The Development and Initial Validation of the Suicide Prevention Attitudes Rating Scale

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A Dissertation Presented

by

ERIK J. REINBERGS

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Approved as to style and content by:

_____
Sara Whitcomb, Chair

_____
Sarah Fefer, Member

_____
Katherine Dixon-Gordon, Member

_____
Craig Wells, Member

_____
Jennifer Randall
Associate Dean of Academic Affairs
College of Education

DEDICATION

To every single one who left.

To every single one left behind.

To every single one left.

ACKNOWLEDGMENTS

The arena where I will celebrate this PhD holds 10,000 people. Those who die by suicide in the US would fill the stands nearly five times over in just one year. Since I began this degree, over 350,000 people have died by suicide in the US – including some 48,000 young people. No one in this work is left untouched.

I first saw suicide up close when my high school began what would become a cluster of youth suicides. The support of the teachers before, during, in the aftermath – especially Anne Phaneuf, Page Martineau, and Jill Surprenant – changed me forever. They, along with Gordon McGregor, who lead our small-town gay-straight alliance, profoundly shaped who I am today. They introduced me to literature, to journalism, to the world beyond our town, to teaching, and to public health. For their support, talent, insight, and compassion, I am eternally grateful. I also had no idea at the time how Valerie Hall – now Dr. Valerie Hall – would end up guiding my first training as a scientist and putting doctoral study on my map.

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All of this rests on the foundation of love from my parents Katie and Arvids and my partner Chase. There truly are no words.

ABSTRACT

THE DEVELOPMENT AND INITIAL VALIDATION OF THE SUICIDE PREVENTION ATTITUDES RATING SCALE

MAY 2020

ERIK J. REINBERGS, B.A., COLUMBIA UNVIERSITY

M.Ed., UNIVERSITY OF MASSACHUSETTS AMHERST

Ph.D., UNIVERSITY OF MASSACHUSETTS AMHERST

Directed by: Professor Sara A. Whitcomb

Suicide is the second leading cause of death for the 10-24 age range (Centers for Disease Control and Prevention, 2018). Despite national attention, youth suicide rates have increased by 50% since 1999 (CDC WISQARS, 2018). To better target and evaluate school-based suicide prevention efforts, this study undertakes the development and initial validation of the Suicide Prevention Attitudes Rating Scale (SPARS) in a sample of California school principals. After a thorough literature review and initial item development, experts in the suicide prevention field reviewed and provided feedback on the initial items and construct definition. A cognitive interview protocol with school principals was then used to ensure items are interpreted as intended. After a large-scale data collection process, psychometric analyses used methods from classical psychometrics, exploratory factor analysis, confirmatory factor analysis, and item response theory to refine the internal structure of the measure. Through these methods, the study collects initial validity evidence in the areas of test content evidence, response process evidence, evidence of internal psychometric structure, and evidence based on relations to other variables (AERA, APA, NCME, 2014).

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CHAPTER 1

INTRODUCTION

Statement of the Problem

According to the Centers for Disease Control and Prevention (CDC), suicide is the second leading cause of death for the 10-24-year-old age group in the United States (CDC WISQARS, 2018). It is now the leading cause of death for 13-year-old girls and 14-15-year-old boys (CDC WISQARS, 2019). Although suicide prevention has received increased attention in recent years and despite recent legislation in at least 16 states mandating suicide prevention training for school employees (American Foundation for Suicide Prevention, 2017), the youth suicide rate in the U.S. has increased 50% since 1999 (Hedegaard, Curtin, & Warner, 2018; CDC WISQARS, 2018). For female youth ages 10-14, the suicide rate increased 240% from 1999 to 2017; for female youth 14-24, the suicide rate increased 93% in the same time period (Hedegaard, Curtin, & Warner, 2018). For male youth, the increases were smaller but still significant. For males ages 10-14, the suicide rate increased 74% from 1999 to 2017; for males age 15-24 the suicide rate increased 35% in the same time period (Hedegaard, Curtin, & Warner, 2018). In 2017, 6,769 young people ages 10-24 died by suicide in the U.S. (CDC WISQARS, 2018). When all age groups are considered, the suicide rate in the U.S. increased 33% from 1999-2017 – despite a national effort outlined in the 2001 *National Strategy for Suicide Prevention* and in the revised 2012 *National Strategy for Suicide Prevention* that resulted in "unprecedented levels of suicide prevention activities" (Hedegaard, Curtin, & Warner, 2018; Substance Abuse and Mental Health Services Administration, 2017, p. 7).

Researchers and school-based mental health professionals (e.g., school

psychologists, school counselors, and school social workers) alike are simultaneously attempting to implement existing evidence-based suicide prevention strategies and undertake a wide variety of research with the ultimate goal of reducing youth suicide. Schools are ideal settings to implement a number of evidence-based prevention practices for a wide range of social, emotional, and behavioral concerns – including programs that address risk and protective factors for suicide, as well as programs that screen students and provide or refer at-risk students to evidence-based mental health treatment (Singer, Erbacher, and Rosen, 2018). However, the uptake of a full range of suicide prevention practices in schools has been slow, the degree to which schools feels suicide prevention is part of their mission is understudied, and further research is needed to determine the most effective components of school-based suicide prevention.

This study is based on the following premises. First, past research has shown that large systems can dramatically reduce suicide rates for the population under their care (Covington et al., 2011; Hogan & Grumet, 2016). For example, between 1996 and 2002, the US Airforce decreased the suicide rate of its service members by 33% (Hogan & Grumet, 2016; Knox et al., 2003). In another example, the Henry Ford Health System reduced the suicide rate of patients receiving behavioral healthcare by 75% (Coffey, Coffey, & Ahmedani, 2015; Hogan & Grumet, 2016). Second, best-practice guidance highlights the importance of leadership in successfully implementing both school-based interventions and successful systems-level suicide prevention efforts (Forman, Olin, Hoagwood, Crowe, & Saka, 2009; Covington et al., 2011; SAMHSA, 2012; Hogan & Grumet, 2016). For example, both the *Suicide Care in Systems Framework* from the National Action Alliance for Suicide Prevention and the *Zero Suicide* healthcare

framework highlight the importance of active leadership in successful systems-level suicide prevention efforts (Covington et al., 2011; Hogan & Grumet, 2016). Third, having the ability to accurately measure leaders' attitudes toward suicide prevention will enable future research to determine the degree to which these attitudes influence systems-level outcomes and whether or not interventions targeting these attitudes improve systems-level outcomes.

A number of important research and guidance documents provide the foundation for these premises. For example, the *Suicide Care in Systems Framework* report from the Clinical Care and Intervention Task Force to the National Action Alliance for Suicide Prevention (hereafter: Task Force) identified three critical factors held in common by successful large-scale suicide prevention efforts:

1. Core Values (i.e., "The belief and commitment that suicide can be eliminated in a population under care…").
2. Systems Management (i.e., "Taking systematic steps across care systems to create a culture that no longer finds suicide acceptable, set aggressive but achievable goals to eliminate suicide attempts and deaths among members, and organize service delivery and support accordingly").
3. Evidence-Based Clinical Care Practice (i.e., using "Standardized risk stratification, targeted evidence-based clinical interventions, accessibility, follow-up, and engagement and education of patients, families and health care professionals" to achieve results). (Covington et al., 2011, p. i)

The degree to which these elements are present in school-based suicide prevention is understudied. As such, no validated measure adequately captures the core values

(conceptualized in this study as of attitudes toward suicide prevention) towards suicide prevention efforts held by school administrators; this study hopes to make such measurement possible.

The degree to which attitudes affect overt behavior is unsettled in the literature. Attitudes regarding one construct are one of many variables that influence overt behavior (Albarracin, Johnson, & Zanna, 2005). Other variables including learning history (operant and classical conditioning), sociological characteristics, cognitions (beliefs, attitudes, and thoughts), emotions, and current environmental contingencies – as well as the complex interactions between these variables – may impact the behavior of an individual or groups of individuals (Albarracin, Johnson, & Zanna, 2005). Despite the need for more research on both the degree to which and the process through which attitudes affect behavior, research supports that attitudes do play a role in influencing overt human behavior (Ajzen & Fishbein, 2005). Additionally, research shows that efforts to change attitudes can influence changes in overt behavior (Johnson, Maio, and Smith-McLallen, 2005).

Attitude measures used in the context of improving intervention implementation have shown recent promise in schools. Two school-based studies found that measuring attitudes at the pre-implementation phase and subsequently tailoring the implementation approach based on those attitudes and related individual level factors (subjective norms and perceived behavioral control) may be especially promising in improving implementation of evidence-based practices in schools (Cook, Lyon, Kubergovic, Browning Wright, & Zhang, 2015; Lyon et al., 2019). In another example, a measure capturing the attitudes held by school staff toward trauma-informed care has also been

recently validated and used to inform implementation of trauma-informed approaches in schools (Baker, Brown, Wilcox, Overstreet, & Arora, 2016). Preliminary research has suggested that in some instances, individual attitudes may be a more significant barrier than organization context factors (Lock et al., 2019).

The attitudes of school administrators may be an important target given their power over which initiatives receive priority and resources (e.g., money, staff time) and their ability to help set the collective vision for a school. Administrator support and leadership style has been cited as a key variable in implementation success in school-based initiatives like Positive Behavior Interventions and Support (PBIS), Multi-Tiered Systems of Support (MTSS), and evidence-based services for students with Autism Spectrum Disorder (ASD; Eagle, Dowd-Eagle, Snyder, & Holtzman, 2015; Stadnick et al., 2019). Developers of evidence-based practices rate administrator support as a highly important factor in implementation success (Forman, Olin, Hoagwood, Crowe, & Saka, 2009).

Guidance from the Substance Abuse and Mental Health Services Administration (SAMHSA) on implementing suicide prevention programs in high schools lists cultivating administrator support as "Step 1" (SAMHSA, 2012, p. 18). Similarly, the first element listed by the Task Force in the *Suicide Care in Systems Framework* under the first critical domain, Core Values, is "Leadership Leading to Cultural Transformation" (Covington et al., 2011, p. 3). The report notes,

> While it may sound simple, a major challenge for organizations to effectively eliminate suicide among their members requires them to instill the core belief that suicides can be prevented in their organization and to systemically manage

> service delivery around that core belief. (Covington et al., 2011, p. 3)

Additionally, the *Zero Suicide* framework's first domain is leadership, which is conceptualized as:

> The top leadership of a health care organization should commit to reducing suicide for people under its care. Leadership implies setting goals, taking action toward goals, and emphasizing suicide prevention as a critical patient safety issue. Because loss of a patient to suicide is traumatic, leadership must create a culture marked by both a commitment to safety and by support for staff members who do the difficult work of caring for suicidal individuals. (Hogan & Grumet, 2016, p. 1086)

The field lacks psychometrically validated tools to measure school leaders' attitudes toward suicide prevention. Such a tool would enable the assessment of the role leaders' attitudes play in system-wide suicide prevention efforts and may lead to potential interventions to increase success by tailoring implementation approaches to pre-exiting attitudes.

Currently, no validated measure exists that is suitable for examining the attitudes school leaders hold toward suicide prevention. Nearly all existing measures capture attitudes towards suicide in general, not towards suicide prevention (see Kodaka, Poštuvan, Inagaki, & Yamada, 2011 for a review of instruments measuring attitudes toward suicide). There is one existing measure that assesses the attitudes toward suicide prevention held by medical professionals; however, this measure has a number of shortcomings (The Attitudes to Suicide Prevention Scale; Herron, Ticehurst, Appleby, Perry, & Cordingley, 2001). First, the items on the measure are specifically worded for

clinical providers, limiting the wider use of the scale. Second, the scale has only minimal reliability and validity evidence. For example, the development study conducted an exploratory factor analysis on a small sample ($N = 80$), found a Cronbach's alpha of 0.77, did not undertake an expert review or response process protocol, did not compare the measure against other scales for convergent or discriminant validity, did not examine measurement invariance across groups of clinicians compared in the study, and did not compute effect size statistics for the differences found between groups (Herron, Ticehurst, Appleby, Perry, & Cordingley, 2001).

In addition to limitations in measurement, there are also very few studies that consider attitudes toward suicide prevention despite recent research that has identified attitudes as playing an important role. For example, O'Connor and Portzky (2018) surveyed suicide prevention experts on the top challenges facing the suicide prevention field in research and in practice. The experts listed the "need to change attitudes, beliefs and knowledge regarding the preventability of suicide in general…" as the number two concern facing suicide prevention practice (p. 9). Another recent study showed a surprising finding regarding medical professionals' attitudes regarding suicide prevention. The study measured the attitudes of emergency room nurses toward lethal means counseling: 91% of the respondents supported lethal means counseling, yet 60% questioned whether suicide was preventable (Betz, Brooks-Russell, Brandspigel, Novins, Tung, & Runyan, 2018). A similar study found that less than half of ER nurses and physicians thought "most" or "all" suicides are preventable (Betz et al., 2013). These findings suggest that the attitudes (or in this case, beliefs) about suicide prevention seem to lag behind support for specific practices or even the desire to engage in specific

prevention practices. This discrepancy has not been further examined in the literature. Similar research has not been conducted with school leaders.

This study aims to develop and provide initial validity evidence of the Suicide Prevention Attitudes Rating Scale (SPARS) to examine attitudes toward suicide prevention – a construct that is hypothesized to be similar yet distinct from attitudes toward suicide itself, stigma towards people with suicidal behaviors, and support for various prevention and intervention practices (Renberg & Jacobsson, 2003; Stecz, 2019). This measure aims to be useful to suicide prevention researchers, consultants, and school-based mental health professionals who are working to more effectively implement school-based suicide prevention efforts.

Youth Suicide

Suicide is defined as a "death caused by self-directed injurious behavior with any intent to die as a result of the behavior" (US Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012, p. 14). The term suicidal behavior includes a broader range of phenomena, including plans, attempts, and death (US Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). Suicidal ideation refers to "thoughts of engaging in suicide-related behavior" (US Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012, p. 14).

The two major national sources of youth suicide data in the US are the CDC Fatal Injury Database and the CDC Youth Risk Behavior Surveillance System (YRBSS). The latter includes the school-based Youth Risk Behavior Survey (YRBS) that gathers self-

report data on suicidal thoughts and behaviors of high school students. In 2017, the most recent year for which data are available, 6,769 young people ages 10-24 died by suicide (CDC WISQARS, 2018). This number has dramatically increased over the last two decades, with young women seeing the greatest increase in suicide death (CDC, 2018; Hedegaard, Curtin, & Warner, 2018). While young women are more likely to attempt suicide, young men die by suicide at three times the rate of young women (CDC, 2018). This difference is in part explained by young men selecting more deadly means than young women, namely firearms (CDC, 2018). Research from the 2015 YRBS indicates that an average of 29.9% of high school students (39.8% of female students; 20.3% of male students) felt so sad or hopeless every day for two weeks or more over the last 12 months that they stopped engaging in previously enjoyable activities (Kann et al., 2016). Approximately 17.7% of high school students (23.4% of female students; 12.2% of male students) reported seriously considering suicide during the prior year, with 14.6% of students (19.4% of female students; 9.8% of male students) reporting having made a suicide plan (Kann et al., 2016). On average, 8.6% of high school students attempted suicide at least once in the prior year (11.6% of female students; 5.5% of male students) with 2.8% of students attempting suicide that resulted in needing medical treatment (3.7% of female students; 1.9% of male students; Kann et al., 2016). Sexual minority adolescents are at particular risk, being three to four times more likely to attempt suicide than their heterosexual peers with approximately 1 in 4 sexual minority adolescents attempting suicide (Caputi, Smith, & Ayers, 2017).

