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## **The Relationship Between Painful/Provocative Training Experiences and Capability for Suicide Among Medical Students**

Brittney Assavedo

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THE RELATIONSHIP BETWEEN PAINFUL/PROVOCATIVE TRAINING  
EXPERIENCES AND CAPABILITY FOR SUICIDE AMONG MEDICAL STUDENTS

by

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A Dissertation  
Submitted to the Graduate School,  
the College of Education and Human Sciences  
and the School of Psychology  
at The University of Southern Mississippi  
in Partial Fulfillment of the Requirements  
for the Degree of Doctor of Philosophy

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## ABSTRACT

The primary aim of this study was to examine the relationship between capability for suicide and painful and provocative experiences related to practicing within the medical profession (mPPEs) among students enrolled in a College of Osteopathic Medicine (n = 114). It was posited that frequency of engagement in mPPEs would predict scores on measures of capability for suicide above and beyond the effects of gender and painful and provocative experiences unrelated to practicing within the medical profession (PPEs). It was also posited that frequency of both witnessing and performing an mPPE would moderate the impact of curriculum component on capability for suicide, such that students enrolled in the clinical component of the medical school curriculum (i.e. students within the third and fourth years of training) would exhibit the highest mean levels of capability, particularly when such individuals have witnessed and performed an elevated number of provocative medical experiences. Results indicated that frequency of mPPEs significantly predicted scores on measures of capability for suicide, suggesting that students frequently engaging in mPPEs exhibit higher capability for suicide. Moreover, this finding suggests that medical training contributes to the development of capability for suicide through exposure to mPPEs. Results also indicated that neither frequency of witnessing or performing mPPEs significantly moderated the impact of curriculum component on capability. Findings from the current study may serve to inform suicide prevention efforts among medical students by highlighting the relationship between mPPEs and capability for suicide, among a population known to exhibit elevated suicidal ideation.

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## DEDICATION

This work is dedicated to all of those who have provided support and encouragement throughout my graduate training, especially my parents and husband.

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## LIST OF ABBREVIATIONS

<i>3ST</i>	Three-Step Theory
<i>AACOM</i>	American Association of Colleges of Osteopathic Medicine
<i>AAMC</i>	Association of American Medical Colleges
<i>ACSS</i>	Acquired Capability for Suicide Scale
<i>ACSS-FAD</i>	Acquired Capability for Suicide Scale- Fearlessness about Death
<i>ANCOVA</i>	Analysis of Covariance
<i>ANOVA</i>	Analysis of Variance
<i>CDC</i>	Centers for Disease Control
<i>IPTS</i>	Interpersonal Psychological Theory of Suicide
<i>LES-MD</i>	Life Events Scale - Medical Doctors
<i>LES-MS</i>	Life Events Scale – Medical Students
<i>mPPEs</i>	Medical Painful and Provocative Experiences
<i>PPE</i>	Painful and Provocative Experiences
<i>PPES</i>	Painful and Provocative Experiences Scale
<i>SCS-3</i>	Suicide Capacity Scale

*SD*

Standard Deviation

## CHAPTER I - INTRODUCTION

As the tenth leading cause of death in the United States, suicide is a significant public health concern (Centers for Disease Control [CDC], 2017). Prior research suggests that certain occupations confer an elevated risk for suicide. One occupational group exhibiting an elevated risk for suicide is medical practitioners. The proportion of deaths resulting from intentional self-harm among medical practitioners is significantly elevated relative to other occupations (NIOSH, 2015). In fact, the suicide rate among medical practitioners is 2 to 4 times higher (Schernhammer & Graham Colditz, 2004) than that of the general population (13.75 per 100,000; CDC, 2017).

One theoretical framework that may provide an explanation for the discrepancy in the suicide rate among medical practitioners is the interpersonal psychological theory of suicide (IPTs; Joiner, 2007). The IPTs posits that, in addition to a desire to die by suicide, which is comprised of feelings of both perceived burdensomeness and thwarted belongingness, an individual must possess the ability to die by suicide (i.e. capability) in order to enact lethal self-harm. The capability for suicide is comprised of both heightened pain tolerance and increased fearlessness of death. Furthermore, the IPTs proposes that the capability for suicide can be developed directly through repetitive exposure to painful and/or provocative experiences (PPEs; e.g. combat exposure) or indirectly through exposure to other's pain and provocation (e.g. exposure to suicidality; (Van Orden et al., 2010).

The components of the IPTs have been empirically examined in a sample of physicians (n = 419) practicing various medical specialties. Results revealed that physicians exhibited significantly elevated mean levels of capability relative to military

personnel with prior suicide attempts (Fink-Miller, 2015<sup>a</sup>). This is noteworthy given that nonclinical samples of military personnel have previously been demonstrated to have higher levels of capability than civilians who have engaged in multiple suicide attempts (Bryan, Morrow, Anestis, & Joiner, 2010; Assavedo, Green, & Anestis, 2018). Furthermore, the frequency of PPEs related to practicing within the medical profession (mPPEs; e.g. witnessing a patient's death, providing a life-limiting diagnosis, etc.) significantly predicted scores on capability even after accounting for the effects of gender and PPEs unrelated to practicing within the medical profession (Fink-Miller, 2015<sup>b</sup>). Additionally, PPEs related to practicing within the medical profession (mPPEs) significantly differed across various medical specialties, as physicians practicing emergency medicine and surgery endorsed more frequent experience of mPPEs.

