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MEDIATION ANALYSIS OF A BROADER CONCEPTUALIZATION
OF THE THREE-STEP THEORY OF SUCIDALITY

by

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A thesis submitted in partial fulfillment of the requirements
for the degree of Bachelor of Science
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ABSTRACT

Unsatisfactory results for the aim of reducing suicide rates have motivated the creation of new models to predict suicide, such as the ideation-to-action framework, which focuses on differentiating those with suicidal ideation and those who attempt suicide. The most recently published theory on the ideation-to-action framework is the Three-Step Theory (3ST). Step 1 proposes that the combination of pain and hopelessness causes suicidal ideation, step 2 proposes that ideation increases when pain and hopelessness surpass connectedness, and step 3 proposes that strong suicidal ideation escalates to action when the person has the capacity to attempt suicide. The theory's concepts are intentionally conceptualized very broadly. The current study aims to compare the traditional conceptualization measurements of the Three-Step Theory with a broader range of predictors. We aim to test the first two steps of the theory through a mediation model and examine if connectedness serves as a mediator in the relationship between psychological pain and hopelessness in predicting the severity of suicidal ideation. We hypothesized that adding a broader conceptualization of pain (i.e., physical pain) and connectedness (i.e., perceived meaning of life, social pleasure, affective empathy) will better account for the level of suicidal ideation. We also hypothesized that connectedness serves as a mediator in the relationship between psychological pain and hopelessness in predicting suicide ideation severity. Following exclusions and removing missing data, 97 participants were available for analysis. Results showed that one of our novel measurements of connectedness, perceived burdensomeness, mediated the relationship between psychological pain and suicidal ideation severity.

This thesis is dedicated to my parents. For their endless love, support, and encouragement.

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INTRODUCTION

Suicide is among the leading causes of death worldwide, which makes it an important and relevant public health problem. In the United States alone, there were 47,500 deaths by suicide (CDC, 2021), and an estimated 800,000 deaths around the globe (WHO, 2021). These numbers do not account for the thousands of failed suicide attempts; just in the U.S. 12 million adults reported that they seriously thought about suicide, 3.5 million made a plan, and 1.4 million attempted suicide (CDC, 2019). From an international perspective, it is calculated that for every suicide death there are about 20 suicide attempts (WHO, 2019). Suicide is a tragedy that strikes families, communities, and entire countries, and it can cause long-lasting effects on those affected by it. Even though suicide is such a critical problem to society, it is also considered "preventable" by the use of timely, evidence-based, and appropriate interventions (CDC, 2021).

The aim of creating those interventions is what has propelled research on suicidal thoughts, behaviors, and risk factors. One of the most relevant risk factors is biological sex, with males being at least twice as likely to commit suicide than females (WHO, 2018), but with females presenting higher rates than males for suicidal-thinking, non-fatal suicidal behaviors, and suicidal attempts (Crosby et al, 2009). Some other commonly studied risk factors are mood and anxiety disorders (especially depression and bipolar disorder), borderline personality disorder, substance abuse disorders, previous suicide attempts, being part of a population minority (e.g., non-heterosexual, immigrant), and access to lethal means, among many other (AFSP, 2021; CDC, 2019; WHO, 2015-2019). However, when researchers try to use this

knowledge of risk factors on actual prediction, studies have shown that all these risk factors had little to no effect on suicide death prediction. According to a meta-analysis of risk factor literature for suicide thoughts and behaviors, there has not been an improvement in predictive ability over the past 50 years, with no risk factor categories or subcategories being substantially more relevant than any other (Franklin et al., 2017). This perspective aligns with later findings, a study by Belsher and colleges supports that the accuracy of prediction of future events (suicide attempts or deaths) with current models is near zero (Belsher et al., 2019).

Despite these disappointing conclusions, researchers must use this information to fuel future attempts to create and study suicide models and risk factors. One way to do this is by following the critics and "next steps" from the recent literature. A recent meta-analysis emphasizes the need for a broader methodology to study traditional risk factors, as well as the creation of new models that might be more comprehensive of the reality of suicide (Franklin, 2017). The need for new models gave birth to a new generation of suicide models called the ideation-to-action framework of suicide. This framework focus on the fact that not everyone who thinks about suicide will attempt suicide, as well as risk factors for those who think about committing suicide, "ideators", and for those who might attempt or complete suicide, "attempters" (Klonsky, Saffer, & Bryan, 2018). Currently, there are four theories on this framework, the interpersonal theory of suicide, the integrated motivational–volitional model, the fluid vulnerability theory, and the three-step theory (3ST) (Klonsky, Saffer, & Bryan, 2018).

Of these theories, the 3ST is the most recently published, and expanding evidence supports its emphasis on emotional or psychological pain and hopelessness in the development

of suicidal desire and motivation (Klonsky, Saffer, & Bryan, 2018). As presented by Klonsky and May (2015), step one suggests that the combination of pain and hopelessness causes suicidal ideation. This is supported by the idea that people are shaped by behavioral conditioning and when life is painful or miserable, one is being punished for being alive, which may cause the desire of avoiding life. But if someone considers that there is hope for a change in their conditions, one's focus will be on achieving a better scenario. That is why hopelessness and pain are considered necessary and sufficient for suicidal desire to develop. Step two proposes that ideation increases when pain surpasses connectedness. Connectedness is defined as any sense of meaning or purpose, including, but not limited to, loved ones, interests, roles, and projects. Step three proposes that strong suicidal ideation escalates to action when the person has the capacity to attempt suicide. There is not a clear definition of suicide capacity by the authors of this theory besides that it involves 3 factors: dispositional, acquired, and practical. Dispositional variables are defined as genetic predispositions and factors, such as lower pain sensitivity and low fear of death; acquired variables refer to exposure to experiences that involve pain, injury, or fear of death; lastly, practical variables are those which give the person physical means or mechanisms to make a lethal attempt possible, this could include specific knowledge, experience, and access to firearms, or other means. The 3ST was purposefully broad when conceptualizing its main constructs (pain, hopelessness, connectedness, and suicide capacity). The reasoning behind not being specific about the sources of pain was that diverse forms of pain might discourage a person from engaging with life. Following the same logic, connectedness was broadly defined, given that everyone's "purpose" to be alive might differ extensively.