Prevention of Youth Suicide

Suicide is a preventable public health problem (see Zalsman et al., 2016 for a

wide-ranging review) that can be addressed in schools. Suicide prevention efforts in the U.S. have existed for decades, with the first suicide prevention center opening in 1958 in Los Angeles, California (U.S. Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). Activity in suicide prevention increased dramatically during the 1990s, including the publication of key government reports, the funding of a suicide prevention research center, the founding of a number of suicide prevention non-profits, and the establishment of the National Hopeline Network (U.S. Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). In the 2000s, the activity in suicide prevention efforts continued. Notably, SAMHSA launched the National Suicide Prevention Hotline and established the National Suicide Prevention Resource Center, and the HHS published the first *National Strategy for Suicide Prevention* (U.S. Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). This report was updated in 2012 and outlines the national strategy agenda for preventing suicide death in the U.S. which consists of 13 goals across four key domains: 1) Healthy and empowered individuals, families and communities, 2) Clinical and community preventive services, 3) Treatment and support services, and 4) Surveillance, research, and evaluation (U.S. Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). The report states that suicide prevention activities should be integrated across multiple settings, including schools (U.S. Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012).

A number of government and non-profit documents collect guidance on school-based suicide prevention for practitioners. In 2012, SAMHSA published *Preventing Suicide: A Toolkit for High Schools* (SAMHSA, 2012). This document recommends a multifaceted approach to school-based suicide prevention efforts that include having protocols for helping students at risk of suicide, protocols for after a suicide, staff education and training, parent education and outreach, student education, and screening (SAMHSA, 2012). Some states have also created their own comprehensive documents for school suicide prevention and response. For example, *The Montana Crisis Action School Toolkit on Suicide* (*Montana CAST-S*) is divided into three comprehensive sections: suicide prevention, suicide interventions, and postvention after a suicide (Poland & Poland, 2017). Additionally, the American Foundation for Suicide Prevention (AFSP) and the Suicide Prevention Resource Center's (SPRC) *After a Suicide: A Toolkit for Schools* is a comprehensive postvention strategy document for schools (AFSP & SPRC, 2018).

School-based suicide prevention efforts can be conceptually organized into multi-tiered systems of support (MTSS) that typically correspond to the three levels of prevention service: tier 1 or universal, tier 2 or selected, and tier 3 or indicated (Gordon, 1983). Tier 1 or universal services target the entire population for prevention, tier 2 or selected services target a smaller risk group for prevention services, and tier 3 or indicated services typically target individuals at highest risk or for whom aspects of the concern are already present. Singer, Erbacher, & Rosen (2018) review the existing school-based suicide prevention literature and align their results within a three-tiered MTSS framework. Their review suggests tier 1 could consist of staff education and

gatekeeper training, student education, and screening – as well as programs designed to enhance positive behavior; tier 2 could consist of risk assessments and skills groups and/or referrals to outside providers; while tier 3 could consist of clinical interventions, crisis plans, more intensive risk monitoring, and referrals (Singer, Erbacher, & Rosen, 2018). While there is evidence to suggest these prevention efforts are useful and important, they have not been conclusively studied as a package of multi-tiered supports. Rather, research has focused on the effectiveness or feasibility of individual components. One school-based universal intervention with evidence of effectiveness is the Signs of Suicide Program (SOS), which teaches students to recognize and respond to suicide risk and screens students for depression and suicidal ideation (Singer, Erbacher, & Rosen, 2018; Schilling, Aseltine, & James, 2016). Although universal interventions like Positive Behavior Interventions and Supports (PBIS; Sugai & Horner, 2009) and universal Social Emotional Learning curricula (SEL; Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011) seem conceptually likely to decrease suicide risk, no existing research evaluates these programs with regards to suicide-related outcomes (Singer, Erbacher, & Rosen, 2018). However, school difficulties are correlated with suicidal behaviors (Thompson, Connelly, Thomas-Jones, & Eggert, 2013). Similarly, because low academic achievement is associated with suicide risk, programs that improve academic outcomes also may have an effect on suicide-related outcomes, but very little intervention research has examined this question – largely due to methodological challenges (Singer, Erbacher, & Rosen, 2018). Given the relative paucity of suicide prevention research compared to intervention research for specific disorders, Miller, Eckert, and Mazza (2009) also highlight the need for school psychologists to promote a wide range of prevention

programs (in addition to suicide prevention programs) for which there is an established literature, including depression, substance use, and disruptive behavior disorders as these mental health problems are associated with suicide risk. Additionally, clinical interventions like Dialectical Behavior Therapy have reduced suicide behaviors in adolescents (McCauley et al., 2018; Miller, Rathus, & Linehan, 2017) and DBT has been adapted to school contexts (Mazza, Dexter-Mazza, Miller, Rathus, & Murry, 2016).

At least seven reviews have found evidence of some positive effects of school-based suicide prevention efforts – albeit while also pointing out a number of methodological weaknesses in research literature (Miller, Eckert, & Mazza, 2009; Cusimano & Sameem, 2011; Zallsman et al. 2016; Singer, Erbacher, & Rosen, 2018; Katz et al., 2013; Klimes-Dougan, Klingbeil, & Meller, 2013; Robinson et al., 2013). The most frequent limitations highlighted in these reviews are the paucity of randomized controlled trials and the reliance on secondary outcomes (changes in attitudes, knowledge, beliefs, or help-seeking behavior) over primary outcomes (suicide attempts or suicides). To date, three school-based programs have shown evidence of effectiveness on primary outcomes (suicide attempts or suicides) through randomized controlled trials: The Signs of Suicide Program (SOS; Schilling, Aseltine, & James, 2016), the Good Behavior Game (GBG; Wilcox et al, 2008), and the Youth Aware Mental Health Program (YAM; Wasserman et al., 2015). It is worth noting, however, that the GBG does not explicitly target suicidal behaviors, suggesting that targeting upstream factors (i.e., preventing disruptive behavior and increasing positive behavior) may be a powerful avenue for school-based suicide prevention research to further explore.

Many barriers to school-based suicide prevention exist. Despite recent advances, a

number of methodological issues hamper school-based suicide prevention research (and suicide prevention research in general) – including the low base rates of suicide that necessitate very large sample sizes, difficulty disentangling the numerous complex factors that increase suicide risk, ethical issues, and the heterogeneity of outcome measures (Miller, Eckert, & Mazza, 2009; Singer, Erbacher, & Rosen, 2018). There is also reluctance to address suicide in school settings – due in part to stigma and the perpetuation of myths about suicide (Miller, Eckert, & Mazza, 2009). This project aims to measure and thus better understand the attitudes toward suicide prevention held by school principals in hopes of improving implementation success.

Lastly, it is well documented that mental health professionals have inadequate training in suicide (Schmitz et al., 2012). However, parents assume that their child will receive services aimed at preventing their death. This discrepancy is highlighted in testimony to Washington state lawmakers by Paul Quinnett, suicide prevention expert and founder of the Question Persuade Refer gatekeeper training program. He states:

> Parents believe that if their child becomes suicidal and sends detectable suicide warning signs to teachers, staff, other students, or any of the professionals targeted in this bill for training, that their child will be recognized and responded to, remain safe, and that they will be notified immediately while life-saving actions are taking place through established best practice policies and procedures. Sadly, parents, and the public are misinformed. One of the reasons for rising negligence-based lawsuits against school systems stems from the fact that, according to surveys conducted by the Suicide Prevention Action Network, the majority of Americans support suicide prevention and now believe what our

> former Surgeon General of the United States said in 2001, "Suicide is our most preventable form of death." If the public believes suicide is preventable and school counselors, social workers, and nurses do not, or are not trained in how to prevent suicide, then when a child dies by suicide, the parents and the public, have a right to ask: Why did my child die from a preventable form of death while in your care? (Quinnett, 2019, para. 13-16)

This testimony points to a potentially significant gap in attitudes between the public and school staff. To date, little research has examined variation in attitudes toward suicide prevention.

Implementation Science

The movement for evidence-based practice has gained significant ground across many clinical fields (Rousseau & Gunia, 2016), including school psychology (Kratochwill & Shernoff, 2003). Although the research literature on effective interventions continues to advance, one study estimates that research findings take 17 years to be adopted into routine clinical practice (Balas & Boren, 2000). The field of implementation science is focused on the process of transferring research into practice to improve outcomes. Eccles and Mittman (2006) define implementation science as:

> [T]he scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and, hence, to improve the quality and effectiveness of health services. It includes the study of influences on healthcare professionals and organizational behavior. (p. 1)

In 2005, the National Implementation Research Network (NIRN) released a seminal study outlining key frameworks for implementation efforts (Fixsen, Naoom, Blasé,

Friedman, & Wallance, 2005). These frameworks were updated and clarified in 2015 (Bertram, Blase, & Fixsen, 2015). The first framework aspect outlined in the updated study is titled Intervention Components. This framework outlines pre-implementation considerations of program selection, including model definition, theoretical support, model theory of change, match to target population, and an examination of alternative models. The second framework aspect, Implementation Stages, consists of the exploration stage, the installation stage, the initial implementation stage, and the full implementation stage. The third and final framework aspect, Implementation Drivers, is broken down into three integrated and compensatory parts that lead to implementation consistency and ultimately to program success: Competency drivers, leadership drivers, and organization drivers.

The measure to be developed and tested in this proposed study is relevant to a number of aspects in the NIRN implementation framework described above. The framework highlights the need to measure the characteristics and needs of the population targeted by the intervention, the characteristics and needs of the organization implementing the intervention, and to measure the effects of organizational adjustments (Bertram, Blase, & Fixsen, 2015). A valid measure is needed to examine the attitudinal characteristics of administrative staff regarding suicide prevention within the organization as well as to examine change in those attitudes given adjustments to organizational and implementation efforts.

Leadership is theorized as a key implementation driver in the NIRN framework. The framework posits two types of leadership drivers: technical and adaptive. Technical leadership is called for to apply management principles to well specified challenges in

situations where a shared goal is well-defined. Adaptive leadership is called for when an organization needs visionary support when there is less agreement on problems and solutions. Facilitative administrative actions refer to proactively ensuring policy and procedural supports for implementation success. With a valid measure of administrators' attitudes toward suicide prevention, implementers of suicide prevention programs will be able to measure this key organizational variable in implementation success and monitor its change over time. If administrators do not hold positive (or at least neutral) attitudes suicide prevention in the population under their care, implementation efforts of school-based suicide prevention efforts are likely to be ineffective given the large role leadership and administration plays in the NIRN framework.

An important component of implementation science is the study of implementation strategies, which are defined as "a systematic intervention process to adopt and integrate evidence-based health innovations into usual care" (Powell et al., 2012, p. 124). Implementation strategies are thus purposeful efforts to increase the likelihood of successful implementation. Selecting and tailoring implementation strategies to address the particularities of a given implementation effort are likely to increase implementation success, although little empirical research exists to firmly guide this practice (Powell et al., 2015). Efforts to assess the implementation context in schools have begun, alongside calls for linking the assessment of the implementation context to specific action-oriented implementation strategies (Lyon et al., 2018). The beliefs and attitudes of implementers have been shown to impact implementation success in the educator sector. For example, Cook, Lyon, Kubergovic, Browning Wright, and Zhang (2015) used a supportive beliefs intervention during the implementation process to

successfully increase the implementation success of a systematic program to improve student's social, emotional, and behavioral outcomes.

By better understanding administrator attitudes toward suicide prevention, this project aims to enable further research on tailoring implementation strategies to school-based suicide prevention efforts. Measuring a range of attitudes toward suicide prevention among school administrators is essential so that implementation efforts can target change efforts toward specific attitudes. This could be done at multiple implementation levels, from the individual school level to the state level. The measure of attitudes toward suicide prevention could be used to examine attitudinal barriers, assess readiness, monitor changes in attitudes over time, and contribute to tailoring suicide prevention initiatives at multiple levels of scale. Future implementation research could examine whether attitudes toward suicide prevention using this measure is a significant moderator for successfully implementing suicide prevention programs (Lewis et al., 2018).

The Current Study

This study develops the SPARS and examines initial validity evidence of the measure. As rates of youth suicide continue to increase, the need is great to better understand the many potential factors involved in improving school-based suicide prevention efforts. One area of need established in the current research is to better understand (and potentially modify) the attitudes individuals hold toward suicide prevention in general (O'Connor & Portzky, 2018). The importance of favorable attitudes toward suicide prevention among organization leaders has also been shown to be a key ingredient to successful large-scale suicide prevention programs (Covington et al., 2011).

This study aims to develop and provide initial validity evidence for a measure of suicide prevention attitudes that can be used to further study these attitudes and eventually be used to see if shifting these attitudes are a relevant modifiable variable to improve suicide prevention efforts.

This study uses methods of classical psychometrics, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and item response theory (IRT). The scale is developed according to the guidance found in DeVellis (2017) and in McCoach, Gable, & Madura (2013). Initial item development was undertaken through an extensive review of the suicide prevention literature and of existing tools measuring attitudes toward suicide. Evidence of item and construct validity is assessed by an expert panel and a cognitive interview response protocol for select participants. The main sampling frame consists of school principals from California. These administrators were emailed a link to a survey containing demographic questions, the SPARS measure, a measure of suicide stigma, a measure of suicide literacy, a measure of perceived mental health stigma, and questions regarding the current suicide prevention strategies (if any) used at their schools. Analyses examining item performance, internal consistency, factor loading (via EFA and CFA), test and item function (via IRT), and the relationship to other variables (via linear regression and correlations) were undertaken. The results of the above steps were then synthesized to present the initial validity evidence for the measure across standards regarding test content, response process, internal structure, and relations to other variables (AERA/APA/NCME, 2014).

Related research has been conducted in this area, although there has been little attention to attitudes specifically related to suicide prevention. For example, the

acceptability of various school-based suicide prevention programs has been previously assessed both quantitatively and qualitatively and generally shows that screening programs receive less support than other interventions (Whitney, Renner, Pate, & Jacobs, 2011; Scherff, Ecker, & Miller, 2005; Eckert, Miller, DuPaul, & Riley-Tillman, 2003; Miller, Eckert, DuPaul, & White, 1999). A number of scales have been developed that examine attitudes toward suicide (see Kodaka, Poštuvan, Inagaki, & Yamada, 2010 for review) or the stigma related to suicide (Batterham, Calear, & Christensen, 2013a; Batterham, Calear, & Christensen, 2013b). However, these measures do not assess attitudes toward the prevention of suicide and many lack standard validity evidence.