In addition to research examining individuals already established within specific careers, studies have revealed heightened levels of capability among individuals in training for health professions. Specifically, veterinary medicine students with increased frequency of experience with euthanasia endorsed heightened levels of fearlessness about death relative to veterinary students without such exposure (Witte, Correia, & Angarano, 2013). The authors proposed that this elevation was accounted for by diminished levels of distress associated with exposure to euthanasia due to repetitive exposure. A more recent theoretical framework that expands upon the IPTS, the three-step theory (3ST; Klonsky & May, 2015), may provide further explanation for the elevated suicide rates in medical professions. The 3ST proposes that capability for suicide is comprised of three components: dispositional, acquired, and practical. Similar to the IPTS, the 3ST posits that acquired factors result from habituation to pain and fear of death (e.g. exposure to

pain, injury, and death); however, this theory also posits that dispositional factors, genetic factors related to heightened pain tolerance and fearlessness of death (e.g. pain sensitivity); and practical factors, factors that make a suicide attempt more feasible (e.g. knowledge and access to lethal means) contribute to an individual's capability for suicide. Although not examined within the framework of the 3ST, prior research suggests that dispositional capability may influence occupational decisions. In a sample of military personnel assessed pre-deployment as well as at several follow-ups post-deployment, Bryan, Sinclair, and Heron (2016) reported that combat exposure was positively correlated with subsequent capability for suicide, but also that pre-deployment capability was positively correlated with subsequent combat exposure. This supports the 3ST contention that capability is in part dispositional and can predispose individuals to not only encounter PPEs (e.g. a wider range of combat related experiences), but also potentially pursue careers more likely to involve PPEs (e.g. enrollment in the military). With respect to medical training, this indicates that dispositional capability may play an important role in the decision to pursue a medical career and, furthermore, may influence the decision to pursue specific specialties, as some medical specialties are known to exhibit an increased frequency of mPPEs (e.g. emergency medicine, internal medicine, and surgery). Prior research also suggests that some occupations may contribute to the practical capability for suicide, as some occupations require knowledge related to specific means that can be utilized for a suicide attempt in addition to providing access to such means. Although overdose is the most common means utilized for suicide attempts within the general population (Ting, Sullivan, Boudreaux, Miller, & Camargo, 2012), this means is classified as low lethality within the general population given that

approximately 3 percent of intentional overdoses result in death, whereas 85 percent of self-inflicted gunshot wounds result in death (CDC 2017). In contrast to the general population, a substantially higher proportion of suicides among physicians result from means of overdose (26.6% vs. 57%; Hawton, Clements, Simkin, & Malmberg, 2000). Psychological autopsies suggest that one of the most common methods of suicide utilized by medical practitioners is overdose (73.37%; Hawton, Malmberg, & Simkin, 2004). Additionally, prior findings suggest that the class of medication utilized for intentional overdoses may vary depending upon knowledge regarding these medications. Toxicology reports performed during autopsies suggest physician suicide decedents are significantly more likely to have antipsychotics or barbiturates present in their body relative to non-physician suicide decedents (Gold, Sen, & Schwenk, 2013), as barbiturates are the most common class of medication utilized for overdose by physicians (Hawton et al., 2000). Furthermore, the majority of these physician suicide decedents obtained these means through their employment (Hawton, et al., 2004). In addition to requiring knowledge about and providing access to lethal means, prior research suggests that some occupations may increase capability by providing familiarization with lethal means. For instance, prior research demonstrated that military personnel are more likely to utilize firearms in a suicide attempt, as a significantly greater proportion of both non-lethal and lethal suicide attempts among military personnel involved firearms (Anestis and Bryan, 2013). One explanation for the frequent utilization of firearms in suicide attempts among military personnel may be that military training and experiences require personnel to become familiar with the utilization of firearms, the most lethal means for a suicide attempt. A substantially lower proportion of suicides among male physicians

resulted from means commonly utilized by the general population (e.g. hanging, suffocation, and self-poisoning with gas), although these means were likely accessible by physicians (Hawton et al., 2000). Furthermore, a substantially higher proportion of medical practitioners specializing in anesthesiology utilized anesthetics relative to medical practitioners practicing other specialties. The primary aim of the current study is to examine the relationship between the capability for suicide and PPEs that are related to practicing within the medical professions among a sample of medical students. The current study aims to expand upon prior research by Fink-Miller (2015<sup>b</sup>) by examining the relationship between capability for suicide and mPPEs at the training level, as capability may further develop during the training experience. Moreover, the current study will utilize a cohort design to examine how capability is impacted longitudinally by specific experiences related to the medical training. Finally, the current study aims to utilize a more comprehensive measure of capability than utilized in previous research in order to examine the relationship between capability and mPPEs. Similar to Fink-Miller (2015<sup>b</sup>) we expect that the frequency of engagement in provocative medical experiences will predict scores on measures of capability for suicide above and beyond the effects of gender and PPEs unrelated to practicing within the medical profession. Given that the medical school curriculum is comprised of both a pre-clinical component, which consists of classroom and laboratory instruction, and a clinical component, which consists of rotations occurring at various medical facilities, it seems plausible that trainees in the clinical component may exhibit higher mean levels of the capability for suicide. Furthermore, the extent to which students in the clinical component have witnessed or performed provocative medical experiences may amplify such group differences.