Because of the recency of the 3ST, there are still many gaps in the literature. To begin with, empirical studies on the 3ST have used limited indicators despite the initial broad definition of the main constructs. For example, when studying the 3ST, pain has always been operationalized just as psychological pain up to this point, which according to a recent peer review, presents a significant limitation since one of the central differences between the 3ST and other theories of the ideation-to-action framework is that pain of any kind can make life aversive and contribute to suicidal ideation, including physical and medical sources of pain (Pachkowski, Hewitt & Klonsky, 2021). Another clear limitation established by Pachkowski, Hewitt, and Klonsky, is the lack of studies using more than social connection indicators, given that the definition of connectedness in this theory goes beyond social domains and includes every source of purpose or meaning. This conclusion is also supported by Smith, Kuhlman, and Wolford-Clevenger (2020), who in their analysis of the Interpersonal Theory of Suicide concluded that a broader definition of "thwarted belongingness," one of the main constructs of the theory, might better account for different levels of suicidal ideation. In the Interpersonal Theory of Suicide, "thwarted belongingness" is presented as an unmet need for interpersonal connection, while in the 3ST, "connectedness" offers a much broader definition that is not limited by social aspects. Another limitation of the literature on the 3ST is the lack of empirical evaluation of the directionality of its progressing steps using statistics such as mediation, path analysis, structural equation model (SEM), as proposed by Anderson and Happ (2020).

In response to those gaps in the literature, the current study aims to measure some of the prime constructs of the 3ST with a broader range of indicators. Primarily, a self-report measure of physical pain will be added as an indicator of "pain" along with a traditional psychological

pain measure. This study will also expand indicators of connectedness to represent the broader aspects of the construct, such as including scales of purpose in life, and social pleasure, and empathic concern. Additionally, the current study aims to test the first two steps of the 3ST for what appears to be the first time using a mediation model. We aim to examine whether measures of connectedness serve as mediators in the relationship between measures of pain/hopelessness and suicide ideation severity. Specifically, we hypothesized that as the level of the mediators became more pathological (e.g., reduced social connectedness), the strength of the relationship between both traditional and non-traditional measures of pain and hopelessness with suicidal ideation severity would increase. This direction of the mediation model is consistent with the 3ST. However, our model is novel in that we included both nontraditional and traditional measures of the constructs. This study does not measure the last step of the 3ST, which is suicide capacity, but measures its precursor, suicidal ideation severity. As the current study sample is undergraduate students, we did not expect sufficient variability in suicide capacity measures or suicide attempts.

METHODS

Participants

Participants were undergraduate students from the University of Central Florida. The sample was recruited through the Psychology Department's Sona Systems portal and consists of students enrolled in undergraduate psychology courses. Participants received class credit for partaking in the study. Participants were at least 18 years old to register in this study. We collected a sample of 122 participants. The following exclusions were applied: self-reported current neurological condition ($n = 7$), a statement that the researcher should not use their data ($n=6$), scoring high is social desirability ($n = 2$), completing the study faster than the 10th percentile of the entire sample (*m:*18.56min SD: 20.17min, $n =10$). The final sample size was 97 participants, (54.7% female, mean age: 19.69, SD = 3.163; range 18 to 41 years old). Two participants identified as non-binary gender, and therefore were not including in analysis including biological sex. Our final sample was composed of 65 Caucasians (67%), 11 African Americans (11.3%), 7 Asian (7.2%), 2 Native Americans (2.1%), 8 mixed or "other" (8.2%), and 4 "prefer not to say" (4.1%). The sample included 31 participants (32%) of Latinx or Hispanic ethnicity.

Measures

Demographics: The Demographics and Health Questionnaire (DHQ) is a 7-item questionnaire focused on gender, age, and mental health history, which might provide a broader understanding when analyzing the data. Questions include, "Are you currently receiving psychotherapy?" Yes/No. For more details, please refer to Appendix A.

Validity Scale 1 - Marlow-Crowne Social Desirability Scale (MCSDS). The MCSDS is formed by 13 true or false questions that measure the social desirability response tendency of participants (Reynold,1982). This social desirability measurement reflects expression management, where a high score represents an unwillingness to accept shortcomings. Therefore, those who score more than two standard deviations over the mean of the entire sample are most likely to underreport constructs such as suicidal ideation and will be excluded from the data analysis. Questions include, "It is sometimes hard for me to go on with my work if I am not encouraged."

Validity Scale 2 - Insufficient Effort Responding (IERS). The IERS represents the lack of motivation from a participant to comply with survey instructions or correctly interpret the survey's content (Huang et al., 2015). The eight questions include "I work fourteen months in a year" and other improbable or impossible questions that will be answered through true or false. If the participant has two or more items incorrect, they will be excluded from our sample.

Validity Scale 3 - Self-Reported Single Item (SRSI): According to Meade and Craig (2012), the SRSI represents a short and straightforward dichotomous alternative to assess the integrity of the data of the surveys. Overall, the SRSI variable excluded 10% of the participants in the initial research. The question will be worded: "Lastly, it is vital to our study that we only include responses from people that devoted their full attention to this study. Otherwise, months of effort (the researcher's and the time of other participants) could be wasted. Often there are several distractions present during studies (other people, TV, music, etc.). In your honest opinion, should we use your data in our analyses in this study? You will receive credit no matter

what. We appreciate your honesty!" and it will be answered by "yes" or "no." All participants who respond "no" will be excluded from our data analysis. The cited paper detailed that this single item had high sensitivity to insufficient attention, indicating that respondents may be more forthcoming about not using their data based on their behaviors than their sincereness about their effort or attention on the survey.

Physical pain. The 6-item scale, Graded Chronic Pain Scale-Revised (GCPS-R), includes two multiple-choice questions regarding the last three months of chronic pain and four multiple-choice questions about the previous seven days. Questions addressed the frequency of the pain and how much it limits the participants' life and work experiences. The psychometric properties of this measurement have been established (Michael Von Korff et al., 2020). This measurement includes questions such as "In the past three months, how often did you have pain?" and the options are "Never," "Some days," "Most days," and "Every day."