By understanding attitudes towards suicide prevention in a sample of school principals, this study aims to inform future work in which the implementation of school-based suicide prevention programs is tailored to address pre-existing attitudinal barriers. Thus, this project combines methods, research, and frameworks of suicidology, prevention science, psychometrics, and implementation science. For example, at an individual level, an administrator's score on the SPARS could be used to facilitate a motivational interviewing intervention (Miller & Rollnick, 2013) to encourage taking positive action in preventing suicide among students. Or, at the state level, broad training and implementation mandates could be tailored to the current attitudes of specific districts. Furthermore, data from the SPARS could inform targeted public health messaging campaigns about suicide prevention (see Torok, Calear, Shand, & Christensen, 2017, Pirkis, Rossetto, Nicholas, Ftanou, Robinson, & Reavley, 2017 for reviews of the suicide prevention messaging literature). The specific research questions of this study, based on the areas of test validity in Standards for Educational and Psychological Testing

(AERA/APA/NCME, 2014) are as follows:

- Question 1: To what extent is content validity evidence for the SPARS present as measured by expert reviewer feedback?
- Question 2: To what extent is response process validity evidence present for the SPARS as measured by a cognitive interview protocol with a convenience sample of principals?
- Question 3: To what extent does the SPARS data show a valid internal psychometric structure using classical, factor analytic, and item response theory techniques?
- Question 4: To what extent does the SPARS evidence convergent and discriminant validity to other variables?

The fifth area of test validity as outlined by the Standards for Educational and Psychological Testing (AERA/APA/NCME, 2014), consequential validity, is not directly explored in this study due the limited usage data inherent in the initial validation process. However, potential hypotheses to be explored regarding future consequential validity are explored in the discussion section.

A number of secondary questions will also be examined on an exploratory basis. These questions include:

- Are there significant differences in SPARS scores between principals who have an have not experienced a death of a student by suicide?
- Are there significant differences in SPARS scores depending on how many suicide prevention strategies a school currently has in place?
- Are there significant differences in SPARS scores between demographic groups?

The study ends with a synthesis of initial validity evidence regarding the SPARS and presents remaining questions that could be investigated regarding the measure in future research.

CHAPTER 2

REVIEW OF THE LITERATURE

Overview

The following literature review presents a summary of the latest research regarding youth suicide and youth suicide prevention. In reality, these two areas of research are inextricably tied but are separated here for clarity. Youth suicide – from definitions, epidemiology, possible etiologies, assessment, treatment, and current limitations in the research – is discussed first. Research on youth suicide prevention is presented second. Special attention is given to research highlighting the school context regarding both youth suicide and its prevention. Additionally, measurement challenges and recent measurement advances in the suicidology literature are highlighted in hopes of contributing to additional research in this area. Most research is regarding the United States context unless otherwise specified. This review employs a narrative methodology with literature collected from online academic search engines, websites of prominent suicide prevention / suicidology organizations, government reports and agencies, treatment manuals, and backwards searches from reference lists.

Youth Suicide

Youth suicide is a broad, active, and interdisciplinary research area under the larger umbrella of suicidology. The following section contains research from literature in psychology, psychiatry, social work, prevention science, pediatrics, psychometrics, public policy, and implementation science. This section begins with important definitions in suicidology. Following definitions, the epidemiology and the possible etiologies of youth suicide is reviewed. Next, assessment and treatment literatures are summarized.

Related research on youth non-suicidal self-injury (NSSI) is mentioned where applicable, but a full examination of the NSSI literature is outside the scope of this review.

Definitions

In the United States, standard definitions and recommended data elements for surveilling the epidemiology of suicide are set by the CDC (Crosby, Ortega, & Melanson, 2011). These definitions are reaffirmed in the *2012 National Strategy for Suicide Prevention* (US Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). Suicide is defined as, "Death caused by self-directed injurious behavior with any intent to die as a result of the behavior" (US Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012, p. 144). A suicide attempt is "A nonfatal, self-directed, potentially injurious behavior with any intent to die as a result of the behavior. A suicide attempt may or may not result in injury" (US Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012, p. 144). Suicidal ideation is defined as "Thoughts of engaging in suicide-related behavior" (US Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012, p. 144). Non-suicidal self-directed violence (more commonly termed non-suicidal self-injury or NSSI in the US) is defined as "Behavior that is self-directed and deliberately results in injury or the potential for injury to oneself. There is no evidence, whether implicit or explicit, of suicidal intent" (US Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012, p. 144). The broader term suicidal behaviors are defined as "Behaviors

related to suicide, including preparatory acts, suicide attempts, and deaths" (US Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012, p. 14). The overarching term encompassing these definitions is 'self-directed violence', which is defined as "Behavior that is self-directed and deliberately results in injury or the potential for injury to oneself" (Crosby, Ortega, & Melanson, 2011, p. 21). In the definitions, means and methods are differentiated. Means is defined as "The instrument or object used to carry out a self-destructive act" whereas methods are "Actions of techniques that result in an individual inflicted self-directed injurious behavior" (US Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012, p. 14). For example, medication is a means whereas an overdose is a method.

Importantly, the CDC uniform definitions give guidance on unacceptable terms for describing self-directed violence. Added descriptors to suicide and suicide attempts such as 'completed suicide', 'successful suicide', 'failed attempt', or 'nonfatal suicide' are unacceptable for multiple reasons (Crosby, Ortega, & Melanson, 2011). The first reason is that these terms imply death as the desired outcome – most clearly in the use of successful, failed, or completed. The second reason is that these terms carry redundancies. Instead of completed suicide or successful suicide, the term suicide is preferred because suicide is already defined as resulting in death. Failed attempt is also redundant because a suicide attempt, by definition, does not result in death. Similarly, nonfatal suicide is an oxymoron. Instead of nonfatal suicide, suicide attempt is preferred. The terms 'parasuicide', 'suicide gesture, 'manipulative act', and 'suicide threat' are also unacceptable because 1) they imply a value judgement on the person's actions, 2) make

assumptions on motivations that may be unknowable by others, and 3) are often vaguely defined. The definitions also discourage the use of the word 'suicidality' because this can either refer to suicidal thoughts and/or suicidal behaviors and thus introduce uncertainty. Instead, thoughts and behaviors should be specified as separate constructs for more accurate description (Crosby, Ortega, & Melanson, 2011). Additionally, the phrase 'commit suicide' is also inappropriate as it connotes moral failing and criminality (American Association of Suicidology, 2018). Instead, 'died by suicide' or 'took his/her/their own life' is preferred.

The Veterans Affairs (VA) system has adopted a set of uniform definitions for self-directed violence that are consistent with the CDC definitions. This system is called the Self-Directed Violence Classification System (SDVCS). This system has a number of advantages beyond standardizing language in the nation's largest healthcare system. For example, the definition of each term listed in the system is mutually exclusive to help ensure accuracy in communication. The mutually exclusive nature of each definition makes the creation and use of an SDVCS flow chart possible (including the selection of terms through electronic health record systems). For further discussion of the SDVCS, see Matarazzo, Homaifar, Farro, and Brenner (2015) and the VA Rocky Mountain Mental Illness Research, Education and Clinical Center for Veteran Suicide Prevention (Rocky Mountain MIRECC; https://www.mirecc.va.gov/visn19/education/nomenclature.asp).

A similar classification system of self-directed violence is the Columbia Classification Algorithm of Suicide Assessment (C-CASA) which has been used to improve the classification of suicidal behaviors in large randomized controlled trials of

antidepressant medication (Posner, Oquendo, Gould, Stanley, & Davies, 2007). The C-CASA can be mapped ("cross-walked") onto the SDVCS (Matarazzo, Clemans, Silverman, & Brenner, 2013).

Epidemiology

There are two main data sources on the epidemiology of youth suicide in the United States and both are administered by the CDC. The first is fatality data (available by county, state, and the national level for all ages) that is accessible to the public through two CDC data interfaces: The Web-Based Injury Statistics Query and Reporting System (CDC WISQARS) and the Wide-ranging Online Data for Epidemiologic Research (CDC WONDER). These sources provide information the number, type (intentional or non-intentional), and mechanism of fatality. In the fatality data, suicide consists of the following ICD-10 codes: X60-X84 (mechanisms of intentional self-harm), Y87.0 (sequelae of intentional self-harm), and U03 (suicide terrorist attacks). The second data source is a nationally-representative, self-report survey called the Youth Risk Behavior Survey (YRBS). This provides self-report behavioral data on mood concerns, suicidal ideation, and suicide attempts for high school students – among other risk behaviors like drug use, risky sexual behavior, and unhealthy eating.

As discussed above, in 2017, 6,774 youth 24 years old or younger died by suicide (CDC WONDER, 2018). Thus, approximately 18 young people die by suicide each day in the United States. Mirroring the trend in adults, young men died by suicide at a rate approximately 3.8 times that of young women in 2017 (CDC WONDER, 2018). Native American youth had the highest suicide rate in 2017 at 16.54 per 100,000, followed by white youth at 7.89, Asian or Pacific Islander youth at 5.4, Black or African American

youth at 4.89, and Hispanic or Latino youth at 4.22 (CDC WONDER, 2018). The youth suicide rate (ages 0-24) varies significantly by state. For example, in 2017, the lowest rate of youth suicide was in Washington DC with a rate of 2.76/100,000 while the highest was in Alaska with a rate of 15.78/100,000 – a rate 5.72 times higher (CDC WONDER, 2018). In general, rural states have significantly greater rates than more densely populated states (CDC WISQARS, 2018). The average rate across all states for young people ages 10-24 in 2017 was 10.57/100,000 (CDC WISQARS, 2018). The most frequent means of suicide for young people in 2017 was firearms, which were used in 46.43% of all youth suicides. Suffocation was the second most frequent mechanism at 38.45% and poisoning was the third most frequent at 7.41% (CDC WONDER, 2018).

Youth suicide rates (and overall rates) in the US have increased sharply since 1999 (Hedegaard, Curtin, & Warner, 2018). Across all age groups, the rate of suicide rose 33% from 1999 to 2017 (Hedegaard, Curtin, & Warner, 2018) yet the rate of suicide rose 50% in the 10-24 age group during the same time period (CDC WISQARS, 2018). The largest increase among young people was for female youth age 10-14, which increased 200% from 1999-2017 (Hedegaard, Curtin, & Warner, 2018). The rate for female youth age 15-24 increased at a rate approximately three times greater than the average, rising by 93% (Hedegaard, Curtin, & Warner, 2018). Rate increases were also observed among young males: a 74% increase for ages 10-14 and a 35% increase for ages 15-24 (Hedegaard, Curtin, & Warner, 2018). A similar trend also is seen in hospital visit data for suicidal ideation or suicide attempt encounters, with the rate doubling for adolescents between 2008 and 2018 (Plemmons et al., 2018). Suicide is the second leading cause of death for the 10-24-year-old age group and the leading cause of death

for 13-year-old women and 14-15-year-old men (CDC WISQARS, 2018).

Data from the 2015 YRBS provide representative estimates of the percentages of high school students that seriously consider suicide, plan suicide, and/or attempt suicide. About 17.7% of high school students seriously considered suicide, 14.6% made a suicide plan, and 8.6% attempted suicide at least once in the prior 12 months (Kann et al., 2016). Approximately 2.8% of high school students made an attempt in the prior year that resulted in medical treatment (Kann et al., 2016). The YRBS data indicate that high-school-aged women attempt suicide at a rate approximately two times greater than their male peers (11.6% vs 5.5%; Kann et al., 2016). An analysis of the 2015 YRBS data by Caputi, Smith, and Ayers (2017) finds that sexual minority high school students are 3.37 times more likely to attempt suicide than their heterosexual peers and that approximately one in four sexual minority high school students attempted suicide in the prior 12 months.

Potential Etiologies

Following the example of Cha et al. (2017), this section is titled 'potential' etiologies to highlight the lack of sufficiently precise causal understandings of youth suicide. Currently, the research has identified a very large number of correlational risk factors across a wide variety of domains (e.g., biological, psychological, and social). There are such a large number of risk factors associated with suicidality that Joiner et al. (2005) titled one study, "Four Studies on How Past and Current Suicidality Relate Even When 'Everything but the Kitchen Sink' is Covaried". A full review of every risk factor is outside the scope of this chapter; however, the reader is referred to Cha et al. (2017) and Esposito-Smythers, Weismoore, Zimmerman, and Spirito (2014) for more comprehensive treatment. Major risk factors include demographics, prior suicide

attempts, substance use disorders, mood disorders, access to lethal means, NSSI, chronic medical conditions, and a history of child maltreatment (Cha et al., 2017; Esposito-Smythers, Weismoore, Zimmerman, & Spirito, 2014; SAMHSA, 2012; Suicide Prevention Resource Center & Rogers, 2011). Risk factors are limited in their predictive accuracy for an individual because risk factors operate in complex combinations, may be experienced differently across individuals, are not always modifiable, and are not sufficiently predictive for clinical validity (e.g., many people are depressed, but only some depressed people die by suicide; Suicide Prevention Resource Center & Rogers, 2011; Franklin et al., 2017).

It is important to differentiate (distal) risk factors from more proximal risk factors, also known as warning signs. It has been suggested that, given the limited predictive capability of the many identified risk factors, warning signs may be potentially more clinically useful for preventing suicide (Rudd, 2008). Warning signs include talking about ending one's own life, recent life crises, obtaining lethal means, intoxication, the development of a suicide plan, rehearsing suicide behaviors, talking about death and dying in ways that are unusual for the individual, dramatic mood changes, significant agitation, hopelessness, and/or rage, and increases in reckless behavior (Rudd et al., 2006). The presence of multiple warning signs (especially combined with the presence of multiple distal risk factors) may be cause for increased concern.

The field of suicidology has moved from identifying hundreds of distal psychosocial factors associated with increased suicide risk, to a focus on more proximal warning signs, and now to the identification and monitoring of individual-level suicide 'drivers' in the clinical encounter (Jobes, 2016; Tucker, Crowly, Davidson, & Gutierrez,

2015). Jobes (2016) defines drivers as "patient-defined problems that propel a person into an acute suicidal state" (p. 126). Drivers can be further divided into direct drivers or indirect drivers (i.e., contextual vulnerabilities that make the patient more likely to be susceptible to direct drivers; Jobes, 2016). This shift to individual drivers can be seen in contemporary evidence-based treatments for suicide behaviors that are discussed in a later section.

A theory of why people die by suicide that has received significant empirical research attention is Joiner's (2005) interpersonal theory of suicide (IPTS). This theory states that the desire for death forms from a combination of perceived burdensomeness and social isolation (Joiner, 2005). However, according to the theory, for the desire for death to lead to an attempt requires that the individual have the acquired capability for suicide (through repeated exposure, and presumably habituation and/or inhibitory learning processes, to painful or provocative experiences; Joiner, 2007). The last decade has seen the theory gain empirical research support (see Chu et al., 2017 for a comprehensive review), including in a number of studies with adolescent populations (e.g., Stewart, Eaddy, Horton, Hughes, & Kennard, 20187; Horton et al., 2016; Joiner et al., 2009). The interpersonal theory of suicide is an important theory of suicide for both its research support and clinical utility in the assessment and treatment of suicidal thoughts and behaviors. However, additional studies capable of causal inference are needed, especially with adolescents. It also made a major contribution to the field by for providing a framework to differentiate those with suicidal ideation and those who make attempts (Klonsky & May, 2014; Klonsky & May, 2015).

Other prominent theories include Shneidman's (1985, 1993) cubic model where

pain, press, and perturbation are each sides of a cube on a 1 (low) to 5 (high) ranking – with the corner marked by the coordinates 5, 5, 5 representing significant lethality. Klonsky and May (2015) propose the Three-Step Theory (3ST) along the "ideation-to-action" framework (see Klonsky & May, 2014). In this model, pain and hopelessness lead to suicidal ideation (step 1), pain that is greater than connectedness leads to strong ideation (step 2), and capability of suicide leads to an attempt (step 3; Klonsky & May 2015). Other theories have emphasized hopelessness as a key construct (Beck, 1985) or social isolation (Durkheim, 1951).