Specifically, it is hypothesized that frequency of witnessing a medical provocative experience would moderate the impact of curriculum component on capability for suicide, such that students enrolled in the clinical component of the medical school curriculum (i.e. students within the third and fourth years of training) would exhibit the highest mean levels of capability, particularly when such individuals have witnessed an elevated number of provocative medical experiences. Similarly, it is hypothesized that frequency of performing a medical provocative experience would moderate the impact of curriculum component on capability for suicide, such that students enrolled in the clinical component of the medical school curriculum would exhibit the highest mean levels of capability, particularly when such individuals have performed an elevated number of provocative medical experiences. Finally, we propose that, among students within the fourth year of training, rotation choices with higher frequencies of provocative medical experiences will be associated with capability for suicide above and beyond the effects of gender, PPEs unrelated to practicing within the medical profession, and exposure to provocative medical experiences prior to the fourth year rotation. Results consistent with our hypotheses would demonstrate that capability for suicide further develops during medical training, allowing for the identification of a population at risk. Moreover, the current study may also clarify which training experiences contribute to capability for suicide.

## CHAPTER II - METHODS

### Participants

A total of 134 students enrolled in a college of Osteopathic Medicine participated in the study; however, due to invalid data, 20 participants were excluded from the study (n = 114). Participants included students from both the pre-clinical (n = 41) and clinical (n = 65) components of the medical school curriculum (15.1% first-year students, 23.6% second-year students, 23.6% third-year students, and 37.7% fourth-year students).

Participants ranged in age from 21 to 47 years ( $M_{\text{age}} = 27.59$ ). Regarding participant ethnicity: 64.7% identified as White, 3.9% as Black, 5.9% as Hispanic/Latino(a), 24.5% identified as Asian/Pacific Islander, and 1.0% identified as other racial/ethnic background. Approximately 50% of participants identified as male (n = 51). Prior to enrollment in medical school, 8.8% of participants were employed as a first responder, 47.1% were employed as a healthcare professional and 11.1% of participants reported a current or past military affiliation. Demographic information is included in Table 1.

Excluded participants (n = 20) included students from both the preclinical and clinical components of the medical school curriculum (5% first-year students, 5% second-year students, 10% fourth-year students). Data pertaining to classification was missing for 80% of excluded participants. Excluded participants ranged in age from 24 to 28 years ( $M_{\text{age}} = 26.00$ ). Regarding participant ethnicity for excluded participants: 20% identified as White, 5% identified as Hispanic/Latino(a). Data pertaining to ethnicity was missing for 75% of excluded participants. Approximately 10% identified as male and 15% identified as female. Data pertaining to gender was missing for 75% of excluded participants. Prior to enrollment in medical school, 15% of excluded

participants were employed as a healthcare professional, 5% were employed as a first responder, and 5% reported a current or past military affiliation.

## Measures

### *Painful and Provocative Medical Experiences*

The Life Events Scale - Medical Students (LES-MS) is a 32-item self-report questionnaire assessing specific painful and provocative experiences that commonly occur during the course of training for medical students. Items are rated from 1 (*never observed/assisted with supervision*) to 5 (*frequently observed/assisted with supervision*). Higher scores indicate more frequent observation/performance of mPPEs. The LES-MS is a modified version of the LES-Medical Doctors (LES-MD; Fink-Miller, 2015<sup>b</sup>), a 16-item self-report measure assessing specific painful or provocative work experiences specific to physicians practicing within the field of medicine. Specifically, the phrasing of the items on the LES-MD was modified to more appropriately fit the aspect of training within the medical field rather than practicing within the medical field, as students in training typically observe their preceptor performing these painful or provocative experiences. Additionally, students may be granted the opportunity to perform these painful or provocative experiences under the supervision of their preceptor. The LES-MS is comprised of 2 subscales, a 16-item subscale assessing observation of mPPEs and an 11-item subscale assessing performance of mPPEs. The LES-MD has previously demonstrated adequate reliability (Fink-Miller, 2015). The LES-MS demonstrated excellent reliability ( $\alpha = 0.96$ ). Additionally, the LES-MS subscale assessing observation of mPPEs demonstrated excellent reliability ( $\alpha = 0.96$ ) and the subscale assessing performance of mPPEs demonstrated good reliability ( $\alpha = 0.85$ ).

### *Capability for Suicide*

The Acquired Capability for Suicide (ACSS; Bender, Gordon, Brensin, & Joiner, 2011) is a 20-item self-report questionnaire assessing the extent to which individuals perceive themselves capable of engaging in lethal self-harm. Items are rated from 0 (*Not at all like me*) to 4 (*Very much like me*) with higher scores indicating greater capability. The 20-item version has demonstrated good internal consistency ranging from 0.81 to 0.88 (Ribeiro, Witte, Van Orden, Selby, Gordon, Bender, & Joiner, 2014). Furthermore, the inclusion of item 20 has been shown to enhance the ACSS's ability to predict suicidal behavior (Rimkeviciene, Hawgood, O’Gorman, & De Leo, 2017). The ACSS demonstrated acceptable reliability ( $\alpha = 0.75$ ).

The Suicide Capacity Scale (SCS-3; Klonsky & May, 2015) is a 6-item self-report questionnaire assessing the three components of capability: dispositional, acquired, and practical. Items are rated from 0 (*Strongly Disagree*) to 6 (*Strongly Agree*). Higher scores indicate a greater capacity for suicide. The SCS-3 demonstrated poor reliability ( $\alpha = 0.51$ ).

### *Painful and Provocative Experiences*

The Painful and Provocative Events Scale (PPES; Bender et al., 2011) is a 25-item self-report measure assessing the frequency with which individuals have experienced/engaged in activities that are physically painful (e.g. getting a tattoo) or physically and/or emotionally provocative (e.g. going skydiving) throughout their lifetime. Items are rated from 1 (*Never*) to 5 (*More than 20 times*) with higher scores indicating more frequent experience/engagement in activities. Although this version is currently unvalidated, this measure has previously demonstrated acceptable reliability in

undergraduate samples (Selby, Connell, & Joiner, 2010; Ribeiro et al., 2014). The PPES demonstrated questionable reliability ( $\alpha = 0.66$ ).