Emotional Pain - Scale of Psychache (SOP). This 13-item scale measures current emotional and psychological pain as described by Edwin Shneidman (1993). The questionnaire is divided into two parts. The first nine items are focused on the intensity and frequency of psychological pain. Sample questions include " Psychologically, I feel terrible.", and participants respond using a 5-point Likert Scale, where 1 = Never, 2 = Sometimes, 3 = Often, 4 = Very Often, and 5 =Always. The second part of the scale is focused more on how affected the participant is by the psychological pain. Sample questions include "My pain is making me fall apart," and participants are asked to choose:1 = Strongly Disagree, 2 = Disagree, 3 = Unsure, 4 = Agree, or 5 = Strongly Agree. A coefficient alpha reliability of .94 confirms that the scale is a

highly homogeneous measure, and the presence of a large correlation (.65) with self-report

criteria of self-destruction behaviors supports the validity of this scale (Holden et al., 2001).

Hopelessness - Beck Hopelessness Scale 4-item version (4-BHS). This measure by Aish

and Wasserman was validated in 2,000 participants and found to have a high correlation of $r =$

.88 with the original 20-item scale (Yip and Cheung, 2006). This measurement was designed to

evaluate three factors of hopelessness, which were labeled "Feelings about the Future," "Loss of

Motivation," and "Future Expectations." This measurement includes statements such as "Future

Seems Dark," where subjects will answer "True" or "False."

Burdensomeness and Belongingness. Interpersonal Needs Questionnaire (INQ 15-item

version). The 15-item version of the Interpersonal Needs Questionnaire (15-INQ) includes nine

items measuring exclusively "thwarted belongingness," and six items for "perceived

burdensomeness." Compared with the 25-item version, this measure represents relatively pure

indicators of their respective constructs (Van Orden et al., 2012). The INQ was designed to

measure participant's beliefs about the extent to which they feel a burden to others

(burdensomeness) and the degree to which they feel connected to others (belongingness).

Questions include "These days, the people in my life would be better off if I were gone," and are

answered with a 7-point Likert Scale, where 1 is "not at all true for me" and 7 is "very true for

me."

Social Anhedonia. Anticipatory and Consummatory Interpersonal Pleasure Scale

(ACIPS). The ACIPS is a 17-item scale that assesses the hedonic capacity of pleasure for

interpersonal interactions. The scale was found to have strong internal consistency (Cronbach's

α=0.86) and was validated by Gooding and Pflum (2014). This measure includes statements such as "I enjoy joking and talking with a friend or coworker" and uses a 6-point Likert scale, where 1= "very false for me," and 6= "very true for me." Higher scores represent higher pleasure from interpersonal interactions.

Purpose in Life. The Purpose in Life Test-Short Form (PIL-SF). This measure is a 4-item questionnaire validated as a short version of the Purpose in Life Test (PIL) by Schulenberg, Schnetzer, & Buchanan (2011). According to the cited paper, the PIL-SF's alpha, when administered independently from the 20-item version, was .84, which is comparable to the reliability of the long-form (.86). Participants will be asked to respond to questions such as "My existence is:" followed by a 5-point Likert Scale, where 1= "utterly meaningless, without purpose," to 5 = "purposeful and meaningful."

Social Connectedness. Social Connectedness Scale-Revised (SCS-R). The SCS-R is a 20-item questionnaire designed to assess social connectedness. Social connectedness is considered the attribute of the self-related to interpersonal closeness with the social world (Lee, Lee & Draper, 2001.) Sample questions include "I am able to relate to my peers." Responses will be on a 6-point Likert scale ranging from 1=strongly disagree to 6=strongly agree. The scale was previously validated and had an alpha of .92, showing strong reliability.

Empathy - Interpersonal Reactivity Index (IRI-EC). The IRI was designed to evaluate an individual's level of empathy (Davis, 1980). The current study will only use one of the four subscales, Empathic Concern (EC), which focuses on feeling sympathy and compassion for others. The 7-item measurement of EC presents satisfactory internal and re-test reliability, with

alphas varying from .72 to .70 (Davis, 1980). Sample questions include "I am often quite touched by things that I see happen." Participants will answer each item with a 5-point Likert scale from "Does not describe me well" (zero points) to "Describes me very well" (four points), with negatively-worded items scored in reverse.

Suicide Ideation.

Shortened Version of the Suicide Cognitions Scale (SSCS). This measures is a 9-item self-report measurement designed to predict current suicidal thoughts and beliefs beyond the effects of other risk factors. The SSCS was presented and evaluated using Cronbach's alphas, varying from $r = 0.97$ to $r = 0.96$ (Bryan et al., 2016). This version of the SCS, which does not include the word *suicide*, was chosen to avoid explicit overlap with the DSISS and reduce the burden on participants by decreasing the number of items from 18 to 9. Sample statements include "No one can help me solve my problems." Participants will respond using a 5-point Likert scale, ranging from 1 (Strongly disagree) to 5 (strongly agree.)

Depressive Symptoms Index–Suicidality Subscale (DSISS). The DSISS is a 4-item self-report scale designed to assess the degree of suicidal thoughts, urges, and plans. It uses a 4-point Likert scale. Responses vary from 0 to 3. Greater scores indicate greater severity of suicidal ideation. The DSISS has been shown to have strong psychometric properties in several studies (Joiner & Rudd, 1996; Joiner, Pfaff, Acres, 2002). The DSISS had an alpha coefficient of 0.90 when used with adolescents and young adults (Joiner, Pfaff, Acres, 2002).

Procedure

Participants logged into the Psychology Department's Sona System web portal to sign up for this study. All questions were presented and answered through the Qualtrics website. This study was approved by the UCF Institutional Review Board. Participants were asked for their informed consent as well as to provide demographic information (DHQ; see Appendix A). Then they completed the MCSDS validity scale and the 8 items of the IERS were presented as four pairs between different measures. The participants continued by answering the measures listed above in the presented order. After the last scale (DSISS), participants answered the third validity scale (SRSI) and then were awarded academic credit for participation.

RESULTS

Descriptive statistics and Cronbach's alphas are presented in Table 1.

The hopelessness scale showed a moderate alpha reliability coefficient ($\alpha = .72$). All other scales possessed good to excellent internal reliability (e.g., SOP $\alpha=.96$). Of the 97 participants, 5 reported the higher level of physical pain (level 3), 7 reported level 2, 5 reported level 1, and 80 reported the lowest (level 0). This distribution suggests that our sample did not have enough variability for this scale.