Drawing on the cognitive work of Beck, Rudd (2006) proposed the Fluid Vulnerability Theory (FVT) of suicide. The theory proposes that a suicidal mode is acutely activated following an internal or external trigger (i.e., thoughts, events, affective experiences) and is time-limited. The suicidal mode consists of four parts: the cognitive system, the affective system, the physiological system, and the behavioral system. A person's baseline risk is conceptualized as the threshold for activating the suicidal mode with varying susceptibilities across all four domains. Thus, someone with high baseline vulnerability across domains would be at greater risk of an event setting off the suicidal mode than a person with low baseline vulnerability across domains. In accordance with cognitive theory, the central pathway to the suicidal mode in this theory is cognition as the interpretation of the experience across all four areas is thought to be deeply influential. Specifically, a combination of core beliefs is thought to form a suicide belief system that leads to susceptibility to the activation of the suicidal mode: the core belief of unlovability, the core belief of helplessness, the core belief of inability to handle distress, and the core belief of perceived burdensomeness (Rudd, 2006). This theory provides a

framework through which quickly shifting risk might be modeled to overcome the limited short-term predictive validity of the distal risk factor paradigm (Bryan & Rudd, 2016).

Assessment

Screening

Screening practices are intended to be short, easily deployable methods of assessing for the increased risk of a presence of a given concern. Screening can either be universal (e.g., whole school) or targeted (e.g., students with identified mental health concerns; Whitcomb, 2018). Screening tools typically have high sensitivity but lower specificity (Horowitz, Ballard, & Pao, 2009. In other words, screenings are designed to catch the vast majority of true positives but also may produce many false positives. Where screening tools are employed, it is vital that follow-up assessments are conducted with those who screen positive for suicidal thoughts or behavior (Singer, Erbacher, Rosen, 2018). These assessments, often called risk assessments, are discussed in the following section. In the current section, the rationale for suicide risk screening, current recommendations, a sample of commonly used screening tools, and a discussion of the many challenges associated with suicide screenings are presented – with special attention given to the school context.

The ultimate goal of screening for young people for suicide risk is to reduce the number of people who die by suicide. Screening practices for a given condition are recommended when, "[T]he condition causes significant morbidity or mortality, can be effectively treated, prevalence is not too rare and earlier detection is critical" (Horowitz, Ballard, & Pao, 2009, p. 621). Youth suicide arguably meets all of the above criteria (Horowitz, Ballard, & Pao, 2009). As schools serve nearly all young people, schools have

been identified as promising sites for suicide risk screenings (Horowitz, Ballard, & Pao, 2009; Singer, Erbacher, & Rosen, 2018). Other promising sites include pediatric primary care and emergency departments (Horowitz, Ballard, & Pao, 2009). While current evidence is limited that youth suicide risk screening significantly decreases death by suicide (discussed further below), there is evidence that screening for suicidal thoughts and behaviors leads to increased identification of suicidal ideation and increased treatment service utilization. For example, a longitudinal study of at-risk youth found that 70% of those identified at risk during a school-based screening followed through on the referral recommendation (Gould et al., 2009). Suicide risk screening among adolescents was also found to have no iatrogenic effects in a large randomized controlled trial and is associated decreased suicidal ideation (Blades, Strirzke, Page, & Brown, 2018; Gould et al., 2005).

A Sentinel Event Alert from The Joint Commission titled "Detecting and Treating Suicide Ideation in all Settings" concluded that the universal use of standardized screening measures is more effective than clinician judgement in identifying suicidal ideation in the general patient population (The Joint Commission, 2016). However, research reviews have found no scientific support for the use of suicide risk assessment instruments in predicting suicidal acts (Runeson et al., 2017). Risk assessment instruments may be useful beyond predictive value – they may serve as guides or training tools for less experienced staff or help to direct providers and patients toward appropriate treatments (Runeson et al., 2017).

A commonly used screening measure, especially in the healthcare context, is the freely-available Patient Health Questionnaire 9 (PHQ-9) – a depression screener that

includes one question on suicidal ideation (Kroenke, Spitzer, & Williams, 2001). To facilitate screening with young people, the National Institutes of Mental Health developed and released a toolkit called Asking Suicide-Screening Questions (ASQ; Horowitz et al., 2012). The screener is 4-5 questions that can be administered by non-mental health specialists for youth ages 10-24 (Horowitz et al., 2012). Research from Ballard et al. (2012) found that youth highly approved (96%) of being asked suicide screening questions in an urban pediatric emergency department. Perhaps the most widely used screening instrument is the freely-available Columbia Suicide Severity Rating Scale Screener (C-SSRS), which is a 3-6 question triage tool that can be easily administered by non-mental health specialists (Posner et al., 2011). The scale has demonstrated validity evidence among adolescents (Gipson, Agarwala, Opperman, Horowitz, & King, 2014), is available in over 33 languages, has been adapted to a number of adult and pediatric settings, and has been either endorsed, approved, or adopted by the Department of Defense, the CDC, the Food and Drug Administration, National Institutes of Health, SAMHSA, the Action Alliance, and the WHO (see http://cssrs.columbia.edu for the scale and a listening of 100+ research studies using the measure). However, some researchers contend that the C-SSRS has entered wide-spread use as the gold standard prior to having received extensive validation (Giddens, Sheehan, & Sheehan, 2014). For example, a more recent, large-sample study with the C-SSRS predicting both fatal and non-fatal attempts to have an area under the curve (AUC) of 0.65 and only mildly better odds of predicting a fatal or non-fatal attempt than chance (Lindh et al., 2018).

While school-based screening for emotional and behavioral concerns is regarded

as an evidence-based approach to addressing the mental health needs of young people (Dowdy, Ritchey, & Kamphaus, 2010), the evidence for school-based universal suicide screening is more limited. However, a study examining the overlap between students known to professionals as being at increased suicide risk versus those identified by the universal use of the C-SSRS found that 34% of students were only identified by screening – suggesting that universal screening for increased suicide risk in schools identifies a substantial portion of students at risk not previously known to school staff (Scott et al., 2009). The school-based Signs of Suicide prevention program that has shown efficacy evidence in RCTs includes universal screening for depression and suicidal ideation as one of its components (Schilling, Aseltine, & James, 2016).

Universal school-based screening for suicide risk is hampered by a number of concerns including limited personnel resources in conducting the screening and following up on positive screens, high numbers of false positives, limited referrals for evidence-based treatment of suicidal thoughts and behaviors, the likely need for active-consent from parents, and lower acceptability by school administrators compared with psychoeducational interventions (Miller, Eckert, DuPaul, & White, 1999; Whitney, Renner, Pate, & Jacobs, 2011). Lastly, the current research relies on indirect efficacy evidence (e.g., increased identification and service utilization) instead of directly examining causal links between screening and the reduction of suicide attempts or suicides. More research is needed on the potential negative effects of high numbers of false positives of suicide screening at both the systems (e.g., resources) level and the individual (e.g., stigma) level. Further cost-benefit analysis of universal compared to selective screening of suicide risk is also needed.

Risk Assessment

A full accounting of the clinical skills and toolset of youth suicide risk assessment is beyond the scope of this review. Unfortunately, clinicians are often inadequately trained in conducting suicide assessments despite the seriousness of the task (Cramer, Johnson, McLaughlin, Rausch, & Conroy, 2013). The assessment of suicide risk typically involves a clinical interview (sometimes semi-structured) of presenting concerns, risk and protective factors, and the assessment of past and present suicidality (including the intensity, context, and duration of thoughts, urges, intentions, plans, means, preparatory behaviors, and attempts) from which the clinician establishes a risk formulation to inform treatment and client safety (Boccio, 2015; Chu et al., 2015; Pettit & Buitron, 2018). The risk formulation can be further refined into chronic risk estimation and an acute risk estimation (see Rudd, 2008). Although risk assessment has typically involved estimating acute and baseline risk within the categories of low, medium, high, or imminent, this classification is largely not based on empirical evidence and has been criticized as lacking utility (Pisani, Murrie, & Silverman, 2016). Importantly, suicide risk assessments should re-occur frequently to monitor ongoing risk – a task that is often neglected in practice (Erbacher & Singer, 2017). Thorough documentation of the assessment is vital (Jobes, 2016; Stanley, Simpson, Wortzel, & Joiner, 2019).

There are a number of tools available to assist the clinician in both assessing for risk and in organizing the information obtained to form a risk estimate. These tools can vary in length and depth. Examples of tools with research support are the full C-SSRS assessment (Posner et al., 2011), the Suicide Status Form (SSF) from the Collaborative Assessment and Management of Suicidality Framework (CAMS; Jobes, 2016) and the

University of Washington Risk Assessment and Management Protocol (UWRAMP; Linehan, Comtois, & Ward-Ciesielski, 2012). A set of school-based risk assessment tools has also been developed by Erbacher, Singer, and Poland (2015). A brief self-report measure called the Suicidal Behaviors Questionnaire – Revised (SBQ-R) also has validity evidence among young people (Osman et al., 2001). A promising new, freely available tool developed with modern Item Response Theory methods is the Suicidal Affect-Behavior-Cognition Scale (SABCS; Harris et al., 2015). The SABCS has evidence of high reliability, predictive validity, convergent validity, sensitivity to change, no differential item functioning across sex, age, or ethnicity, and stronger psychometric properties than the SBQ-R (Harris et al., 2015).

Risk assessments are hampered by the low base-rate of suicides, making establishing accurate predictive power of such a multi-faceted issue extremely difficult (Belsher et al., 2019). Accordingly, risk assessments have been critiqued as not having sufficient predictive value – especially when done without the aid of a standardized tool (Woodford et al., 2019; Randall, Sareen, Chateau, & Bolton, 2018, Quinlivan, 2016; Wang et al., 2016). Ultimately, clinicians can only estimate risk – which is not the same as predicting when and if someone will die (Jobes, 2016). For example, even modern machine learning algorithms on massive general-population hospital datasets only predict suicide with about 1% accuracy despite being accurate in global risk categorization (i.e., AOC ≈ 0.80, PPV ≈ 0.01; Belsher et al., 2019). As Pokorny (1983) and more recently Carter and Spittal (2018) have demonstrated, the positive predictive value (PPV) in predicting low incidence events such as suicide is severely limited by low base rates. For example, an assessment with 99% specificity and 99% sensitivity for a phenomenon with

a base rate of 10 per 100,000 will always have a less than .01 PPV (Pokorny, 1983). Even in a group at very high risk for suicide, for example, 500 out of 100,000, an assessment with 99% specificity and 99% specificity would only yield a PPV of 0.33 – still potentially too low for meaningful clinical use (Pokorny, 1983). However, in extremely high-risk populations (5000 per 100,000), machine learning algorithms have obtained PPVs of 0.75-0.78 (Belsher, 2019; Walsh, Ribeiro, & Franklin, 2017). Even if using algorithmic approaches with large hospital datasets did accurately predict risk, this approach has many ethical uncertainties that have not been resolved (Tucket, Tackett, Glickman, & Reger, 2019).

A key piece of the clinical assessment of suicide risk is the assessment of access to lethal means, especially firearms. Firearms were used in approximately 50.6% of all suicides in the United States and 46.4% of all suicides of young people age 10-24 (CDC WISQARS, 2017). Firearms also represent the most lethal common means of suicide, with approximately 80-90% of suicide attempts made with a firearm resulting in death (Spicer & Miller, 2000; Shenassa, Catlin, & Buka, 2003; Elnour & Harrison, 2008). One study found that youth aged 10 to 24 died by suicide on their first attempt at a rate of 74% - with 85% of first attempt deaths involving the use of a firearm (McKean, Pabbati, Geske, & Bostwick, 2018). Assessing the client's plan regarding methods and means – especially their lethality – is critical to effective risk assessment and safety planning (discussed further below).

Although risk factors have limited predictive validity, their assessment remains an important part of formulating suicide risk (Chu et al., 2015; Franklin et al., 2017). Risk factors include prior attempts, NSSI, severe psychopathology (major depression, bipolar

disorder, borderline personality disorder), access to or familiarity with firearms, hopelessness, isolation, perceived burdensomeness, and repeated exposure to painful or provocative experiences (Chu et al., 2015). Assessing for components of the recently proposed Acute Suicidal Affective Disturbance (ASAD) may be a promising avenue for classifying individuals at high acute risk to imminent risk. ASAD is a proposed suicide-specific diagnostic entity marked by a rapid (hours/days) increase in suicidality (Rogers, Chu, & Joiner, 2019). ASAD consists of four defining features:

A. A drastic increase in suicidal intent over the course of hours or days (not weeks or months);
B. Marked social alienation (e.g., social withdrawal, perceived liability on others) and/or self-alienation (e.g., self-hatred, perceptions that one's self is an onerous burden);
C. Perceptions that the above criteria are hopelessly intractable;
D. Two or more manifestations of overarousal (agitation, irritability, insomnia, nightmares). (Rogers, Chu, & Joiner, 2019)

A number of recent psychometric and correlational studies have provided evidence that ASAD is a distinct construct and differentiates ideators, attempters, and multiple attempters more reliably than depression or other psychopathology (Rogers et al., 2017; Rogers, Chu, & Joiner, 2019; Rogers, Hom, & Joiner, 2019; Stanley, Rufino, Rogers, Ellis, & Joiner, 2016; Tucker, Michaels, Rogers, Winegate, & Joiner, 2016). Joiner has related the ASAD constellation of symptoms to antipredator defensive reactions of withdrawal and agitation seen in other mammals (Joiner & Stanley, 2016). More prospective research is needed to confirm the utility of the ASAD construct, ideally

proximal to suicidal crises (i.e., prospective studies of suicidal patients presenting to emergency rooms or mobile crisis teams; Rogers, Chu, & Joiner, 2019).

Furthermore, a functional or chain assessment of specific thoughts, emotions, urges, and behaviors conducted for instances of suicidal thoughts or behaviors (see Linehan, 1993; Bryan, 2015) can help clarify individual risk factors, warning signs, and individualized treatment targets (Jobes, 2016). Targeting these individual drivers of suicide behaviors provide an ideographic complement to nomothetic risk estimation and are a key component of evidence-based treatments for suicide discussed below.

Treatment

Despite the devastating scope of the problem, comparatively little rigorous evidence exists examining effective treatments for suicidal youth. For example, a 2015 meta-analysis examining suicide attempts as an outcome measure found a statistically insignificant pooled effect size for therapeutic interventions of adolescents, although the studies and meta-analysis may not have been adequately powered to detect a low base rate outcome (Ougrin, Tranah, Stahl, Moran, & Asarnow, 2015). A full review of treatments is beyond the scope possible in this section, a brief summary of the available youth evidence is presented with information from the adult literature where the youth literature is scant. For a brief overview of the core competencies in suicide risk assessment and management, the reader is referred to Rudd, Cukrowicz, and Bryan (2008). Additionally, the line between prevention and treatment is blurred in treating suicidal clients. Larger scale suicide prevention techniques are presented in a later section. To conceptually bridge the gap between suicide prevention and the treatment of suicidal clients, the work described below is sometimes referred to as ‘clinical suicide

prevention'.