### *Rotation Choice*

Students selected the medical and surgical rotations they elected to complete during their fourth year of training. Rotation options known to have higher frequency of mPPEs were determined based upon prior research from Fink-Miller (2015) examining frequency of mPPEs among various medical specialties. Rotations were also determined based upon consultation with an Associate Dean of Academic Affairs and medical students to ensure inclusion of rotations relevant to the medical school curriculum. Rotations options known to have higher frequency of mPPEs relevant to the medical school curriculum for the current sample included: Critical Care, Emergency Medicine, Hospice and Palliative Care, Internal Medicine, Pediatric Emergency Medicine, Pediatric ICU, Wilderness Medicine, and all surgical rotations. The sum of the number of selected rotations known to have higher frequency of mPPEs was obtained. The minimum number of rotations known to have higher frequency of mPPEs elected by participants was 2 and the maximum number of rotations elected was 3.

### *Curriculum Component*

Participants were assigned to either the preclinical or clinical component based upon their classification in the medical training program. Participants reporting either a first or second year classification were sorted into the preclinical category; whereas, participants reporting either a third or fourth year classification were sorted into the clinical category.

### *Demographics*

Demographic covariates were determined empirically by testing for significant associations between the predictor, outcome, and moderating variables and age, race, sexual orientation, marital status, military status, first responder status, and healthcare professional status.

### *Procedures*

All procedures were reviewed and approved by the relevant Institutional Review Boards prior to the onset of data collection. Participants were recruited from a local College of Osteopathic Medicine. Participants completed a survey comprised of various questionnaires utilizing a secure Qualtrics survey link. A series of validation questions aimed to identify individuals who are not reading and responding carefully was included throughout the survey (e.g. please select yes). Data was deemed invalid if participants failed to respond to 2 of 3 validation questions correctly. Participants completing the survey were compensated with a single entry into a lottery for a chance to win 1 of 10 Amazon gift cards worth \$25 dollars.

### *Data Analytic Procedures*

In order to examine whether frequency of engagement in mPPES (i.e. total frequency of both observing and witnessing mPPEs) will predict higher levels of capability for suicide above and beyond the effects of gender and PPEs unrelated to practicing within the medical profession, two hierarchical regression analyses were conducted. Frequency of mPPEs (i.e. LES-MS total score) served as the predictor variable for both analyses and capability for suicide served as the outcome variable; however, capability for suicide was measured utilizing total scores from both the ACSS

and the SCS-3. Multicategorical moderation analyses were conducted to examine whether the relationship between curriculum component (didactic vs clinical) and capability for suicide is moderated by the frequency with which medical students have performed or witnessed mPPEs. Finally, ANCOVAs were conducted to examine differences in capability between fourth year students who choose rotation options known to have higher frequency of mPPEs and those who choose other rotations.

## CHAPTER III - RESULTS

### Examination of Distributions

Frequency of performing mPPES (i.e. LES Performance subscale) exhibited significant kurtosis (4.89) and was log transformed to better approximate a normal distribution (-0.25).

### Selection of Covariates

First, chi-square analyses were utilized to examine associations between curriculum component (i.e. preclinical vs. clinical) and demographic variables (race, sexual orientation, marital status, military status, first responder status, and healthcare professional status). Results indicated that military status ( $\chi^2(1, N = 106) = 4.57, p < 0.05$ ) was significantly associated with curriculum component such that individuals in the preclinical component were more likely to report current or past military affiliation. No other demographic variables were significantly associated with curriculum component.

An ANOVA (Analyses of Variance) was conducted to determine if a significant difference in frequency of total mPPES existed for demographic variables (race, sexual orientation, marital status, military status, first responder status, and healthcare professional status). Results indicated significant differences between frequency of total mPPEs and marital status ( $F(49, 90) = 2.08, p < 0.05$ ), such that individuals identifying as divorced ( $M_{mPPE} = 68.25$ ) endorsed higher mean frequencies of mPPEs. Results also indicated a significant difference between frequency of total mPPEs and military status ( $F(49, 90) = 1.78, p < 0.05$ ) and first responder status ( $F(49, 90) = 1.91, p < 0.05$ ). Individuals with no military affiliation ( $M_{mPPE} = 60.98$ ) and individuals previously employed as a first-responder ( $M_{mPPE} = 73.71$ ) endorsed higher mean frequencies of



mPPEs. Similarly, a series of ANOVAs were utilized to determine between group differences in outcome variables (i.e. capability for suicide assessed by both the ACSS and SCS-3) and moderators (frequency of both observing and performing mPPEs assessed by the LES-MS) for the demographic variables. Results indicated significant differences between frequency of observing mPPEs and military status ( $F(1, 92) = 5.33$ ,  $p < 0.05$ ) such that individuals with no military affiliation endorsed higher mean frequencies of observing mPPEs ( $M_{LESO} = 43.53$ ). Results also indicated a significant difference between frequency of performing mPPEs and marital status ( $F(20, 90) = 2.07$ ,  $p < 0.05$ ) such that individuals who identified as divorced endorsed higher mean frequencies of performing mPPEs ( $M_{LESP} = 1.36$ ).

Zero-order correlations were used to examine associations between frequency of total mPPEs and age. Results revealed a significant correlation between age and frequency of total mPPEs ( $r = 0.23$ ,  $p < 0.05$ ). Zero-order correlations were again used to examine associations between age and continuous outcome variables (capability for suicide assessed by both the ACSS and SCS-3) and moderators (frequency of both witnessing and performing mPPEs). Results revealed significant correlations between age and frequency of performing mPPEs ( $r = 0.26$ ,  $p < 0.05$ ).