Zero-order correlations for all variables are shown in Table 2. Females reported greater empathic concern ($p < .001$), psychological pain ($p = .02$), and perceived burdensomeness ($p =.03$) than males. In addition, older participants showed higher levels of perceived burdensomeness ($p = 0.044$). All traditional predictors of suicidal ideation from the 3ST showed statistically significant relationships with suicidal ideation in the expected directions. The two suicidal ideation scales were significantly correlated with an effect size (i.e., r value) of .65 ($p <.001$). The strength of the predictor relationships varied between SSCS and DSISS measure of suicidal ideation severity, and generally showed larger effect sizes with the SSCS. Effect sizes of the traditional predictor scales varied from small/medium r values of .38 (hopelessness and DSISS) and .58 (hopelessness and SSCS) to medium/large values of .79 (psychological pain and SSCS) and -.63 (social connectedness and SSCS). The effect size of the nontraditional scales with suicidal ideation severity varied from non-significant (physical pain), to medium values of -.47 and -.40 (social pleasure with SSCS and DSISS), to medium/large values of -.66 (purpose in life and SSCS) and .68 (perceived burdensomeness and SSCS).

Testing mediation models

See Table 3 for all mediation results. We examined the direct effects between the scales for Step 1 of the 3ST (physical pain, psychological pain, and hopelessness) to suicide ideation (SSCS and DSISS) to confirm that the independent variables were related to the dependent variables. Psychological pain was significantly associated with suicide ideation severity, but only for the SSCS scale. Hopelessness was also positively related to suicidal ideation SSCS scale. Physical pain (GCPSR) did not have a significant direct effect on either suicidal ideation scale.

From the indirect effects for all variables related to connectedness, only perceived burdensomeness had a significant mediation effect, which was specific to a positive relationship between psychological pain and suicidal ideation severity as defined by the SSCS scale (standardized B = .009, p =.03; bias-corrected 95% CI: .0006 to .017). As perceived burdensomeness was greater, the positive relationship between psychological pain and suicidal ideation severity became stronger. The DSISS scale showed the same significant mediation path when using a traditional distribution, but not when using a bias-corrected 95% confidence interval. All of the remaining mediation models were not statistically significant.

DISCUSSION

The purpose of the present thesis was to examine suicidal ideation severity through the lens of the first two steps of the three-step theory (3ST) in a sample of university students. In contrast with previous studies, we aimed to explore a broader conceptualization of the constructs pain and connectedness than what is traditionally used in 3ST studies. In addition, to the best of our knowledge, we are conducting the first mediation analysis of the 3ST. Findings partially supported the utility of the novel scales, supporting one of those measuring connectedness, but not for physical pain, when predicting suicide ideation severity. Results supported the 3ST perspective of connectedness as a mediating factor in the relationship between psychological pain and suicidal ideation severity.

Zero-order correlations partially supported the hypothesis, as not all scales were significant for predicting suicide ideation severity. Contrary to the prediction, there was no evidence supporting a relationship between physical pain or empathic concern with suicidal ideation severity in our sample (see Table 2). Of the novel scales proposed for connectedness, scales measuring social pleasure, purpose in life, and perceived burdensomeness had significant direct relationships in the expected directions with suicidal ideation severity for both scales (SSCS and DSISS).

Results of the mediation analysis supported the first two progressing steps presented by the 3ST. Our hypothesis was partially supported, as one, but not all, measures of connectedness mediated the relationship between psychological pain, but not hopelessness, and suicidal ideation severity. While most of the scales used to measure connectedness were significantly correlated to

suicidal ideation severity, only perceived burdensomeness made a significant contribution to the mediation model. As perceived burdensomeness was greater, the positive relationship between psychological pain and suicidal ideation severity became stronger (see Table 3).

When the 3ST was first proposed, connectedness was measured by the INQ subscale of thwarted belongingness. The other subscale of the INQ, perceived burdensomeness, was not used until the present study to measure connectedness within the 3ST. Another previously used scale for measuring connectedness was the SCS-R. However, it is essential to note that when including traditional and nontraditional scales to measure connectedness, only perceived burdensomeness showed significant mediation out of all combinations examined. A possible reason why other more traditional scales did not serve as a significant mediator might be that we did not include other factors relevant for Step 3, such as previous suicide attempts. However, based on these preliminary results, future studies should explore whether perceived burdensomeness is a critical construct for defining connectedness instead of more traditionally used constructs in 3ST research.

Another essential point to note from the mediation model is that connectedness mediated the relationship between psychological pain and suicidal ideation severity, but not between hopelessness and suicidal ideation severity. This outcome is inconsistent with the second proposition of the 3ST, which states that when pain and hopelessness overwhelm connectedness, suicidal ideation will escalate from moderate to strong (Anderson & Happ, 2020). However, previous presentations of the theory specifically highlighted the importance of pain exceeding connectedness for suicide ideation to become more severe (Klonsky & May, 2015). Our mediation results support the first presentation of the theory, as a measure of connectedness

mediated the relationship between pain and suicidal ideation severity. In contrast, no measure of connectedness mediated the relationship between hopelessness and suicidal ideation severity.

Other results included a significant positive correlation between the two scales of suicide ideation severity, which supports the construct validity of the scales. While they were correlated, the SSCS showed stronger and broader relationships with the other variables in the study (see Table 2). This provides support for the SSCS self-report measure, as compared to the DSISS, for the study of the 3ST. Many of the scales used for measuring connectedness had significant intercorrelations, probably based on the overlap of the sub-constructs. For example, the ACIPS scale measured social pleasure and was positively correlated to SCS-R, which measures social connectedness (see Table 2).

The current study supports and adds to the growing evidence for steps 1 and 2 of the 3ST. First, previous studies of step 2 have been limited by using particular social connectedness scales to assess connectedness, but different kinds of connectedness within and beyond social domains have remained unexplored. The current study addressed this limitation by including a broader measurement of connectedness, such as purpose in life (PIL), social pleasure (ACIPS), affective empathy (IRI-EC), and perceived burdensomeness (INQ subscale). Second, by using mediation analysis, our study supports the empirical evaluation of the directional progression of first two steps of 3ST in predicting suicidal ideation severity.