Of note in the following review is that an important conceptual shift has happened in the treatment of suicidal thoughts and behaviors during the last generation from risk-factor models to functional models. As Bryan & Rudd (2018) point out, the first modern treatments of suicidal individuals can be described as being influenced by a 'risk factor model' of treatment. This model assumes that suicide risk is a combination of a wide variety of risk factors and their interactions and thus targeting malleable risk factors in psychotherapy would lead to reductions in suicidality. However, risk factor research on suicidal thoughts and behaviors suffers from a number of challenges including large numbers of potential risk factors, low base rates leading to limited predictive power and difficulty reaching clinical significance, the exponential number of possible combinations of multiple risk factors across multiple populations, the challenge of applying group-level analysis to individuals, and the difficulty of traditional research methods to incorporate change in risk factor status into their analyses (Franklin et al., 2017). For example, a 2017 meta-analysis of 50 years of literature on risk factors for suicidal thoughts and behaviors concluded that "*at least within the narrow methodological limits of the existing literature*, there is no evidence that any known risk factors – broad or specific – approach what many might define as clinical significance" (emphasis in original; Franklin et al., 2017).

Bryan and Rudd (2018) argue that the field then moved to a specialized version of the risk factor model, called the 'psychiatric syndromal model.' This model asserts that the psychiatric disorder (e.g., depression) is the priority for the treatment of suicide risk. However, this model has the same limitations as the risk factor model listed above. Moreover, it does not account for why only a small amount of the total of all depressed

people die by suicide – or conversely, why an estimated 54% of suicide decedents did not have a known mental health condition (Stone et al., 2018). They also point to research that suggests psychiatric disorders are primarily correlated with suicidal ideation and do not sufficiently distinguish suicide ideators versus suicide attempters (May & Klonsky, 2016; Klonsky, May, & Saffer, 2016). Bryan and Rudd (2018) point out that a meta-analysis of CBT interventions for treating suicidality did not find any significant effects when suicidality was targeted indirectly (i.e., by treating depression; Tarrier, Taylor, & Gooding, 2008).

Current effective therapies for the treatment of suicide behaviors fall under the 'functional model' where suicidal behaviors and their contexts are the direct and primary target of treatment (Bryan & Rudd, 2018). In this approach, antecedents and consequences of behavior (including thoughts, emotions, urges, sensations, and overt behavior) are tracked and targeted for intervention – as well as the contexts of thoughts, emotions, urges, sensations, and the behaviors. Evidence-based examples of this approach include Dialectical Behavior Therapy (DBT; Linehan, 1993), Cognitive Therapy for Suicide Prevention (CP-SP; Wenzel, Brown, & Beck, 2009), the Collaborative Management of Suicide Risk (CAMS; Jobes, 2016), and Brief Cognitive Behavioral Therapy for Suicide Prevention (BCBT-SP; Bryan & Rudd, 2018).

Another important transition in the field of clinical suicidology is the changing role of inpatient treatment. Evidence is accumulating that inpatient treatment should only be used as a last resort when faced with 'clear and imminent risk' in accordance with state law. However, there is little empirical basis for establishing clear and imminent risk nor agreed upon sufficiently specific definitions (see Berman & Silverman, 2014 for a

review of this issue). Current guidance is that suicidal ideation alone does not present a clear and imminent risk, but rather the clinician's judgement that the client is at near term risk (typically hours to days) based on the presence of risk factors combined with the strength of ideation, urges, intent, plan, and capability for lethality (Gould et al., 2016). The shift in how hospitalization is viewed is due to inpatient hospitalization for suicidality having unclear evidence of effectiveness (Lear & Pepper, 2018), the possibility of iatrogenic effects (Linehan, 1993; Qin & Nordentoft, 2005; Jobes, 2016; Lear & Pepper, 2018), perceived coercion having further iatrogenic effects (Jordan & McNiel, 2019), and that an unacceptably high number of suicides occur within ER or inpatient settings (The Joint Commission, 2019). The risk of suicide rises 200 to 300 percent following discharge from hospitalization (Chung et al., 2019). Furthermore, the interventions with the most evidence for treating suicidality (even among highly suicidal populations with borderline personality disorder) are outpatient treatments (Linehan, 1993; Wenzel, Brown, & Beck, 2009; Jobes, 2016; Bryan & Rudd, 2018). This shift is significant in that the dominant practice of hospitalizing suicidal individuals 'defensively' (i.e., for the self-protection of the clinician) is now strongly challenged. Freedenthal (2018) summarizes this shift as follows: "The operating belief is: *Better safe than sorry*. The question needs to be asked*: For whom is it better*?" (emphasis in original, p. 112). Even when hospitalization is indicated, inpatient stays are typically brief and focus on crisis stabilization – not building a life worth living (Linehan, 1993).

There is not enough evidence to currently recommend medication as a standalone treatment for suicidal thoughts and behaviors (Bryan & Rudd, 2018). One possible exception, however, is that clozapine appears superior in reducing suicidality in patients

with psychotic disorders compared to other antipsychotics like olanzapine (Bryan & Rudd, 2018; Hennen & Baldessarini, 2005; Meltzer et al., 2003). There is some evidence that lithium is more effective than placebo in reducing suicides among patients with bipolar disorder, but this claim has also been challenged and newer (yet underpowered) research suggests lithium is not more effective for preventing suicide than valproate (Bryan & Rudd, 2018; Cipriani, Pretty, Hawton, & Geddes, 2005; Oquendo et al., 2011) Treatment with an selective serotonin reuptake inhibitor (SSRI) meaningfully reduced suicide attempts in patients with depression 65 years and older (FDA, 2007). Medication in combination with psychotherapy may be useful in treating the symptoms of mental health problems associated with suicidality such as depression and bipolar disorder (Bryan & Rudd, 2018). In adolescents with treatment resistant depression (defined as 2 months of no response on their first SSRI trial), the addition of CBT was more effective than switching medications (Brent et al, 2008). Cautions for medication use in suicidal patients include the need to consider overdose potential, the lethality of the medication (i.e., the ratio of the therapeutic dose to the lethal dose), and the possibility of SSRI treatment inducing symptoms of mania in previously unrecognized bipolar disorder (Bryan & Rudd, 2018). The Food and Drug Administration (FDA) applied a black box warning about the potential for increased suicidal thoughts and behaviors (but not suicides) in patients 24 years old and younger for both SSRIs and mood stabilizers. This decision and its consequences have remained controversial (Rudd, Cordero, & Bryan, 2009; Stone, 2014; Friedman, 2014). A recent re-analysis of FDA second-generation anti-depressant trials found that patients in the active treatment arms were 2.4 times more likely to attempt suicide ($p < 0.00001$; $BF = 180.1$) with an absolute risk increase of 0.41

percent (Hengartner & Plöderl, 2019). For a further review of psychopharmacological treatment of suicidal adolescents, see Zalpuri and Singh (2019).

Effective treatments for suicidal thoughts and behavior exist, yet trials of these treatments have primarily been with adult participants (Linehan, 1993; Wenzel, Brown, & Beck, 2009; Jobes, 2016; Bryan & Rudd, 2018). Although it is possible that these treatments also work with adolescents, whether or not this is true is an empirical question that needs confirmation. For example, non-experimental research has suggested the use of the Collaborative Assessment and Management of Suicidality intervention (CAMS) may be effective with adolescents (Anderson, Keys, Jobes, 2016; Jobes, 2016; Jobes, Gregorian, & Colbern, 2018; O'Conner, Brausch, Anderson, & Jobes, 2014; Romanowics, O'Connor, Schak, Swintak, & Lineberry 2013), yet no experimental studies have yet provided confirmatory evidence of this hypothesis. However, a feasibility RCT for CAMS with adolescents is actively being planned (Jobes, Gregorian, & Colbern, 2018).

Dialectical Behavior Therapy (DBT) is currently the only treatment to have evidence of reducing self-injury in adolescents in two randomized controlled trials with active control conditions (Mehlum et al., 2014; McCauley et al., 2018). The Mehlum et al. (2014) study combined non-suicidal self-injury and suicide attempts in the analysis, but found significant reductions in suicidal ideation, self-injury, and depression. The McCaulty et al., (2018) found significant reductions in both self-injury and suicide attempts. Given that suicide is the second leading cause of death for the 10-24-year-old age group and the leading cause of death for 13-year-old women and 14-15-year-old men, it is unfortunate that only two RCTs with adequate power to measure reductions in

adolescent suicide attempts have been conducted: McCauley et al.'s (2018) study on adolescent DBT and Diamond et al.'s (2018) study on Attachment Based Family Therapy (ABFT) (CDC WISQARS, 2019). Of these two studies, only the McCauley et al. (2018) study on DBT found a significant reduction in attempts compared to the active control.

DBT is a multicomponent behavioral treatment for suicidal behavior, NSSI, and borderline personality disorder developed by Marsha Linehan (Linehan, 1993). The treatment consists of weekly individual psychotherapy using primarily behavioral techniques, a weekly behavioral skills instruction group (teaching mindfulness, emotion regulation, distress tolerance, and interpersonal effectiveness skills), the availability of between-session skills phone coaching, and a therapist consultation team (Linehan, 1993). This treatment has been adapted for adolescents (DBT-A; Miller, Rathus, & Linehan, 2017) and a school-specific adaptation of the skills instruction component is also available (DBT-STEPS-A; Mazza, Dexter-Mazza, Miller, Rathus, & Murphy, 2016). A recent retrospective chart analysis with historical matched controls of implementing DBT in an inpatient adolescent setting found that DBT reduced NSSI, suicide attempts, and restraints (Tebbett-Mock, Saito, McGee, Woloszyn, & Venuti, 2018). Moreover, the study found that implementing DBT in this setting was associated with saving over $250,000 from reduced constant observation hours (Tebbett-Mock, Saito, McGee, Woloszyn, & Venuti, 2018).

Two examples of family-based cognitive-behavioral therapy have also found evidence of efficacy in randomized controlled trials: Integrated CBT (I-CBT; Esposito-Smythers, Spirito, Kahler, Hunt, & Monti, 2011) and Safe Alternatives for Teens and Youth (SAFETY; Asarnow, Hughes, Babeva, & Sugar, 2017). I-CBT found significant

reductions in suicide attempts among youth with co-occurring substance use disorder and suicidality in a pilot randomized trial with an active control condition (Asarnow, Hughes, Babeva, & Sugar, 2017). However, this pilot trial was not adequately powered and did not control for multiple comparisons limiting the certainty of the results (Asarnow, Hughes, Babeva, & Sugar, 2017). The SAFETY intervention makes use of CBT and DBT techniques and involves families in treatment. The results a randomized trial with active treatment control suggest that the SAFETY intervention showed efficacy evidence for reducing suicide attempts among adolescents (Asarnow, Hughes, Babeva, & Sugar, 2017). However, this study also was limited by low statistical power (Asarnow, Hughes, Babeva, & Sugar, 2017).

There is a paucity of RCT evidence regarding Acceptance and Commitment Therapy (ACT) for suicidal clients – despite its close conceptual ties to DBT. One trial in adult veterans found evidence that ACT reduced suicidal ideation (Kumpula et al., 2019). However, measures of suicidal ideation may not be an appropriate measure for ACT trials because ACT focuses on changing the function of thoughts, not changing or reducing the thoughts themselves per se. This is an important, but unexplored, measurement concern for both DBT and ACT trials and suggests attempts are a better proxy measure for these treatments – and that changes in suicidal ideation should be interpreted with caution, especially in comparison to cognitive therapy methods.

Other treatment modalities have shown less rigorous evidence of potential effectiveness (see Glenn, Frankling, and Nock, 2015; Ougrin, Tranah, Stalh, Moran, & Asarnaw, 2015; Chat et al., 2017; Singer, O'Brien, & LeCloux, 2017 for reviews). For example, attachment-based family therapy (AFBT; Diamond, Reis, Diamond, Siqueland,

& Isaacs, 2002) showed evidence of success in reducing suicidal ideation in adolescents in a randomized trial with an active control condition (Diamond et al., 2010). However, this study did not measure suicide attempts and had low statistical power (Diamond et al., 2010). A more recent randomized trial with sufficient power did not find any significant differences between ABFT and non-directive family therapy in either suicidal ideation, depression, or attempts (Diamond et al., 2018).

A number of CBT approaches and crisis intervention strategies for suicidal individuals include the use of safety planning and lethal means counseling strategies (e.g., Bryan & Rudd, 2018; Feedenthal, 2018; Jobes, 2016; Linehan, 1993). These strategies do not need to be delivered by mental health clinicians and thus might not formally be considered 'treatment' and may be used, for example, by paraprofessionals on crisis hotlines or nurses in emergency rooms (Stanley & Brown, 2012). The Safety Planning Intervention (SPI) was developed as a stand-alone intervention, has been successfully used in adolescent populations, and has efficacy evidence in large trials within the VA (Stanley & Brown, 2012; Stanley et al., 2018; Stanley et al., 2009). According to Stanley & Brown (2012), SPI includes:

> (a) recognizing warning signs of an impending suicidal crisis; (b) employing internal coping strategies; (c) utilizing social contacts and social settings as a means of distraction from suicidal thoughts; (d) using family members or friends to help resolve the crisis; (e) contacting mental health professionals or agencies; and (f) restricting access to lethal means. (p. 256)

When the individual recognizes the warning signs, they refer to their plan, implement the plan until it reduces the suicidal crisis, or they reach a professional for intervention. The

SPI stands in contrast to so called 'no-suicide contracts' that are not effective and do not equip the patient to maintain safety (Rudd, Mandrusiak, & Joiner, 2006). Research on a similar intervention called crisis response planning suggests adding reasons for living to the safety plan may be beneficial (Bryan et al., 2017). This important intervention is woefully understudied in the school context and with adolescent populations.

Lethal means restriction – now preferably termed lethal means safety – is an essential component of the safety plan (see Stanley, Hom, Rogers, Anestis, & Joiner, 2016 for the importance of using "means safety" language). Lethal means safety can be applied at universal, selected, or indicated levels (Barber & Miller, 2014). This section covers lethal means safety in the context of the clinical encounter, which is referred to as 'lethal means counseling' or 'counseling on access to lethal means'. A training program titled Counseling on Access to Lethal Means (CALM) has been shown to increase professionals' comfort, knowledge, and frequency in talking about means safety with suicidal clients (Jonhson, Frank, Ciocca, & Barber, 2013; Sale et al., 2018). Lethal means safety interventions rest on four research established points: 1) suicidal crises are time-limited; 2) the method used to attempt suicide depends on availability; 3) methods have varying lethality (and often the second choice method is often less lethal); and 4) the vast majority of people that attempt suicide and survive do not make another attempt (Barber & Miller, 2014). This approach has been especially important in addressing firearm access among suicidal clients as firearms are the most frequently used and most frequently deadly lethal means in the US (Anestis, 2018). For a full review of the prevention science regarding firearm related injury and death, see Pallin, Spiter, Ranny, Betz, and Wintemute (2019).

Prevention Science in Youth Suicidology

The following sections provide an overview of the prevention science literature in youth suicidology. History, national strategy documents, legislative efforts, and practices are reviewed – with specific attention on how this material interacts with the education system. While the line between prevention and treatment is inexact, prevention in the following sections refer to practices and strategies outside of the context of an individual clinical encounter.

School psychology has long pushed for a prevention approach to the most pressing problems facing young people (Strein, Hoagwood, & Cohn, 2003). This approach includes focusing on both disease prevention and health promotion, multiple levels of intervention (universal, selective, indicated), and efforts that focus on the social context and attempt to affect the largest group of youth possible (Strein, Hoagwood, & Cohn, 2003). Schools, as sites that serve nearly all children, are ideal locations for prevention work regarding health broadly, mental health, and suicide. As school systems are the *de facto* mental health care system for young people, their potential to accomplish prevention goals is substantial (Burns, et al. 1995; Strein, Hoagwood, & Cohn, 2003).