#### Primary Analyses

Frequency of total mPPEs (i.e. LES-MS total score) was significantly associated with capability for suicide assessed by the ACSS, above and beyond the effects of gender, marital status, military status, first responder status, age and frequency of painful and provocative experiences ( $\beta = .27$ ;  $p = 0.008$ ;  $f^2 = .09$ ). Results indicated that frequency of total mPPEs accounted for 6.3% of the variance in capability for suicide

(total  $R^2 = 0.33$ ). Frequency of total mPPEs was significantly associated with capability for suicide assessed by the SCS-3 above and beyond the effects of covariates ( $\beta = .29$ ;  $p = 0.010$ ;  $f^2 = .09$ ). Results indicated that frequency of total mPPEs accounted for 7.2% of the variance in capability for suicide (total  $R^2 = 0.16$ ).

The moderating effect of frequency of witnessing mPPEs on the relationship between curriculum component and capability for suicide assessed by the ACSS, while controlling for gender, military status, and frequency of PPEs was non-significant. Results indicated that the overall model was non-significant ( $b = .04$ ,  $SE = .16$ ,  $p = .80$ ,  $f^2 = .00$ ). The main effect of curriculum component was non-significant ( $\beta = .07$ ;  $p = 0.56$ ).

Similarly, the moderating effect of frequency of witnessing mPPEs on the relationship between curriculum component and capability for suicide assessed by the SCS-3, while controlling for gender, military status, and frequency of PPEs was also non-significant ( $b = .06$ ,  $SE = .10$ ,  $p = .55$ ,  $f^2 = .00$ ). The main effect of curriculum component was non-significant ( $\beta = .01$ ;  $p = 0.97$ ).

The moderating effect of frequency of performing mPPEs on the relationship between curriculum component and capability for suicide assessed by the ACSS, while controlling for gender, marital status, military status, and frequency of PPEs was non-significant. Results indicated that the overall model was non-significant ( $b = .35$ ,  $SE = 15.99$ ,  $p = .98$ ,  $f^2 = .00$ ). The main effect of curriculum component was non-significant ( $\beta = .08$ ;  $p = 0.52$ ).

Similarly, the moderating effect of frequency of performing mPPEs on the relationship between curriculum component and capability for suicide assessed by the SCS-3, while controlling for gender, marital status, military status, and frequency of

PPEs was also non-significant ( $b = 5.76$ ,  $SE = 10.54$ ,  $p = .59$ ,  $f^2 = .00$ ). The main effect of curriculum component was non-significant ( $\beta = .11$ ;  $p = 0.40$ ).

It should be noted that analyses comparing data between included and excluded participants on curriculum component, total frequency of mPPEs, ACSS, and SCS-3 were unable to be conducted. Inability to conduct these analyses was due to missing data, as participation in the current study was likely terminated due to failure to respond correctly to validation questions. Overall, data was only available for 2 of the excluded participants.

#### Post-Hoc Analyses

Frequency of total mPPEs was significantly associated with practical capability assessed utilizing a subscale of the SCS-3, above and beyond the effects of gender, marital status, military status, first responder status, age and frequency of painful and provocative experiences ( $\beta = .27$ ;  $p = 0.018$ ;  $f^2 = .07$ ). Results indicated that frequency of total mPPEs accounted for 6.1% of the variance in capability for suicide (total  $R^2 = 0.17$ ). Frequency of total mPPEs did not significantly predict either dispositional capability ( $\beta = .11$ ;  $p = 0.33$ ;  $f^2 = .01$ ) or acquired capability ( $\beta = .13$ ;  $p = 0.23$ ;  $f^2 = .02$ ) assessed utilizing subscales of the SCS-3 above and beyond the effects of covariates.

#### Exploratory Analyses

The proposed exploratory analyses were unable to be conducted due to all fourth year students opting to participate in rotations with higher frequencies of mPPEs. Exploratory analyses were adjusted to examine whether frequency of engagement in rotations known to exhibit elevated frequency of mPPEs (i.e. the number of rotations known to exhibit elevated frequency of mPPEs which students opted to participate in)

was associated with capability for suicide above and beyond the effects of gender, PPEs unrelated to practicing within the medical profession. Results indicated that frequency of engagement in rotations known to exhibit elevated frequency of mPPEs was not significantly associated with capability assessed utilizing the ACSS ( $\beta = -.11$ ;  $p = 0.465$ ;  $f^2 = .02$ ) or the SCS-3 ( $\beta = -.03$ ;  $p = 0.870$ ;  $f^2 = .00$ ).

## CHAPTER IV – DISCUSSION

The primary aim of this study was to examine the relationship between capability for suicide and mPPEs among medical students (i.e. at the training level). Moreover, this study aimed to do so by utilizing more comprehensive measures of capability than previously utilized. The final aim of the current study was to examine the relationship between both observing and performing mPPEs utilizing a cohort design in order to understand how capability is impacted throughout the course of medical training.