Limitations of this research include that our modest sample size prevented the use of more advanced statistical analyses such as structural equation modeling (SEM) and path analyses. Future research should acquire a larger sample and use SEM to evaluate the

progressing steps of the theory empirically. Second, our sample was drawn from university undergraduates in Florida, who, compared to other populations, presented less variability in some of the study concepts, such as physical pain. Future directions might include the study of different populations that might present more variability of physical pain, such as those with chronic pain from injuries or diseases. Third, the current study did not assess capability for suicide, which is emphasized in step 3 of the 3ST, given that we did not expect sufficient instances of suicide attempts in the relatively healthy young sample. Future studies should focus on more at-risk populations, such as clinical samples (e.g., mood disorders and borderline personality disorder). However, some strengths of the study include broadening the connectedness scales, which concluded with a nontraditional scale of connectedness, perceived burdensomeness, being the only significant mediator for all examined relationships between Step 1 variables and suicidal ideation. Another strength includes the use of mediation analyses for what appears to be the first time to study the 3ST.

In conclusion, the current study showed partial support for our hypothesis. Replication with various subgroups of individuals (e.g., clinical psychiatric populations and older adults) that might present greater variability for some constructs (e.g., physical pain, suicidal ideation, and suicide attempts) is desirable and might support the generalizability of the main findings and better support our broader initial hypothesis. In addition, it is essential for future work to examine the progressive steps of the theory with more advanced statistical analysis and include the third step of the 3ST.

TABLES

Table 1: Descriptive Statistics

	Gender	Age	SOP	GCPS-R	BHS	ACIPS	PIL-SF	SCS-R	IRI-EC	Belon.	Burden.	SSCS	DSISS
Mean	1.453	19.691	26.175	0.351	4.701	86.495	15.052	80.897	21.660	27.753	10.093	14.969	0.979
SD	0.500	3.163	12.002	0.830	1.120	11.175	3.601	22.978	5.244	12.61	5.847	7.157	1.931
Range	1.00 – 2.00	18 – 41	13 – 65	0 – 3	4 – 8	46 – 102	7 – 20	30 – 120	0 – 28	9 – 57	6 – 37	9 – 39	0 – 9
Alphas	N/A	N/A	0.962	0.828	0.720	0.879	0.856	0.955	0.842	0.889	0.906	0.937	0.945

SOP: Scale of Psychache; GCPS-R: Graded Chronic Pain Scale-Revised; BHS: Beck Hopelessness Scale 4-item version; Belon.: Interpersonal Needs Questionnaire, Thwarted Belonginess subscale. Burden.: Interpersonal Needs Questionnaire, Perceived Burdensome subscale; PIL-SF: Purpose in Life Test-Short Form; SCS-R: Social Connectedness Scale-Revised; ACIPS: Anticipatory and Consummatory Interpersonal Pleasure Scale; IRI-EC: Interpersonal Reactivity Index, Empathic Concern subscale; SSCS: Shortened Version of the Suicide Cognitions Scale; DSISS: Depressive Symptoms Index–Suicidality Subscale.

Table 2: Zero-Order Pearson's Correlations

Variable		Gender	Age	SOP	GCPS-R	BHS	ACIPS	PIL-SF	SCS-R	IRI-EC	Belong.	Burden.	SSCS	DSISS
Gender	Pearson's r	—												
	p-value	—												
Age	Pearson's r	-0.112	—											
	p-value	0.279	—											
SOP	Pearson's r	-0.238	0.154	—										
	p-value	0.020*	0.132	—										
GCPS-R	Pearson's r	-0.061	0.137	0.132	—									
	p-value	0.559	0.181	0.198	—									
BHS	Pearson's r	-0.001	-0.091	0.452	-0.043	—								
	p-value	0.990	0.375	<.001***	0.676	—								
ACIPS	Pearson's r	-0.005	-0.134	-0.360	-0.077	-0.375	—							
	p-value	0.962	0.192	<.001***	0.452	<.001***	—							
PIL-SF	Pearson's r	0.071	0.017	-0.580	0.011	-0.567	0.421	—						
	p-value	0.496	0.869	<.001***	0.912	<.001***	<.001***	—						
SCS-R	Pearson's r	0.101	0.007	-0.580	-0.005	-0.469	0.622	0.602	—					
	p-value	0.332	0.943	<.001***	0.960	<.001***	<.001***	<.001***	—					
IRI-EC	Pearson's r	-0.343	0.117	0.118	0.119	-0.033	0.339	0.237	0.249	—				
	p-value	<.001***	0.253	0.250	0.247	0.745	<.001***	0.019**	0.014*	—				
Belong.	Pearson's r	-0.138	-0.008	0.576	0.008	0.490	-0.555	-0.585	-0.831	-0.222	—			
	p-value	0.184	0.938	<.001***	0.935	<.001***	<.001***	<.001***	<.001***	0.029*	—			
Burden.	Pearson's r	-0.224	0.205	0.686	-0.030	0.410	-0.287	-0.510	-0.526	-0.032	0.545	—		
	p-value	0.029*	0.044*	<.001***	0.068	<.001***	0.004**	<.001***	<.001***	0.754	<.001***	—		
SSCS	Pearson's r	-0.091	-0.027	0.789	0.084	0.583	-0.468	-0.655	-0.632	-0.130	0.652	0.678	—	
	p-value	0.383	0.796	<.001***	0.412	<.001***	<.001***	<.001***	<.001***	0.205	<.001***	<.001***	—	
DSISS	Pearson's r	-0.102	-0.068	0.545	0.148	0.378	-0.392	-0.500	-0.434	-0.129	0.438	0.537	0.653	—
	p-value	0.327	0.511	<.001***	0.149	<.001***	<.001***	<.001***	<.001***	0.207	<.001***	<.001***	<.001***	—

*=less than .05, **= less than .01, ***=less than .001

SOP: Scale of Psychache (higher score = more psychological pain); GCPS-R: Graded Chronic Pain Scale-Revised (higher grade = more physical pain); BHS: Beck Hopelessness Scale 4-item version (higher score = more hopelessness); Belon: Interpersonal Needs Questionnaire, Thwarted Belonginess subscale (higher score = less belonginess); Burden.: Interpersonal Needs Questionnaire, Perceived Burdensomeness subscale (higher score = more burdensomeness); PIL-SF: Purpose in Life Test-Short Form (higher score = more purpose in life); SCS-R: Social Connectedness Scale-Revised (higher score = more social connectedness); ACIPS: Anticipatory and Consummatory Interpersonal Pleasure Scale; IRI-EC: Interpersonal Reactivity Index, Empathic Concern subscale (higher score = more empathic concern); SSCS: Shortened Version of the Suicide Cognitions Scale (higher score = greater suicide ideation severity); DSISS: Depressive Symptoms Index–Suicidality Subscale (higher score = greater suicide ideation severity).