History

A full history of suicide prevention efforts is the U.S. is beyond the scope of this review. Readers are referred to an excellent summary of this history in the *2012 National Strategy for Suicide Prevention* (U.S. HHS Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). There are a number of notable points, however, that are useful in contextualizing the current landscape of suicide prevention. The following section overviews these key points, organizing themes, and their role in

youth and school-based suicide prevention.

Organized suicide prevention efforts in the U.S. began merely 60 years ago with the establishment of the first suicide prevention center in 1958 that provided a crisis hotline (U.S. HHS Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). Crisis hotlines have been a key component of suicide prevention efforts from the first crises center through today. In 1976, the American Association of Suicidology (AAS, founded in 1968) established a crisis center certification program and awarded its first certification (U.S. HHS Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). The Trevor Project was founded in 1998 to provide crisis services to LGBTQ youth (U.S. HHS Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). A national hotline was first established in 1999 when the National Hopeline Network launched (U.S. HHS Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). The National Hopeline was followed by the currently active SAMHSA National Suicide Prevention Lifeline, which connects callers to a network of local crisis centers across the country (U.S. HHS Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). In 2007, a separate Veterans Suicide Prevention Hotline came online (U.S. HHS Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). The Crisis Text Line, which provides crisis services via text messaging, was launched in 2013 (www.crisistextline.org).

Since the 1960 founding of the International Association for Suicide Prevention, a number of governmental, non-profit, and public-private partnership groups have formed – leading to a wide, but decentralized, network of actors (U.S. HHS Office of the Surgeon

General and National Action Alliance for Suicide Prevention, 2012). These include the National Institute of Mental Health Center for Studies of Suicide Prevention (est. 1967), AAS (est. 1968), the American Foundation for Suicide Prevention (AFSP; est. 1987), the Suicide Awareness Voices of Education (SAVE; est. 1990), the Yellow Ribbon Suicide Prevention Program (est. 1994), the Lifekeeper Foundation (est. 1995), the Suicide Prevention Advocacy Network USA (SPAN USA; est. 1996), the Jason Foundation (est. 1997), the Organization for Attempters and Survivors of Suicide in Interfaith Services (OASSIS; est. 1997), the National Organization for People of Color Against Suicide (est. 1998), the National Council for Suicide Prevention (est. 1999), the Jed Foundation (est. 2000), the SAMHSA Suicide Prevention Resource Center (SPRC; est. 2002), the National Action Alliance for Suicide Prevention (est. 2010), and the Department of Defense's Defense Suicide Prevention Office (DSPO; est. 2011; U.S. HHS Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012).

Out of this matrix of government organizations and public-private partnerships, a number of key reports were commissioned and released – mostly at the direction of government agencies. The first major report, *Suicide Prevention in the 70s*, was published by NIMH in 1973 (U.S. HHS Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). Following this report, the U.S. HHS published a report in 1989 specifically on youth suicide titled *Report of the Secretary's Task Force on Youth Suicide* (U.S. HHS Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). The CDC also released its 1992 document *Youth Suicide Prevention Programs: A Resource Guide* (U.S. HHS Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). Other notable

documents include a report from the CDC on Native American suicides in 1996, a 1999 report titled *The Surgeon General's Call to Action to Prevent Suicide*, and a 2003 presidential commission on mental health that published *Achieving the Promise: Transforming Mental Health Care in America* (U.S. HHS Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). In 2007, the Joint Commission made suicide prevention one of its standards for the accreditation of healthcare facilities in its document *Patient Safety Goals on Suicide* (U.S. HHS Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012).

National Strategy

Influenced by the World Health Organization and United Nations publishing a report titled *Prevention of Suicide: Guidelines for the Formulation and Implementation of National Strategies* and the Surgeon General's 1999 report, the U.S. HHS published the first national strategy for suicide in 2001 (U.S. HHS Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). The 206-page *National Strategy for Suicide Prevention* outlined 11 goals and 68 objectives across a wide variety of areas aimed at reducing suicides (U.S. HHS, 2001). In 2010, a number of public-private organizations collaborated to publish an evaluation of the strategy's success titled *Charting the Future of Suicide Prevention: A 2010 Progress Review of the National Strategy and Recommendations for the Decade Ahead* (U.S. HHS Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). Subsequently, the U.S. HHS released the current national strategy document titled the *2012 National Strategy for Suicide Prevention* (U.S. HHS Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). The strategy now includes 13 goals and

60 objectives organized around four key domains: Healthy and empowered individuals, families, and communities; Clinical and community preventive services; Treatment and support services; and Surveillance, research, and education (U.S. HHS Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). Schools are mentioned as important places for prevention work across multiple domains in this document (U.S. HHS Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012).

Prevention Strategies

The following section provides a brief overview the literature on a variety of suicide prevention strategies deployed outside of the clinical encounter. Special attention is given to strategies and studies conducted in the school context.

Legislation

A variety of laws at both the state and national levels are relevant to suicide prevention. At the national level, congress passed the Garrett Lee Smith Memorial Act in 2004 that funds a variety of youth prevention programs at the state, tribal, or campus level (US Surgeon General & National Action Alliance for Suicide Prevention, 2012). Grant funded activities primarily include gatekeeper trainings but have also funded screening programs, wellness activities and life skills development, hotlines, direct service, clinician trainings, and means safety efforts (Walrath, Garraza, Reid, Goldston, & McKeon, 2015). Although it is methodologically difficult to accurately measure the impact of this large grant program, one study estimated that programs funded by the Garrett Lee Smith Memorial Act prevented nearly 80,000 attempts within a three-year period (Godoy, Walrath, Goldston, Reid, & McKeon, 2015). Another study estimated

that counties implementing Garrett Lee Smith Memorial Act programs prevented 1.33 suicides per 100,000 youth (Walrath, Garraza, Reid, Goldston, & McKeon, 2015). These activities appear to exert an effect two years after implementation but not after three years – suggesting the need for sustained implementation (Godoy Garraza, Kuiper, Goldston, McKeon, & Walrath, 2019).

While a review of involuntary treatment law is outside the scope of this review, it is worth noting that various state laws exist that pertain to involuntary treatment of suicidal individuals. These laws generally fall into three categories: involuntary impatient treatment, involuntary outpatient treatment, and emergency evaluation provisions (Stettin, Geller, Ragosta, Cohen, & Ghowrwal, 2014). These laws and their application vary widely between states (Stettin, Geller, Ragosta, Cohen, & Ghowrwal, 2014). Various state laws also typically allow for exceptions to confidentiality laws when a suicidal client is at imminent risk. The degree to which involuntary commitment laws prevent suicide is uncertain with many experts arguing that involuntary commitment for suicidality may be iatrogenic (Linehan, 1993; Qin & Nordentoft, 2005; Jobes, 2016; Lear & Pepper, 2018)

State law also varies widely regarding means of safety provisions for those with psychiatric concerns, including suicidal individuals. These laws generally govern a) if and when a person can be prevented from purchasing a firearm and b) if and when authorities can temporarily take away a person's firearms. These "red flag" laws or extreme risk protection orders vary widely between states, but initial research supports that they lead to reductions in firearm suicides (Kivisto & Phalen, 2018).

A number of states have laws that require school personnel to be trained in the

basics of suicide prevention (American Foundation for Suicide Prevention, 2017). Eleven states mandate annual training for school staff, 18 states plus Washington D.C. mandate training for school staff but not on an annual basis, and 15 states encourage suicide prevention as an optional training for school staff (American Foundation for Suicide Prevention, 2017). Eighteen states plus Washington D.C. require schools to have a comprehensive policy on suicide prevention and seven states encourage such policies (American Foundation for Suicide Prevention, 2017). Both California and Maryland have statutes requiring student IDs to have suicide prevention hotline numbers on the back (American Foundation for Suicide Prevention, 2017).

Means Safety

Although means safety approaches can be used with any means, much of the current focus in means safety research regards firearms as the majority of suicides involve firearms and firearms are most common lethal means used in the United States (CDC WISQARS, 2018; Shenassa, Catlin, & Buka, 2003). Areas with fewer guns and stricter gun laws have lower suicide rates (Anestis, Selby, & Butterworth, 2017; Anestis, 2018; Balestra, 2018; Knopov, Sherman, Raifman, Larson, & Siegel, 2019). Many guns in the US are stored unsafely, including in homes with children (Anestis, 2018; Scott, Azrael, & Miller, 2018). Strikingly, parents whose children have a history of self-harm risk factors were no more likely to safely store their firearms (Scott, Azrael, & Miller, 2018) and in at least one study were less likely to safely store firearms (Schnitzer, Dykstra, Trigylidas, & Lichenstein, 2019).

Many parents have misperceptions about their children's access to guns. For example, one study of 314 parent-child dyads at a rural family practice clinic were asked

about guns in the home (Baxley & Miller, 2006). This study showed that children contradicted 39% of parents who said their children did not know where the guns in the house were and 22% of parents who said their children never handled a gun (Baxley & Miller, 2006). Children under ten were as likely as children over 10 to know where the gun was stored (73% and 79%) and as likely to report handling the gun (36% and 36%; Baxley & Miller, 2006). No differences were found between parents who reported locking their firearms or discussing firearm safety with their children (Baxley & Miller, 2006).

Means safety approaches have also been successfully used with medications (limiting amount of medications present or using less lethal medications), falls (nets and fencing), hangings (removal of ligature points), and gas inhalation (limiting access to certain gasses and removing toxins from common gasses; Jin, Khazen, & Anestis, 2016). Given the large role of fertilizers and pesticides used in Asian countries, means safety programs limiting the access to these means may also prove beneficial (Weerasinghe et al., 2018)

Gatekeeper Training

Gatekeeper training involves educational programming for adults who frequently come into contact with youth to recognize and respond to suicide risk. Programs may include education on the signs and symptoms of depression or suicide risk, addressing myths about suicide, how to ask young people if they are suicidal, and how to connect young people to care. The Question Persuade Refer program currently appears to have the most robust research base for school-based gatekeeper training programs (QPR; see Mo, Ko, & Xin, 2018; Quinnett, 2017). Gatekeeper trainings generally result in improved

knowledge, attitudes, self-efficacy, skills, and likelihood to intervene with suicidal students (Mo, Ko, & Xin, 2018). However, the research literature on gatekeeper trainings is fraught with a number of methodological challenges. Self-reported levels of knowledge, skill, and likelihood to intervene, for example, are not perfect proxies for whether the interventions changed participant behavior. Additionally, if they do change participant behavior, more rigorous designs are needed to determine if the changes in behavior lead to decreased attempts or suicides. Gatekeeper training is also generally premised on the idea that an appropriate help for young people is available, but this should not be taken for granted. Of note, the school-based Signs of Suicide (SOS) program, which has RCT support for reducing youth suicide attempts, includes staff and parent gatekeeper training as one of its components (Schilling, Aseltine, & James, 2016). As discussed above, gatekeeper training is a core component of prevention programs funded by the Garrett Lee Smith memorial act and locations that implement GLS-funded programs have reduced rates of youth suicide attempts (Godoy, Walrath, Goldston, Reid, & McKeon, 2015; Walrath, Garraza, Reid, Goldston, & McKeon, 2015). However, a recent systematic analysis of gatekeeper trainings for teachers and parents found no improvements in identification and referral of suicidal youth despite changes in knowledge about suicide (Torok, Calear, Smart, Nicolopoulos, & Wong, 2019).

Gatekeeper programs can be divided into two categories: those that train adults (e.g., teachers) likely to work with youth in distress and those that train young people directly. The former can be considered an indirect model whereas the latter is both indirect (i.e., peers helping peers) and direct (i.e., potentially at-risk youth also receiving the training). A recent meta-analysis found significant decreases in attempts at three- and

six-months post intervention for suicide prevention education programs delivered directly to youth – but found no effect on attempts for gatekeeper training delivered to teachers (Pistone, Beckman, Eriksson, Lagerlöf, & Sager, 2019). Of note to the present study, the meta-analysis also highlighted that the measurement quality of attitudes in both types of intervention was considered "very low" and thus no conclusions could be drawn from the pooled evidence (Pistone, Beckman, Eriksson, Lagerlöf, & Sager, 2019, p. 3). The authors conclude:

> [C]hanges in suicidal behaviour are perhaps more likely if the targeted population is personally involved in the intervention as both gatekeepers and target population, as in school-based interventions, than with interventions where the gatekeeper receiving training is merely supposed to work as a mediator for another population, for example, teachers as gatekeepers for pupils. (Pistone, Beckman, Eriksson, Lagerlöf, & Sager, 2019, p. 12)

Further research in this area is needed to determine the most effective ways to involve students in prevention.

Clinical Training & EBP Dissemination

The lack of clinician training regarding working with suicidal clients has been lamented in the literature since at least 1973 (see Rudd, Cukrowicz, & Bryan, 2008 for a review). Kleespies et al. (1993) reported that nearly half of all clinical psychological graduate students received no training in suicidality during graduate school. Similarly, fewer than half of school psychology practitioners received training in suicide risk assessment (Debski, Spadafore, Jacob, Poole, and Hixon, 2007). Psychologists are also less willing to provide services to suicidal clients than non-suicidal clients (Groth &

Boccio, 2018). Although core competency guidelines exist to guide training and supervision, it is unclear to what extent these guidelines have had widespread influence (Rudd, Cukrowicz, & Bryan, 2008). In 2012, an American Association of Suicidology task force released a report outlining the "surprisingly limited" training of mental health professionals in the assessment and management of suicidal patients (Schmitz, et al., 2012).

The adoption and implementation of evidence-based practices has been a challenge across multiple areas of psychology and school-based mental health has not been exempt from this challenge (Lyon & Bruns, 2019). While the evidence-base for the prevention and treatment of adolescent suicidality has grown, implementation is far from wide-spread. As the 2012 *National Strategy* points out, more work is needed on how to most effectively disseminate, implement, and encourage use of evidence-based practices in suicidology (U.S. Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). These efforts are hampered by similar challenges across various mental health concerns: stigma, lack of trained providers, lack of cultural adaptation / competence, and lack of insurance or underinsurance for mental health concerns, lack of adequate insurance reimbursement to clinicians treating high risk patients, and lack of coordinated care across settings. Further, the implementation of gatekeeper and suicide risk assessment trainings for professionals has outstripped the availability of evidence-based clinical services for those identified as at risk.

Despite these challenges, national implementation efforts regarding the identification and treatment of suicidal patients has made advances in the US through two

initiatives: the VA suicide prevention efforts and the Zero Suicide framework. The VA employs a suicide prevention coordinator at each of its medical centers responsible for dissemination and implementation of best-practices in suicide prevention (U.S. Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012). The Zero Suicide initiative is a structured dissemination and implementation effort for healthcare systems to adopt the aspirational goal of having zero suicides among the population under their care through continuous quality improvement efforts (www.zerosuicide.org; Hogan & Grumet, 2016).

Crisis Support

There are currently over 150 crisis centers nationwide that provide emergency services to those in suicidal crises – all of which are currently accessible through a unified National Suicide Prevention Lifeline (www.suicidepreventionlifeline.org). Despite methodological challenges in determining the efficacy of hotlines, initial data support that callers report being less suicidal by the end of call and have continuing decreases in hopelessness and psychological pain in the weeks following their call (Gould, Kalafat, HarrisMunfakh, & Kleinman, 2007). When crisis centers provide follow up calls, callers report that the calls kept them safe and kept them from killing themselves (Gould et al., 2018).