As expected, and consistent with findings from Fink-Miller (2015<sup>b</sup>), frequency of total mPPEs was significantly associated with scores on capability assessed by the ACSS above and beyond the effects of gender, age, marital status, military status, first responder status, and PPEs unrelated to practicing within the medical profession. The frequency of total mPPEs was also significantly associated with capability assessed by the SCS-3 above and beyond the effects of covariates. Post-hoc analyses indicated that frequency of total mPPEs was significantly associated with practical capability above and beyond the effects of covariates, but not significantly associated with either dispositional or acquired capability. The significant association between frequency of engagement in total mPPEs and capability for suicide assessed by both the ACSS and SCS-3 suggests that medical students frequently engaging in mPPEs are more capable of engaging in lethal self-harm. Moreover, the significant association between frequency of engagement in total mPPEs and practical capability suggests that medical training contributes to the development of capability for suicide through increased knowledge of (e.g. dosage of medications necessary to induce lethality) and familiarization with means (e.g. medications) that are commonly utilized by physician suicide decedents to induce lethal self-harm. Overall,

these findings suggest that medical students may be more capable of engaging in lethal self-harm should the desire for suicide develop.

One possible explanation for the discrepant findings of a significant association between frequency of engagement in total mPPEs and capability assessed using the ACSS, but non-significant association between frequency of engagement in total mPPEs and capability assessed utilizing the acquired subscale of the SCS-3 may be due to the distribution of the item content included in the questionnaires used to assess the concept of acquired capability. Although the ACSS does include items assessing pain tolerance, more of the items included on the ACSS assess fearlessness about death, with a large portion of these items assessing fearlessness about death related to experiences that occur during the course of medical training (i.e. sight of blood, killing animals in a science course, talking about death, sight of a dead body); whereas, half of the items included in the acquired subscale of the SCS-3 assess pain tolerance. Therefore, the SCS-3 may be equally assessing both components of acquired capability (i.e. fearlessness about death and pain tolerance); whereas, the ACSS may be more indicative of fearlessness about death. This is further supported by the fact that students enrolled in the clinical component of the current sample exhibited notably higher mean levels of capability assessed utilizing the ACSS ( $M = 45.47$ ,  $SD = 10.70$ ) than a sample comprised of 910 U.S. adult residents in which 59% of individuals reported no history of suicidality ( $M = 39.70$ ,  $SD = 14.35$ ; Klonsky & May, 2015), but comparable mean levels of acquired capability when assessed utilizing a subscale of the SCS-3 ( $M = 7.84$  Vs.  $M = 7.27$ ,  $SD = 2.88$ ). If these two measures of capability (i.e. the ACSS and acquired subscale of the SCS-3) equivalently assessed both components of capability (i.e. fearlessness about death

and heightened pain tolerance) medical students would be expected to have notably higher mean levels of capability assessed utilizing the acquired subscale of the SCS-3 than the sample of diverse individuals, especially given the notable difference in mean levels of acquired capability when assessed utilizing the ACSS.

Another possible explanation for these discrepant findings may be that physicians exhibit a lower perceived pain tolerance. Given that the most common method of suicide among physicians is overdose (Hawton, Malmberg, & Simkin, 2004), specifically by means of antipsychotics and barbiturates (Gold, Sen, & Schwenk, 2013) rather than from more commonly utilized means which are also likely accessible to physicians (e.g. hanging, suffocation, and self-poisoning with gas; Hawton et al., 2000), this suggests that physicians may perceive their own ability to tolerate pain as diminished relative to their pain tolerance threshold. Therefore, when acquired capability is assessed utilizing mainly items directed at pain tolerance, physicians may endorse lower levels of capability for suicide. Further research directly addressing this point is needed.

The non-significant relationship between curriculum component and capability for suicide may be due to sample composition. Approximately 47.1% of participants were employed as a healthcare professional and 8.8% of participants were employed as a first responder prior to enrollment in medical school. Moreover, approximately 43.9% of individuals enrolled in the preclinical component identified as either a former healthcare professional or a first-responder. Medical students in this sample exhibited mean levels of capability assessed utilizing the ACSS-Fearlessness About Death ( $M_{ACSS-FAD} = 15.60$ ,  $SD = 5.26$ ) comparable to physicians practicing in various medical specialties for approximately 24 years ( $M = 15.87$ ,  $SD = 3.27$ ; Fink Miller, 2015<sup>b</sup>). Moreover, medical

students enrolled in the preclinical component also endorsed mean levels of capability ( $M_{ACSS-FAD} = 15.06$ ,  $SD = 4.75$ ) comparable to physicians. Given that mean levels of capability increase as the frequency of exposure to mPPEs increases, medical students in both the preclinical and clinical components would be expected to have lower mean levels of capability relative to physicians practicing in the field. Considering the mean levels of capability endorsed in the current sample within the context of the mean levels of capability endorsed by physicians, it seems likely that majority of individuals in the current sample acquired capability for suicide through exposure to mPPEs during their previous employment. See Table 2 for descriptive statistics.

Another possible explanation for the non-significant relationship between curriculum component and capability for suicide, as well as the elevated mean levels of capability among students in the current sample may be a selection bias effect. Specifically, individuals with inherently higher levels of capability for suicide (i.e. dispositional capability) may seek out an occupation in medicine given that medical occupations are known to involve a higher frequency of pain and provocation (e.g. exposure to injury and death). This is further supported by the fact that medical students enrolled in the preclinical component endorsed mean levels of capability assessed utilizing the ACSS-Fearlessness About Death ( $M_{ACSS-FAD} = 15.06$ ,  $SD = 4.75$ ) slightly higher than civilians with multiple suicide attempts ( $M_{ACSS-FAD} = 14.07$ ,  $SD = 7.07$ ; Assavedo, Green, & Anestis, 2018), a population known to exhibit elevated mean levels of capability for suicide.