Table 3: Mediation Analysis

Parameter estimates

Direct effects

	Estimate	Std. Error	z-value	p	95% Confidence Interval	
					Lower	Upper
Psychache_Tot → SSCS_TOT	0.041	0.007	5.827	< .001	0.027	0.055
GCPSR_Gr → SSCS_TOT	0.053	0.063	0.844	0.398	-0.070	0.176
BHS_TOT → SSCS_TOT	0.165	0.058	2.868	0.004	0.052	0.278
Psychache_Tot → DSISS_TOT	0.018	0.011	1.693	0.091	-0.003	0.039
GCPSR_Gr → DSISS_TOT	0.157	0.096	1.638	0.102	-0.031	0.346
BHS_TOT → DSISS_TOT	0.048	0.088	0.546	0.585	-0.125	0.221

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Psychache_Tot: Scale of Psychache; GCPSR_Gr: Graded Chronic Pain Scale-Revised; BHS_TOT: Beck Hopelessness Scale 4-item version; SSCS_TOT: Shortened Version of the Suicide Cognitions Scale; DSISS_TOT: Depressive Symptoms Index–Suicidality Subscale.

Indirect effects

	Estimate	Std. Error	z-value	p	95% Confidence Interval	
					Lower	Upper
Psychache_Tot → ACIPS_TOT → SSCS_TOT	9.523e-4	0.001	0.698	0.485	-0.002	0.004
Psychache_Tot → PIL_TOT → SSCS_TOT	0.003	0.003	1.137	0.256	-0.002	0.008
Psychache_Tot → SCS_TOT → SSCS_TOT	-0.001	0.004	-0.275	0.783	-0.009	0.007
Psychache_Tot → IRI_TOT → SSCS_TOT	-0.002	0.001	-1.115	0.265	-0.004	0.001
Psychache_Tot → Belonginess → SSCS_TOT	0.004	0.004	1.106	0.269	-0.003	0.011
Psychache_Tot → Burdensome → SSCS_TOT	0.009	0.004	2.122	0.034	6.620e-4	0.017
GCPSR_Gr → ACIPS_TOT → SSCS_TOT	0.004	0.007	0.481	0.630	-0.011	0.018
GCPSR_Gr → PIL_TOT → SSCS_TOT	-0.005	0.009	-0.572	0.567	-0.023	0.013
GCPSR_Gr → SCS_TOT → SSCS_TOT	0.002	0.006	0.248	0.804	-0.011	0.014
GCPSR_Gr → IRI_TOT → SSCS_TOT	-0.015	0.017	-0.855	0.392	-0.048	0.019
GCPSR_Gr → Belonginess → SSCS_TOT	-0.005	0.011	-0.449	0.653	-0.027	0.017
GCPSR_Gr → Burdensome → SSCS_TOT	-0.022	0.017	-1.251	0.211	-0.055	0.012

Indirect effects

			Estimate	Std. Error	z-value	p	95% Confidence Interval Lower	95% Confidence Interval Upper
BHS_TOT	→ ACIPS_TOT	→ SSCS_TOT	0.012	0.017	0.710	0.478	-0.022	0.046
BHS_TOT	→ PIL_TOT	→ SSCS_TOT	0.030	0.026	1.131	0.258	-0.022	0.081
BHS_TOT	→ SCS_TOT	→ SSCS_TOT	-0.006	0.023	-0.274	0.784	-0.051	0.038
BHS_TOT	→ IRI_TOT	→ SSCS_TOT	0.011	0.014	0.795	0.426	-0.016	0.038
BHS_TOT	→ Belonginess	→ SSCS_TOT	0.027	0.025	1.068	0.286	-0.023	0.077
BHS_TOT	→ Burdensome	→ SSCS_TOT	0.016	0.014	1.161	0.246	-0.011	0.043
Psychache_Tot	→ ACIPS_TOT	→ DSISS_TOT	0.003	0.002	1.241	0.215	-0.002	0.008
Psychache_Tot	→ PIL_TOT	→ DSISS_TOT	0.006	0.004	1.383	0.167	-0.002	0.014
Psychache_Tot	→ SCS_TOT	→ DSISS_TOT	-0.003	0.006	-0.551	0.581	-0.015	0.009
Psychache_Tot	→ IRI_TOT	→ DSISS_TOT	-0.001	0.001	-0.779	0.436	-0.004	0.002
Psychache_Tot	→ Belonginess	→ DSISS_TOT	-6.759e-5	0.005	-0.012	0.990	-0.011	0.011
Psychache_Tot	→ Burdensome	→ DSISS_TOT	0.015	0.006	2.414	0.016	0.003	0.028
GCPSR_Gr	→ ACIPS_TOT	→ DSISS_TOT	0.011	0.019	0.586	0.558	-0.026	0.048
GCPSR_Gr	→ PIL_TOT	→ DSISS_TOT	-0.010	0.017	-0.597	0.550	-0.043	0.023
GCPSR_Gr	→ SCS_TOT	→ DSISS_TOT	0.005	0.012	0.398	0.691	-0.018	0.028
GCPSR_Gr	→ IRI_TOT	→ DSISS_TOT	-0.010	0.015	-0.672	0.501	-0.040	0.019
GCPSR_Gr	→ Belonginess	→ DSISS_TOT	8.450e-5	0.007	0.012	0.990	-0.013	0.013
GCPSR_Gr	→ Burdensome	→ DSISS_TOT	-0.038	0.029	-1.304	0.192	-0.095	0.019
BHS_TOT	→ ACIPS_TOT	→ DSISS_TOT	0.038	0.029	1.309	0.190	-0.019	0.096
BHS_TOT	→ PIL_TOT	→ DSISS_TOT	0.056	0.041	1.372	0.170	-0.024	0.135
BHS_TOT	→ SCS_TOT	→ DSISS_TOT	-0.019	0.035	-0.544	0.586	-0.089	0.050
BHS_TOT	→ IRI_TOT	→ DSISS_TOT	0.008	0.012	0.642	0.521	-0.016	0.031
BHS_TOT	→ Belonginess	→ DSISS_TOT	-4.537e-4	0.037	-0.012	0.990	-0.072	0.071
BHS_TOT	→ Burdensome	→ DSISS_TOT	0.028	0.023	1.202	0.229	-0.018	0.074

