
http://tmh.org/Behavioral

National Suicide Prevention Lifeline
1 – 800 – 273 - 8255

APPENDIX C

IRB APPROVAL LETTER

Office of the Vice President For Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8673 · FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 10/08/2015

To: Bruno Chiurliza <**********>

Address: **********

Dept.: PSYCHOLOGY DEPARTMENT

From: Thomas L. Jacobson, Chair

Re: Use of Human Subjects in Research

The application that you submitted to this office in regard to the use of human subjects in the research proposal referenced above has been reviewed by the Human Subjects Committee at its meeting on Your project was approved by the Committee.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals which may be required.

If you submitted a proposed consent form with your application, the approved stamped consent form is attached to this approval notice. Only the stamped version of the consent form may be used in recruiting research subjects.

If the project has not been completed by 10/07/2015 you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the Committee.

You are advised that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report, in writing, any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000446.

Cc: Thomas Joiner <**********>, Advisor

HSC No. 2014.13716

APPENDIX D

IRB RE-APPROVAL LETTER

The Florida State University
Office of the Vice President For Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8673, FAX (850) 644-4392

RE-APPROVAL MEMORANDUM

Date: 10/15/2015

To: Bruno Chiurliza [**********]

Address: **********
Dept.: PSYCHOLOGY DEPARTMENT

From: Thomas L. Jacobson, Chair

Re: Re-approval of Use of Human subjects in Research
The Influence of Acetaminophen and Social Learning on Acquired Capability for Suicide

Your request to continue the research project listed above involving human subjects has been approved by the Human Subjects Committee. If your project has not been completed by 10/12/2016, you must request renewed approval by the Committee.

If you submitted a proposed consent form with your renewal request, the approved stamped consent form is attached to this re-approval notice. Only the stamped version of the consent form may be used in recruiting of research subjects. You are reminded that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report in writing, any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the Chair of your department and/or your major professor are reminded of their responsibility for being informed concerning research projects involving human subjects in their department. They are advised to review the protocols as often as necessary to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

Cc: Thomas Joiner, Advisor [**********]
HSC No. 2015.16365

APPENDIX E

ACQUIRED CAPABILITY SOCIAL LEARNING TASK: EXPERIMENTAL GROUP READING TASK

After reading the passage below, you will be asked a short answer question.

A study in 2010 analyzed three interviews with recent first-time suicide attempt survivors between the ages of 26 and 30.The three attempts took place between six months to a year before the study was conducted. An interesting and unintended finding of this interview study was that the three individuals each seemed to have one thing in common, as far as their attempts were concerned. This common factor was that the methods utilized in the attempts were less lethal methods relative to the ones typically used in the majority of cases where individuals end up dying by suicide (e.g. gunshot wound). These findings led to a lot of speculating as to what gave rise to this common factor. Two important questions in the interview that were observed, in an effort to better understand this were the following: 1) Why did you decide to attempt to take your own life by (method)? 2) How did you feel while you tried to (method)?

Below are the six answers drawn directly from the transcripts of each of the three interviews conducted in the 2010 study. In order to maintain the anonymity of the subjects we will refer to them as Subjects 1, 2, and 3.

Subject 1
1) "I took the pills instead of doing something else because the fact that I was going to die scared me and made me nervous and the pills were something I thought I could just forget that I took and not have to think about that."
2) "After I took the pills, when my body began to feel numb and I felt myself losing my consciousness, I just felt very scared to die."

Subject 2
1) "The concept of life just ending was too difficult to deal with the more I thought about it, and cutting my wrists seemed like a way to do it without thinking of that."
2)"I remember that even just thinking I was going to die when I saw all of the blood drove me into an intense panic, and that was when I dialed 9-1-1"

Subject 3
1)"Well, whenever I even hear conversations about death, I can't handle it, so taking the pills right before going to sleep seemed like the only way I could do it."
2)"Waking up in the middle of the night to that intense pain was the scariest thing I've ever experienced, and I remember thinking that the pain only seemed to get worse the closer I felt to dying."

APPENDIX F

ACQUIRED CAPABILITY SOCIAL LEARNING TASK: CONTROL GROUP READING TASK

After reading the passage below, you will be asked a short answer question.

A study in 2010 analyzed three interviews with recent first-time suicide attempt survivors between the ages of 26 and 30.The three attempts took place between six months to a year before the study was conducted. An interesting and unintended finding of this interview study was that the three individuals each seemed to have one thing in common, as far as their attempts were concerned. This common factor was that the methods utilized in the attempts were less lethal methods relative to the ones typically used in the majority of cases where individuals end up dying by suicide (e.g. gunshot wound). These findings led to a lot of speculating as to what gave rise to this common factor. Two important questions in the interview that were observed, in an effort to better understand this were the following: 1) Why did you decide to attempt to take your own life by (method)? 2) How did you feel while you tried to (method)?

Below are the six answers drawn directly from the transcripts of each of the three interviews conducted in the 2010 study. In order to maintain the anonymity of the subjects we will refer to them as Subjects 1, 2, and 3.

Subject 1
1) "I'm not really certain why I did, so I wouldn't want to give you an answer that's not really true."
2) "To be honest, my memory of it all is kind of hazy, it feels like I dreamt it all."

Subject 2
1) "I have tried to think of an answer for that myself but it's just too difficult of a question to answer."
2) "I can't really remember all of that in such great detail, so I don't think that I can really answer the question."

Subject 3
1) "If I actually had a reason, I don't think I know it. In fact, ever since it happened, I just haven't thought back on all of that."
2)"Like I said, I've done a pretty good job of just moving on with my life since then, so it's just not really something I can say I've ever given too much thought to."

APPENDIX G

ACQUIRED CAPABILITY SOCIAL LEARNING TASK: READING TASK QUESTIONS ADMINISTERED TO BOTH GROUPS

Question

Answer the following questions based on your interpretation of the research findings from the passage above (one short paragraph)

1) **Describe subject 2 in one sentence.**
   _____
   _____

2) **When did the study discussed in the passage take place?**
   _____
   _____

3) **What important useful information, if any, do you think the two interview questions discussed in the passage provided?**
   _____
   _____
   _____
   _____

4) **What was the second question that the three subjects were asked?**
   _____
   _____

5) **Why were the subjects labeled subject 1, subject 2, and subject 3?**
   _____
   _____

6) **What was stated in the passage as the common factor among the three subjects?**
   _____
   _____

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BIOGRAPHICAL SKETCH

Bruno Chiurliza is a graduate student researcher in Florida State University's Clinical Psychology Ph.D. program. He is primarily interested in studying the acquired capability for suicide. More specifically, he is interested in research on interventions targeting acquired capability, research on group differences (e.g., among at-risk groups, such as American Indian/Alaska Natives, Military Service Members, etc.) in acquired capability for suicide, and research on measuring acquired capability and measuring it's components (fearlessness about death and physical pain tolerance).