The non-significant interaction of curriculum component and frequency of both witnessing and performing mPPEs on capability for suicide assessed utilizing both the



ACSS and SCS-3 was initially thought to be due to the use of only partially predictive moderators (i.e. use of the subscales of the LES-MS, rather than the LES-MS total score). Specifically, use of a variable reflecting the entirety of exposure to mPPEs (i.e. LES-MS total score) among medical students was believed to be important given that experiences among individuals enrolled in the same clinical component of the curriculum may be confounded by numerous factors (e.g. differences in supervising physicians, rotation site, support staff at rotation sites (i.e. nurses, techs) etc.). However, results indicated that frequency of mPPEs assessed using the LES-MS total score did not significantly moderate the relationship between curriculum component and capability for suicide assessed by both the ACSS ( $b = -.05, SE = .13, p = .71, f^2 = .00$ ) and SCS-3 ( $b = -.02, SE = .08, p = .80, f^2 = .00$ ). Therefore, this non-significant interaction may be better explained by reduced effects of subsequent PPEs on capability after a specific amount of PPEs is acquired (Bauer, Martin, Allan, Fink-Miller, & Capron, 2018). This is further supported by the fact that the mean levels of mPPEs endorsed by students in the clinical component ( $M = 69.51$ ) were slightly elevated compared to the mean levels of mPPEs endorsed by physicians practicing in various medical specialties for approximately 24 years ( $M = 62.63, SD = 10.64$ ; Fink Miller, 2015<sup>b</sup>) and students in the preclinical component endorsed notably lower mean levels of mPPEs ( $M = 43.03$ ) than students in the clinical component and practicing physicians. Given that approximately 60% of individuals in the current sample were employed in careers that involved exposure to mPPEs prior to their enrollment in medical school, it seems plausible that the relationship between curriculum component and capability for suicide would not be moderated by either frequency of witnessing or performing mPPEs if the effect of subsequent mPPEs

becomes reduced after a specified amount of mPPEs is acquired. Another possible explanation for the non-significant interaction of curriculum component and frequency of both witnessing and performing mPPEs on capability for suicide may be a lack of adequate power necessary to detect interaction effects, as the current sample was limited to 114 participants.

The non-significant association between frequency of engagement in rotations known to exhibit elevated frequency of mPPEs and capability for suicide assessed utilizing both the ACSS and SCS-3 among students in the fourth year of training may be due to a lack of adequate power. An a priori power analyses using G\*Power 3 suggested that a sample size of 128 would allow adequate power (0.80) to detect medium effect sizes ( $f = 0.25$ ) while holding type one error at  $\alpha = .05$ ; however, the number of students enrolled in the fourth year of training in the current study was only 40.

Results from the current study should be considered within the context of their limitations. One such limitation is the lack of ability to account for capability acquired from exposure to mPPEs prior to enrollment in medical school, especially given that majority of the sample was employed as either a healthcare professional or first responder. The composition of the current sample of medical students utilized for this study appears atypical relative to medical school matriculants in the U.S. Specifically, the mean age of medical students in the current sample ( $M_{\text{age}} = 27.59$ ) was slightly elevated relative to both osteopathic medical school matriculants ( $M_{\text{age}} = 24$ ; American Association of Colleges of Osteopathic Medicine [AACOM], 2017), and medical school applicants from 2014 to 2018 ( $M_{\text{age}} = 24$ ; Association of American Medical Colleges [AAMC]). Additionally, the number of individuals previously employed as a healthcare

professional (47.1%) and individuals with military affiliation (11.1%) in the current sample is also notably elevated relative to Osteopathic medical school matriculants, as only 2.4% reported previous matriculation to a healthcare profession school and 2.1% reported military affiliation (AACOM 2017). Future studies should account for exposure to mPPEs prior to medical school enrollment. Conclusions regarding causality and directionality are unattainable due to the use of a cohort design and cross-sectional data. Another limitation is the utilization of self-report questionnaires to measure all variables. This method of data collection relies upon the assumption that all participants understood the questions as well as answered the questions accurately. Future research utilizing different methods (e.g. interviews, behavioral assessments) would enhance confidence in our results. Additionally, because our sample was comprised of medical students enrolled in an Osteopathic medical training program, it is unclear the generalizability of results to students enrolled in Allopathic medical training programs despite the utilization of the traditional model of training by the Osteopathic program from which the study participants were enrolled. Future research should address these limitations in a more representative sample.

Despite these limitations, we believe the findings from the current study have significant scientific and clinical implications. The majority of research examining capability for suicide among health professions has utilized samples consisting of individuals who have been practicing in the field, rather than individuals in training. The data from the current study examine this construct in individuals enrolled in training for careers in the medical profession (i.e. medical students). Results from the current study suggest that students enrolling in medical training exhibit heightened levels of capability

for suicide. Additionally, results suggest that individuals possessing heightened capability for suicide may be motivated to pursue a career as a physician given that careers in the medical field are known to involve heightened exposure to pain and provocation (e.g. injury and death). This is especially noteworthy, given that prior research has indicated that medical students exhibit elevated suicidal ideation (Rotenstein, et al., 2016); thus, results from the current study confirm that medical students exhibit an elevated risk for suicide. Finally, findings from the current study highlight the importance of routine risk assessment among medical students because the transition from suicidal ideation to action may be facilitated once any ideation is experienced as a result of elevated capability.