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Psychache_Tot: Scale of Psychache; GCPSR_Gr: Graded Chronic Pain Scale-Revised; BHS_TOT: Beck Hopelessness Scale 4-item version; ACIPS_TOT: Anticipatory and Consummatory Interpersonal Pleasure Scale; PIL_TOT: Purpose in Life Test-Short Form; SCS_TOT: Social Connectedness Scale-Revised; IRI_TOT: Interpersonal Reactivity Index, Empathic Concern subscale; Belonginess: Interpersonal Needs Questionnaire, Thwarted Belonginess subscale; Burdensome: Interpersonal Needs Questionnaire, Perceived Burdensomeness subscale; SSCS_TOT: Shortened Version of the Suicide Cognitions Scale; DSISS_TOT: Depressive Symptoms Index–Suicidality Subscale.

Total effects

		Estimate	Std. Error	z-value	p	95% Confidence Interval	
						Lower	Upper
Psychache_Tot	→ SSCS_TOT	0.055	0.005	10.195	< .001	0.044	0.065
GCPSR_Gr	→ SSCS_TOT	0.012	0.070	0.168	0.867	-0.125	0.148
BHS_TOT	→ SSCS_TOT	0.255	0.057	4.446	< .001	0.142	0.367
Psychache_Tot	→ DSISS_TOT	0.038	0.008	4.780	< .001	0.022	0.053
GCPSR_Gr	→ DSISS_TOT	0.115	0.102	1.130	0.258	-0.085	0.315
BHS_TOT	→ DSISS_TOT	0.158	0.084	1.887	0.059	-0.006	0.323

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Psychache_Tot: Scale of Psychache; GCPSR_Gr: Graded Chronic Pain Scale-Revised; BHS_TOT: Beck Hopelessness Scale 4-item version; SSCS_TOT: Shortened Version of the Suicide Cognitions Scale; DSISS_TOT: Depressive Symptoms Index–Suicidality Subscale.

Total indirect effects

		Estimate	Std. Error	z-value	p	95% Confidence Interval	
						Lower	Upper
Psychache_Tot	→ SSCS_TOT	0.014	0.006	2.447	0.014	0.003	0.025
GCPSR_Gr	→ SSCS_TOT	-0.041	0.035	-1.168	0.243	-0.110	0.028
BHS_TOT	→ SSCS_TOT	0.090	0.039	2.316	0.021	0.014	0.165
Psychache_Tot	→ DSISS_TOT	0.020	0.008	2.307	0.021	0.003	0.036
GCPSR_Gr	→ DSISS_TOT	-0.042	0.044	-0.954	0.340	-0.129	0.044
BHS_TOT	→ DSISS_TOT	0.110	0.053	2.064	0.039	0.006	0.215

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Psychache_Tot: Scale of Psychache; GCPSR_Gr: Graded Chronic Pain Scale-Revised; BHS_TOT: Beck Hopelessness Scale 4-item version; SSCS_TOT: Shortened Version of the Suicide Cognitions Scale; DSISS_TOT: Depressive Symptoms Index–Suicidality Subscale.

Residual covariances

	Estimate	Std. Error	z-value	p	95% Confidence Interval	
					Lower	Upper
ACIPS_TOT ↔ PIL_TOT	0.132	0.068	1.946	0.052	-9.542e-4	0.266
ACIPS_TOT ↔ SCS_TOT	0.357	0.079	4.504	< .001	0.202	0.513
PIL_TOT ↔ SCS_TOT	0.182	0.061	3.003	0.003	0.063	0.301
ACIPS_TOT ↔ IRI_TOT	0.360	0.096	3.744	< .001	0.172	0.549
PIL_TOT ↔ IRI_TOT	0.265	0.078	3.405	< .001	0.112	0.417
SCS_TOT ↔ IRI_TOT	0.287	0.082	3.483	< .001	0.126	0.449
ACIPS_TOT ↔ Belonginess	-0.286	0.076	-3.765	< .001	-0.434	-0.137
PIL_TOT ↔ Belonginess	-0.160	0.060	-2.676	0.007	-0.277	-0.043
SCS_TOT ↔ Belonginess	-0.431	0.075	-5.756	< .001	-0.578	-0.284
IRI_TOT ↔ Belonginess	-0.258	0.081	-3.188	0.001	-0.417	-0.099
ACIPS_TOT ↔ Burdensome	-0.019	0.064	-0.295	0.768	-0.145	0.107
PIL_TOT ↔ Burdensome	-0.068	0.053	-1.283	0.199	-0.172	0.036
SCS_TOT ↔ Burdensome	-0.097	0.057	-1.710	0.087	-0.207	0.014
IRI_TOT ↔ Burdensome	-0.091	0.071	-1.285	0.199	-0.230	0.048
Belonginess ↔ Burdensome	0.116	0.057	2.047	0.041	0.005	0.227
SSCS_TOT ↔ DSISS_TOT	0.108	0.039	2.760	0.006	0.031	0.184

Note. Delta method standard errors, normal theory confidence intervals, ML estimator.

Psychache_Tot: Scale of Psychache; GCPSR_Gr: Graded Chronic Pain Scale-Revised; BHS_TOT: Beck Hopelessness Scale 4-item version; ACIPS_TOT: Anticipatory and Consummatory Interpersonal Pleasure Scale; PIL_TOT: Purpose in Life Test-Short Form; SCS_TOT: Social Connectedness Scale-Revised; IRI_TOT: Interpersonal Reactivity Index, Empathic Concern subscale; Belonginess: Interpersonal Needs Questionnaire, Thwarted Belonginess subscale; Burdensome: Interpersonal Needs Questionnaire, Perceived Burdensomeness subscale; SSCS_TOT: Shortened Version of the Suicide Cognitions Scale; DSISS_TOT: Depressive Symptoms Index–Suicidality Subscale.