In addition to crisis hotlines, mobile crisis response and stabilization services (MRSS) exist in many communities to provide in-person crisis services to individuals including evaluations, crisis counseling, referrals, and respite services (SAMHSA, 2014).). These services appear to be effective in lowering rates of hospitalization, decreasing ER utilization for psychiatric crisis, increasing use of community mental

health services, and are more effective than hospitalization at linking clients to outpatient services (Kim & Kim, 2017; SAMHSA, 2014). Mobile crisis services also may focus on diverting the mentally ill away from the criminal legal system (SAMHSA, 2014). Compared to emergency department and inpatient treatment, MRSS are lower cost and lead to higher family satisfaction (National Technical Assistance Network for Children's Behavioral Health & SAMHSA, 2016). MRSS services also lead to improved child outcomes (Vanderploeg, Lu, Marshall, & Stevens, 2016).

Upstream Prevention

Upstream, or universal, prevention services target efforts at the population level to reduce risk of problems developing. Evaluating upstream prevention services is hampered by a number of methodological issues, including the cost and difficulty of long-term longitudinal studies and difficulty establishing adequate control groups. Given these challenges, few upstream approaches to suicide prevention have been rigorously evaluated. One upstream prevention approach with considerable evidence, described above, is reduction of access to firearms or other lethal means at the population level. Economic improvements (including broadened social safety net programs, increased healthcare access, increased insurance coverage, increased employment) are thought to reduce a number of risk factors that may be relevant to reducing suicide rates. For example, Gertner, Rotter, and Shafer (2019) found that every one dollar increase in the minimum wage was associated with a 1.9% decrease in the annual state suicide rate. Burke et al. (2019) estimated that rising temperatures from unmitigated climate change could result in between 9,000 and 40,000 additional suicide deaths in the US and Mexico by 2050. As individual approaches like DBT encourage clinicians to help clients build

lives worth living (Linehan, 1993), upstream approaches can be thought of as building societies that enable living. Crucially, whether increasing academic achievement or social emotional skills in children leads to decreases in suicides has not been rigorously studied. One study, however, found that elementary students who participated the good behavior game (a classroom-wide system of positive reinforcement for desired behavior) had lower suicide rates by age 19-21 (Wilcox et al., 2008).

Postvention

In 2015, the Survivors of Suicide Loss Task Force of the Action Alliance released national guidelines for suicide postvention titled *Responding to Grief, Trauma, and Distress after a Suicide* (National Action Alliance for Suicide Prevention Survivors of Suicide Loss Task Force, 2015). The document defines postvention as the following:

> [A]n organized response in the aftermath of a suicide to accomplish any one or more of the following:
>
> - To facilitate the healing of individuals from the grief and distress of suicide loss
> - To mitigate other negative effects of exposure to suicide
> - To prevent suicide among people who are at high risk after exposure to suicide. (National Action Alliance for Suicide Prevention Survivors of Suicide Loss Task Force, 2015, p. 5)

In 2018, the second edition of the popular *After a Suicide: A Toolkit for Schools* was released by the Suicide Prevention Resource Center, Education Development Center, and the American Foundation for Suicide Prevention. The toolkit has been endorsed by the National Association of School Psychologists, The National Association of Secondary

School Principals, and the American School Counselor Association. Together, these two documents outline consensus recommendations in suicide postvention. The documents emphasize having a postvention plan, working with community stakeholders, safe messaging practices, identifying vulnerable individuals, and providing both short-term and long-term psychosocial support.

In the school context, postvention support is often deployed in hopes of preventing the 'clustering' or 'contagion' of suicide among young people. A suicide cluster is defined as "an excessive number of suicides occurring in close temporal and/or geographic proximity" while contagion is defined as "the process by which one suicide facilitates the occurrence of a subsequent suicide" (Insel & Gould, 2008, p. 293). Recent research has provided preliminary evidence to support the claim that assortive relating (i.e., that high risk teens associate with each other and are thus exposed to share risk factors) is not sufficient to explain the clustering of adolescent suicide (Insel & Gould, 2008; Randall, Nickel, & Colman, 2015). Research estimates that suicide clusters account for 1% to 5% of youth suicides (Insel & Gould, 2008). A review of the literature finds support from a variety of methods that clustering is consistent with a social modeling hypothesis in which behavior is learned through modeling (either direct modeling, second hand modeling, or via the media; Insel & Gould, 2008). Qualitative research suggests that messages regarding suicide are 'rekeyed' following peer suicide in a way in which "new meanings reinterpreted broadly shared adolescent experiences (exposure to pressure) as a cause of suicide facilitating youth's ability to imagine suicide as something someone *like them* could do to escape" (Abrutyn, Mueller, & Osborne, 2019, p. 1, emphasis in original).

The issue of contagion from media exposure to suicide has received formal research attention since at least 1974 when sociologist David Phillips coined the term 'the Werther Effect" (Phillips, 1974). *The Sorrows of Youth Werther* by Goethe, written in 1774, depicts the suicide of the main character. This fictional suicide was reported to have led to increased suicides using the same method following its publication (Phillips, 1974). Since then, two cases in media contagion have received particular attention: the death of actor and comedian Robin Williams and the release of the Netflix series *13 Reasons Why*. A recent time-series analysis estimates suicide rates increased 9.85% (an increase of 1,841 suicides over the expected number) following the widely publicized suicide of Robin Williams (Fink, Santaella-Tenorio, & Keyes, 2018). Research has estimated that there were 195 more suicides than expected for the time period among young people ages 10-17 following the release of *13 Reasons Why* (Bridge et al., 2019). Additional research has documented that following the release of 13 Reasons Why, Google searches for "how to commit suicide" were 25% higher than expected (Ayers, Althouse, Leas, Dredze, & Allem, 2017). Research on suicide clustering has led to the publication of multiple best-practice, safe-messaging guidelines for both schools and the media following a suicide (Suicide Prevention Resource Center, Education Development Center, & the American Foundation for Suicide Prevention, 2018; www.reportingonsuicide.org). The extent to which these guidelines have been adopted is unclear.

Recent Measurement Advances in Suicidology

Although measurement and sound psychometric analyses are central to the validity and replicability of psychological science, these topics often do not receive the

attention from applied researchers that is relative to its importance (see Fried & Flake, 2018 for recent commentary). The field of suicidology faces a host of measurement challenges, many of which have been discussed in the preceding sections. These include low base rates precluding strong predictive validity of measures, (Carter & Spittal, 2018; Belsher et al., 2019; Pokorny, 1983), low base rates contributing to underpowered studies, the variability of definitions and constructs under the umbrella of 'suicidality' (Crosby, Ortega, & Melanson, 2011; Klonsky, May, & Saffer, 2015), the compromises of using proxy measures of suicide in research (ideation, plans, attempts; Klonsky, May, Saffer, 2015), and that risk-factor research has not proven sufficiently specific or predictive of attempts or death (Franklin et al., 2017). Many of these concerns have been discussed in the scientific literature since at least the 1950s and are now generally known in the research community (Rosen, 1954; Klonsky, May, Saffer, 2015). The following paragraphs discuss examples of research measurement advances in suicidology and other related measurement advances that may prove beneficial for the study of suicide.

As in other areas of psychology, suicide researchers are beginning to pay increased attention to upholding (and subsequently, reporting) current standards of measurement practice and the consequences of questionable research practice in general and questionable measurement practices specifically (see Borsboom, 2006; Fried & Flake, 2018 for a review of current measurement shortcomings). Higher standards for measurement use have led researchers to challenge the properties of commonly used scales and measurement practices in suicidology (Miller, Lee, & Nock, 2015). For example, Harris, Lello, and Wilcox (2017) point out that most commonly used measures of suicide risk assessment use dichotomous or trichotomous scaling. The authors point

out that this not only goes against decades of psychometric research on best practices in scaling, but also ignores the substantial amount of research suggesting suicide-related thoughts, feelings, and behaviors exist on a wide-spectrum (Harris, Lello, & Wilcox, 2017). Researchers have also questioned the wide-spread use of suicide assessment measures before substantial validity evidence has been accumulated (e.g., the C-SSRS; Giddens, Sheehan, & Sheehan, 2014).

Many assessment measures use single-item self-report responses to measure ideation, plans, and attempts (Miller, Lee, & Nock, 2015). Statistical simulations of this practice have found substantial levels of misclassification – thus reducing statistical power and increasing the likelihood of false conclusions (Miller, Lee, & Nock, 2015). These assessments often do not include definitions of the terms (e.g., suicide attempt) and include specifiers (e.g., *seriously* thought of killing myself) that may be interpreted differently across individuals and populations. Adding follow up questions significantly improved the classification of single-item self-reports (Miller, Lee, & Nock, 2015). A related practice has been to measure suicide risk with one item on a larger scale (e.g., the HAM-D), again going against psychometric best-practice. Importantly, the suicide item on the HAM-D has not been evaluated for monotonicity – that is, examining whether the amount of latent factor increase with each step of the response scale (Harris, Lello, & Wilcox, 2017).

As discussed above, the positive predictive values (PPVs) of suicide risk assessments are far too low to be clinically meaningful and are inherently limited by the low base rate of suicide (Carter & Spittal, 2018; Belsher et al., 2019; Pokorny, 1983). However, the applicability of PPVs to suicide prevention research has recently been

strongly challenged – arguing that the confounding effect of intervention makes PPVs of suicide risk assessments uninterpretable (Thorell, Wahlin, & Ranstam, 2019). For example, if a person scores highly on a risk measure, they receive suicide prevention services – which if they are successful – lower the PPV by keeping the person alive. Thus, low PPVs could be interpreted as showing successful suicide prevention services. As withholding services from high risk individuals is obviously unethical, the only feasible way to account for this confound would be to integrate the effectiveness of the suicide prevention measures in the model – so far, such a model does not exist (Thorell, Wahlin, & Ranstam, 2019).

Another working assumption in suicidology that has been recently challenged is the existence of suicide risk on a behavioral pathway model where risk increases across the ordered categories of ideation, plans, and attempts (Harris, Lello, & Wilcox, 2017). A recent study evaluating this model (scaled: 1 = "Never"; 2 = "It was just a brief passing thought"; 3 = "I have had a plan at least once to kill myself but did not try to do it"; 4 = "I have had a plan at least once to kill myself and really wanted to die"; 5 = "I have attempted to kill myself, but did not want to die"; 6 = "I have attempted to kill myself and really hoped to die") for monotonicity showed that this model did not fit the data. Rather, monotonicity was obtained only when items 4 and 5 were switched in order – suggesting that a plan with high intent was more predictive than an attempt with low intent (Harris, Lello, & Wilcox, 2017).

Self-reports of discrete behaviors (i.e., attempts) also pose a number of measurement challenges (Miller, Lee, & Nock, 2015). A recent study of military services members ($N = 984$) found very inconsistent reporting (35.4%) of past attempts across five

attempt history measures (Hom et al., 2019). Possible explanations include variability in how attempts are defined (or not explicitly defined) and operationalized in items, variability in fear of disclosing mental health concerns in military settings, and lack of careful reading and/or responding (Hom et al., 2019). Two other findings from this study are of note. First, the inconsistencies in responding were not largely due to differences between self-report and interview measures (Hom et al., 2019). Second, service members who most consistently reported suicide attempts were at higher risk – suggesting that consistent reporting might be a sign of increased risk in this population (without suggesting that the inverse is true; Hom et al., 2019).

Advanced measurement techniques are also beginning to be more frequently applied in suicidology. These include network psychometrics, confirmatory factor analytic techniques, and item response theory – each of which are discussed with examples below.

Network psychometrics conceptualizes psychopathology as an interconnected network of symptoms (see Borsboom & Cramer, 2013 for review). This approach has a number of theoretical and applied advantages. For example, it has been argued that the network approach is more a theoretically defensible conceptualization of psychopathology versus traditional latent variable approaches (i.e., that symptoms are interconnected and influence each other rather than modeled as independent symptoms caused by a latent construct). Network models with time-series data allow the examination of how symptoms influence each other. For example, a network model of depression over time might show that fatigue leads to insomnia, which leads to concentration problems, which leads to anhedonia, which leads to suicidal ideation (Fried

et al., 2017). Network models can differentiate symptoms by centrality – i.e., how connected a node is – and could be used clinically to choose which symptom to target first in treatment (Fried et al., 2017). Networks can also be used to quantify 'tipping points' in which a symptom network activates – which may be clinically useful in the prevention of psychopathology (Fried et al., 2017). Networks of multiple kinds of psychopathology can also be used to examine the presence and potential development path of comorbid conditions (e.g., "chronic worry [generalized anxiety disorder (GAD)] → sleep problems (GAD/MDD) → fatigue (GAD/MDD) → depressed mood (MDD)"; Borsboom & Cramer, 2013, p. 97). Recent methodological advances (and their application in the free R statistical software) have greatly increased the use of network techniques (see Epskamp, Borsboom, & Fried, 2017; Jones, Mair, & McNally, 2018 for a tutorials). Latent variables can also be combined with network techniques in addition to symptoms (Epskamp, Rhemtulla, & Borsboom, 2017). Network models of attitudes and attitude change have also been recently developed, but have not yet been applied to suicide-related attitudes (Dalege et al., 2016; Dalege, Borsboom, van Harreveld, & van der Maas, 2017).

A network approach to suicidality has been conceptually explored by de Beurs (2017), who also describes a number of forthcoming network analyses on suicidality using large databases. Network analysis has also been applied to the Beck Depression Inventory-II (BDI-II), which includes one item on suicidal thoughts (Bringmann, Lemmens, Huibers, Borsboom, & Tuerlinckx, 2015). This study found a network structure in which suicidality had a high outdegree (likely to trigger other symptoms) and low indegree (not likely to be influenced by other symptoms) – which provides further

support to the idea that suicidality should be a direct treatment target (Bringmann, Lemmens, Huibers, Borsboom, & Tuerlinckx, 2015; Bryan & Rudd, 2018). Network analysis has also been applied to the construct of acute suicidal affective disturbance (ASAD) in hopes of improving prediction and clinical care of acutely suicidal states (Rogers, Hom, Joiner, 2019). The combination of network analysis and ecological momentary assessment (EMA) study designs in which participants give frequent (typically multiple times a day) self-report responses via mobile phones or other technology may prove especially insightful for suicide risk research but has largely been neglected in suicidology (Davidson, Anestis, & Gutierrez, 2017; Hallensleben et al., 2018).