APPENDIX A - TABLES

*Table 1*

*Demographic Information*

Classification	N = 106	Curriculum Component	N = 106
First-Year	16	Pre-clinical	41
Second-Year	25	Clinical	65
Third-Year	25		
Fourth-Year	40		
Race	N = 102	Marital Status	N = 102
White	66	Never Married	61
Black	4	Currently Married	37
Asian/Pacific Islander	25	Divorced	4
Hispanic/Latino(a)	6		
Other	1		
Sexual Orientation	N = 102		
Heterosexual	97		
Gay/Lesbian	2		
Bisexual	2		
Asexual	1		

Table 2

*Mean Levels of Capability and Medical Painful Provocative Experiences for Each*

*Curriculum Component*

	Preclinical Component	Clinical Component
ACSS	43.59	45.47
SCS-3	20.68	22.05
Dispositional Capability	6.71	7.09
Acquired Capability	7.62	7.84
Practical Capability	6.35	7.13
mPPEs	43.03	69.51
LESO	30.03	49.84
LESP	13.21	19.21

Note: ACSS = Acquired Capability for Suicide Scale, SCS-3 = Suicide Capacity Scale, mPPEs = medical painful and provocative experiences, LESO = frequency of witnessing mPPEs, LESP = frequency of performing mPPEs.

Table 3

*Hierarchical Multiple Regression Analyses Examining the Association between Frequency of Engagement in mPPEs and Capability for Suicide Assessed by both the ACSS and SCS-3*

Step	Capability for Suicide - ACSS					Capability for Suicide - SCS-3					
	$R^2$	$\Delta R^2$	$\beta$	$p$	$f^2$	$R^2$	$\Delta R^2$	$\beta$	$p$	$f^2$	
1	.262					.085					
			Gender	-.47	.000			Gender	-.19	.114	
			Age	-.07	.510			Age	-.19	.091	
			Marital Status	-.06	.493			Marital Status	.05	.612	
			Military Status	.04	.713			Military Status	.16	.140	
			Responder Status	-.14	.158			Responder Status	.01	.939	
			PPEs	.05	.607			PPEs	.06	.629	
2	.325	.062				.157	.072				
			mPPEs	.27	.008	.08		mPPEs	.29	.010	.09

Note: Responder Status = first responder status, PPEs = frequency of painful and provocative experiences, mPPEs = frequency of medical painful and provocative experiences.

Table 4

*Interaction of Curriculum Component and Frequency of Witnessing mPPEs Predicting Capability for Suicide Assessed by both the ACSS and SCS-3*

	Capability for Suicide - ACSS					Capability for Suicide - SCS-3				
	<i>R</i> <sup>2</sup>	$\Delta R^2$	<i>b</i>	<i>SE</i>	<i>p</i>	<i>R</i> <sup>2</sup>	$\Delta R^2$	<i>b</i>	<i>SE</i>	<i>p</i>
	.29				.000	.13				.063
Gender			-10.30	2.26	.000			-2.18	1.45	.139
Military Status			1.52	3.83	.693			3.59	2.48	.151
PPE			0.04	0.14	.776			0.04	0.09	.689
Curriculum			-0.12	6.93	.986			-2.41	4.48	.592
LESO			0.10	0.17	.356			0.08	0.07	.279
Curriculum*LESO	.29	.001	0.04	0.16	.801	.13	.004	0.06	0.10	.554

Note: ACSS = Acquired Capability for Suicide Scale, SCS-3 = Suicide Capacity Scale, PPE = frequency of painful and provocative experiences, Curriculum = curriculum component, LESO = frequency of witnessing mPPEs



Table 5

*Interaction of Curriculum Component and Frequency of Performing mPPEs Predicting Capability for Suicide Assessed by both the ACSS and SCS-3*

	Capability for Suicide - ACSS					Capability for Suicide - SCS-3				
	$R^2$	$\Delta R^2$	$b$	$SE$	$p$	$R^2$	$\Delta R^2$	$b$	$SE$	$p$
	.30				.000	.10				.254
Gender			-9.85	2.32	.000			-2.00	1.53	.193
Marital Status			-1.18	1.56	.452			0.57	1.03	.581
Military Status			1.02	3.80	.789			3.00	2.50	.234
PPE			0.03	0.15	.859			0.05	0.10	.613
Curriculum			1.21	18.80	.949			-5.30	12.38	.670
LESP			12.67	13.03	.334			0.48	8.59	.956
	.30	.000				.10	.003			
Curriculum*NLESP			0.35	15.99	.983			5.76	10.54	.586

Note: PPE = frequency of painful and provocative experiences. Curriculum = curriculum component. NLESP = log transformed frequency of performing mPPEs.

## APPENDIX B – IRB Approval Letters



### **INSTITUTIONAL REVIEW BOARD**

118 College Drive #5147 | Hattiesburg, MS 39406-0001

Phone: 601.266.5997 | Fax: 601.266.4377 | [www.usm.edu/research/institutional.review.board](http://www.usm.edu/research/institutional.review.board)

### **NOTICE OF COMMITTEE ACTION**

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.  
Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 18013006

PROJECT TITLE: Perspectives of Medical Students

PROJECT TYPE: Doctoral Dissertation

RESEARCHER(S): Brittney Assavedo

COLLEGE/DIVISION: College of Education and Psychology

DEPARTMENT: Psychology

FUNDING AGENCY/SPONSOR: N/A

IRB COMMITTEE ACTION: Expedited Review Approval

PERIOD OF APPROVAL: 02/07/2018 to 02/06/2019

**Lawrence A. Hosman, Ph.D.**

**Institutional Review Board**



November 10, 2017

Dear USM IRB Committee Chair

This letter is in support of the research study proposal by Brittany L. Assavedo, USM doctoral candidate. As the Dean of William Carey College of Osteopathic Medicine (WCUCOM). I support online access for our medical students to engage in this project through voluntary participation following the IRB formal review and approval by both USM and WCU. Brittany will work with the Associate Dean of Academic Affairs, Elizabeth McClain, PhD, to ensure the distribution of the online survey and address any issues to ensure the success of the study completion.

A handwritten signature in blue ink, appearing to read "James M. Turner".

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