R-Squared

	R²
SSCS_TOT	0.757
DSISS_TOT	0.429
ACIPS_TOT	0.190
PIL_TOT	0.455
SCS_TOT	0.392
IRI_TOT	0.032
Belonginess	0.399
Burdensome	0.495

ACIPS_TOT: Anticipatory and Consummatory Interpersonal Pleasure Scale; PIL_TOT: Purpose in Life Test-Short Form; SCS_TOT: Social Connectedness Scale-Revised; IRI_TOT: Interpersonal Reactivity Index, Empathic Concern subscale; Belonginess: Interpersonal Needs Questionnaire, Thwarted Belonginess subscale; Burdensome: Interpersonal Needs Questionnaire, Perceived Burdensomeness subscale; SSCS_TOT: Shortened Version of the Suicide Cognitions Scale; DSISS_TOT: Depressive Symptoms Index–Suicidality Subscale.

FIGURES

Figure 1
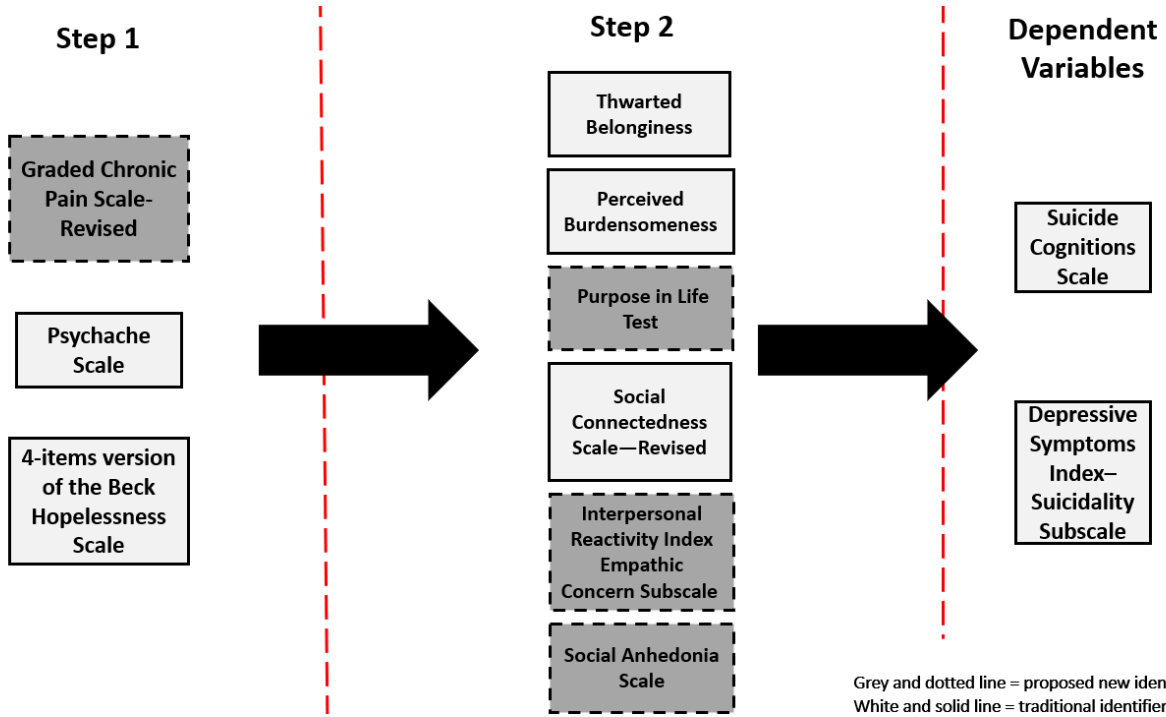
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APPENDICES

APPENDIX A

DEMOGRAPHIC AND HEALTH QUESTIONNAIRE (DHQ)

1. What gender do you identify as?

a.   Female

b.   Male

c.   Other: _____

d.   Prefer not to answer

2. What is your age?

a.   _____

3. Please specify your race (Note: ethnicity will be asked in the next question)

a.   Caucasian

b.   African American

c.   Asian

d.   Native American

e.   Native Hawaiian or Pacific Islander

f.   Other

g.   Prefer not to say

4. Are you Latina, Latino, Latinx, or Hispanic?

a.   Yes

b.   No

5. Are you currently engaging in psychotherapy

a.   Yes

b.   No

6. Do you currently have a diagnosed neurological disorder? (i.e., Parkinsons, epilepsy)

a.   Yes

b.   No

    7. Are you currently taking any prescribed medications? If yes, please specify. If you are

       not sure how to spell, please take your best guess. Dosage is not necessary.

a.   Yes, _____.

b.   No

APPENDIX B

IRB APPROVAL LETTER

UCF

UNIVERSITY OF CENTRAL FLORIDA

Institutional Review Board
FWA00000351
IRB00001138, IRB00012110
Office of Research
12201 Research Parkway
Orlando, FL 32826-3246

EXEMPTION DETERMINATION

January 4, 2022

Dear Jeffrey Bedwell:

On 1/4/2022, the IRB determined the following submission to be human subjects research that is exempt from regulation:

Type of Review:	Initial Study, Exempt Category 2(i)
Title:	Relationships between pain, hopelessness and social isolation.
Investigator:	Jeffrey Bedwell
IRB ID:	STUDY00003672
Funding:	None
Grant ID:	None
Documents Reviewed:	• HRP-254-FORM Explanation of Research.pdf, • HRP-255-FORM - Request for Exemption.docx, • Scales.docx

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made, and there are questions about whether these changes affect the exempt status of the human research, please submit a modification request to the IRB. Guidance on submitting Modifications and Administrative Check-in are detailed in the Investigator Manual (HRP-103), which can be found by navigating to the IRB Library within the IRB system.   When you have completed your research, please submit a Study Closure request so that IRB records will be accurate.

If you have any questions, please contact the UCF IRB at 407-823-2901 or irb@ucf.edu. Please include your project title and IRB number in all correspondence with this office.

Sincerely,

Renea Carver
UCF IRB