Confirmatory factor analysis (CFA) provides a sophisticated toolkit for examining psychometric properties and for constructing measures (Brown, 2015). For example, in suicidology, CFA has been used to examine a number of constructs and measures including ASAD (Stanley, Rufino, Rogers, Ellis, & Joiner, 2016), hotline risk assessment (Witte et al., 2010), and the Thwarted Belongingness Scale (Ma, Batterham, Calear, & Sunderland, 2019). One area that has not yet received sufficient attention in suicidology is the examination of measurement invariance properties of commonly used suicide measures. Measurement invariance analyses whether measures perform the same across groups (e.g., men, women) and/or across time points and can be examined with CFA. For example, De Beurs, Fokkema, de Groot, de Keijser, & Kerkhof (2015) found that the Beck Scale for Suicide Ideation was invariant over time (3 months), thus providing psychometric evidence that the measure may be used in longitudinal assessments. CFA can also be used to improve measurement accuracy by creating factor scores versus sum

scores (i.e., where each item contributes a different weight to the total score versus simple addition where each item contains the same weight). Factor scores may be especially important to suicidality. Consider, for example, that an endorsement of the question about suicidal thoughts on the BDI-II counts the same amount toward the total depression score as the fatigue item. Additional invariance studies are sorely needed in suicidology; however, CFA techniques typically require large samples sizes and thus sufficient samples are difficult to obtain and, in the past, have required specialized (expensive) software (Brown, 2015). Recent tools have made CFA techniques more accessible (e.g., the *lavaan* package in R; Rosseel, 2012) and packages have also been developed to help applied researchers interpret the practical meaning of measurement invariance (Lai, Richardson, & Mak, 2019) and the calculation of factor scores (Gottfredson, Cole, Giodano, Bauer, Hussong, & Ennet, 2019).

Item Response Theory (IRT) is another advanced psychometric technique that is advantageous in examining scale function at the item level versus the total score level and can be used to improve measure development (see Hambleton & Jones, 1993 for an overview and comparison to classical test theory). IRT was used to develop the Suicidal Affect-Behavior-Cognition Scale (SABCS) – which outperformed a widely-used comparison measure (the Suicidal Behavior Questionnaire – Revised) in multiple areas of test performance (Harris et al., 2015). IRT analysis also showed the SABCS to be invariant across sex, ethnicity, and age (Harris et al., 2015). In another example, IRT was used to develop a scale to measure knowledge about suicide postvention (Nader et al., 2013). This study made use of Rasch models, which can be thought of as one parameter logistic IRT models, that have the special advantage of being able to construct interval-

level measures (i.e., where the score difference between 1 and 2 is the same as 2 and 3 – rather than the ordinal measurement obtained by other measurement approaches; see Bond & Fox, 2015 for a comprehensive review of Rasch models). Rasch techniques might be able to not only rank subjects by risk – but to potentially quantify *how much more or less* at risk one person is than other. The further application of IRT and Rasch techniques hold significant promise in improving measurement in suicidology. For example, IRT information functions can be used to examine whether a scale performs best in low, medium, or high suicide levels. In addition to scale information levels and measurement invariance, IRT can be used to examine which items have the greatest ability to differentiate participants and how the response options perform. IRT can also enable computer adaptive testing (CAT), which can shorten measures and reduce the response burden on participants. A CAT simulation study using the Dutch version of the Beck Scale for Suicide Ideation, for example, has shown promise (de Beurs, de Vries, de Groot, de Keijser, & Kerkhof, 2014). Like CFA, IRT generally requires large sample sizes and used to require specialized software. However, a number of R packages are now available to implement IRT analysis (e.g., the *mirt* package Chalmers, 2012 and the *ltm* package, Rizopoulous, 2006).

Taxometric analyses have also recently gained traction in suicide research. Taxometric analyses attempt to determine whether a latent variable is continuous (i.e. dimensional, as commonly assumed in psychology) or categorial (i.e. taxonic). Recent analyses suggest that suicide may be taxonic in adults (Rufino, Marcus, Ellis, & Boccaccini, 2018; Witte, Holm-Denoma, Zuromski, Gauthier, & Ruscio, 2016). However, at least one analysis has found evidence of a dimensional structure for

adolescent suicide (Lui, Jones, Spirito, 2015). Rufino, Marcus, Ellis & Boccaccini (2018) point out that the study by Lui, Jones, & Spirito (2015) has a number of limitations compared to their own including a small sample size, only including depressed adolescents, and an over-reliance on suicidal ideation for a marker of risk. The adult studies found evidence of a two-category structure that shows a low risk and a high-risk taxon. If this pattern holds, risk assessment and treatment allocation might be greatly improved by focusing on the high-risk group membership (Rufino, Marcus, Ellis, & Boccaccini, 2018). This finding also may map on to a network psychometric structure with a 'tipping point' that rapidly switches between a low-risk pattern and a high-risk pattern. Identifying this tipping point and basing treatment on this transformational process could prove especially valuable, but more research is needed.

The measurement of 'suicide adjacent' constructs (i.e., hopelessness, perceived burdensomeness, treatment fidelity, attitudes) is also rightly receiving attention in suicide research. One area that has hampered suicide research is the inadequate measurement of attitudes related to suicide. For example, a systematic review of measures of attitudes toward suicide by Kodaka, Postuvan, Inagaki, & Yamada (2011) identified 18 scales – none of which have strong validity evidence. Similarly, various aspects of suicide attitudes are often measured in pre-post designs evaluating suicide prevention gatekeeper trainings (Torok, Calear, Smart, Nicolopoulos, & Wong, 2019). However, the specific aspect of attitudes (i.e., attitudes toward suicide, toward suicidal people, toward those who self-injure, toward perceived helping capability, toward conducting risk screening, toward specific prevention strategies) is inconsistent across studies and often measured using single item measures or scales without sufficient validity evidence (Torok, Calear,

Smart, Nicolopoulos, & Wong, 2019). The Stigma of Suicide Scale (SOSS) is an example of a more recently developed scale in this area that has established better psychometric qualities than measures in the past (Batterham, Calear, & Christensen, 2013).

A recent poll weighted to be nationally representative of US adults examines attitudes toward suicide prevention (American Foundation for Suicide Prevention & National Action Alliance for Suicide Prevention, 2018). This poll represents a significant advancement in quantifying these attitudes due to its national weighting. Encouragingly, 94% of adults feel that suicide can be prevented at least sometimes and 90% feel that something can reduce the number of suicides (e.g., more research, education, better access to mental healthcare; American Foundation for Suicide Prevention & National Action Alliance for Suicide Prevention, 2018). However, 20% at least somewhat agree that if someone wants to die by suicide, there is nothing anyone can do to help them and 36% at least somewhat agree that only clinical professionals can help someone who is suicidal (American Foundation for Suicide Prevention & National Action Alliance for Suicide Prevention, 2018). Future advances in this area could track change over time, use multiple item (scale) measurement techniques, and track differences between demographic groups. For example, attitudes across professional groups (physicians, psychotherapists, principals, teachers) could be examined to investigate the role these attitudes play in providing care to suicidal individuals. Although the examination of the role attitudes play in the implementation of evidence-based interventions has begun to be measured further investigation in this area should be applied to evidence-based treatments for suicide risk (Aarons et al., 2010). This may prove and important line of

work given the lack of providers who provide evidence-based psychotherapy for suicidal individuals.

Implementation Science in Schools

While researchers have made meaningful gains toward establishing a variety of interventions as effective and/or efficacious across clinical fields, translating these findings into routine practice has proven challenging (Balas & Borne, 2000; Rousseau & Gunia, 2016). Implementation science is the study of strategies to promote the uptake of research-based practices into routine care (Eccles & Mittman, 2006). A number of general frameworks have been proposed to organize the factors that appear to be important for driving implementation efforts (e.g., Bertram, Blase, & Fixen, 2015; Glasgow, Vogt, & Boles, 1999) Specific efforts regarding the application of implementation science to school psychology have also been made (Forman, et al., 2013; Han & Weiss, 2005; Kratochwill & Shernoff, 2003; Owens, 2014). Two prominent research centers in the United States also focus heavily on school-based implementation science for mental health practices: The National Center for School Mental Health (NCSMH) at the University of Maryland School of Medicine and the School Mental Health Assessment Research and Training Center (SMART Center) at the University of Washington. Some interventions, like PBIS, have national technical assistance centers funded through the US Department of Education (see www.pbis.org) to increase uptake and implementation. For example, with the support of national and regional technical assistance centers, PBIS has been implemented in approximately 36,000 schools nationwide since 2000 (OSEP Technical Assistance Center on Positive Behavioral Interventions and Supports, 2019).

Glasgow, Vogt, and Boles (1999) developed a framework that both outlines important implementation factors while simultaneously making clear the tremendous challenged posed to those implementing evidence-based practices in schools. There RE-AIM model examines five factors: Reach, Efficacy, Adoption, Implementation, and Maintenance. The challenge of effective implementation can be shown by assigning percentages to each category and multiplying R x E x A x I x M. In their introduction to a special issue on implementation in special education, Cook & Odom (2013) outline the following example of the RE-AIM model:

> Imagine, for example, that a school district adopts an EBP for its students with learning disabilities in elementary schools. District personnel are understandably excited to begin the new year by rolling out a practice that has been shown by multiple, high-quality studies to meaningfully improve outcomes for, say, 95% of elementary children with learning disabilities. However, only 80% of elementary schools agree to participate in the project (reach). Further, given problems related to training, planning and instructional time, and reluctance to adopt new practices, only 70% of teachers within targeted schools end up using the practice at all (adoption). Due to sometimes ineffectual training and lack of ongoing support, perhaps only 60% of teachers who adopt the practice implement it with fidelity; and only 50% of those maintain their use of the practice over the entire school year. In this scenario, actual impact is calculated as
>
> .95 (efficacy) x .80 (reach) x .70 (adoption) x .60 (implementation) x .50 (maintenance) = .16

> In other words, due to problems at various levels of implementation, the EBP actually had the desired impact on slightly less than 16% of elementary students with learning disabilities—a far cry from the rosy 95% efficacy that district administrators found so attractive.

It is from within this context that implementation science seeks to understand the practices that increase impact. One variable thought to play a role across the RE-AIM implementation factors is the role of leadership/principal support, which is discussed below.

The Role of Attitudes of Principals / Leaders

The role of leadership support has been theorized to be a key implementation variable in both the suicidology literature and in the school mental health field (Covington et al., 2011; Forman et al., 2012; Hogan & Grumet, 2016). One challenging aspect of this work is the difficulty of obtaining accurate, quantitative measurement of leadership support broadly and of the specific factors that may be malleable enough to increase this support. One entryway into this challenge is the examination (and measurement) of the attitudes of key stake holders and whether implementation can be adapted to their attitudes to increase the likelihood of successful implementation. As noted in the introduction, emerging research in school-based mental health implementation suggests that attitudes seem to influence implementation success and can be modified as part of the implementation process (Cook, Lyon, Kubergovic, Browning Wright, & Zhang, 2015; Lyon et al., 2019). The SPARS aims to be a tool to increase the quality of research in this area, specifically regarding the implementation of school-based suicide prevention practices.

In the current study, principals were chosen as the population of interest due to the confluence of research in suicide prevention and school-based implementation science that suggests leadership support is a key variable for successful implementation (Covington et al., 2011; Forman et al., 2012; Hogan & Grumet, 2016). Principals hold tremendous power in the school context across multiple areas relevant to implementation science: Funding allocations, accountability structures, providing professional development opportunities, establishing and communicating a vision of success and/or an adaptive interpretation of challenges, and setting priorities for the school (see Owens et al., 2014 for a discussion of specific school-based implementation science factors and challenges). Targeting administrator attitudes may be especially beneficial given their influence over a wide range of implementation factors. Future research could additionally examine whether changes in principal attitudes influence changes in the attitudes of front-line staff (i.e., teachers). Such research would need to additionally measure whether attitude changes at either level 1) influences implementation variables and 2) leads to improve student outcomes.

CHAPTER 3

METHOD

Overview

This study undertakes the development and initial validation study of the Suicide Prevention Attitudes Rating Scale (SPARS) by employing the scale development methods described by DeVellis (2017) and McCoach, Gable, & Madura (2017). Although the texts differ in how they divide the tasks of scale construction (DeVellis uses an eight-step model; McCoach, Gable, & Madura use a 13-step model), the two methods overlap substantially and complement each other in outlining sound practice in scale development. The process detailed below borrows heavily from both texts. The data analyses rely primarily on factor analytic methods, however descriptive statistics and IRT techniques are also applied. Below, the methods of item development, data collection, item analysis, and measure validation are described.

The methods outlined below describe the process through which initial validity evidence regarding the SPARS was collected and assessed. *The Standards for Educational and Psychological Testing* outlines five sources of validity evidence: Evidence based on test content, evidence based on response processes, evidence based on internal structure, evidence based on relations to other variables, and evidence for the validity and consequences of testing (AERA, APA, NCME, 2014). The sections below detail the connections between the above methods and the first four sources of validity evidence. This study will not collect evidence on the fifth aspect of validity evidence (consequential validity) as the SPARS is too early in development to empirically assess the consequences of its use. However, hypotheses regarding potential consequential

issues arising from its use will be explored in the discussion section of the study. The first four areas of validity evidence discussed below correspond to the four questions investigated stated in Chapter 1.

Item Development

Item development and refinement is an iterative process that includes gathering information from multiple sources. For the development of the SPARS, the process of item development included a thorough literature review, item drafting, expert review, and response-process cognitive interviews. Each of these methods is discussed below.

The literature review, conceptual definitions, and item drafting form the foundation for content validity. Content, here, is defined as "the themes, wording and format of items, tasks, or questions on a test" (AERA, APA, NCME, 2014, p. 14). An expert review served to test the degree of evidence based on test content – in particular by evaluating whether the items are representative and relevant to the construct of attitudes toward suicide prevention, as well as their degree of certainty that each item represents the construct. Furthermore, experts were asked to provide feedback on the wording of individual items and whether they believe any potentially important items are missing. Agreement of the experts on individual items and the scale as a whole were used to examine evidence of content validity.

Literature Review

The process of an in-depth literature review on youth suicide, and in particular on school-based youth suicide prevention efforts, informs item construction for the SPARS. This review is presented in Chapter 2. The literature review helps multiple purposes. First, the literature review serves to ensure that the construct has been accurately defined,

operationalized, and contextualized for use in the measure – and in turn, that the construct as it appears in the measure reflects both the conceptual and empirical literature in suicidology. Secondly, existing measures within the field of suicidology were reviewed for both their strengths and short comings. Lastly, the literature review informs the need for, and potential impact of, a new measure to quantify attitudes toward suicide prevention. Given the wide-spread nature of such a review, a narrative review method was used – accessing literature from online academic search engines, government and non-profit reports, treatment manuals, and backwards searches from relevant reference lists.

Construct Definitions

Attitudes, as discussed at length in Albarracín, Johson, and Zanna (2005), are defined as a tendency to evaluate the object or construct under consideration with some degree of positive or negative regard (see also, Eagly & Chaiken, 1993). Although the concept of an attitude is related to that of a belief, for the purposes of this study, beliefs are differentiated from attitudes by their lack of an evaluative component. That is, beliefs are conceptualized to be held on a continuum from no belief to strong belief, not a negative view to a positive view. Both attitudes and beliefs are also considered different from affective states for the purposes of this study. Although affect might have an evaluative component, affect is specifically tied to the experience of various emotional responses. However, attitudes, beliefs, and affective states can all substantially overlap and/or influence each other (Albarracín, Johson, & Zanna, 2005; McCoach, Gable, & Madura, 2017).

While measures of attitudes toward suicide itself exist, attitudes toward suicide

prevention is conceptualized as a related yet distinct construct. For example, it is conceivable that one holds a sympathetic view of suicidal individuals but also negatively evaluates suicide prevention efforts as ultimately inconvenient and fruitless. Conversely, one could hold highly stigmatizing views of suicidal individuals yet also feel that efforts aimed at preventing their death are good for society.

With the above considerations in mind, suicide prevention was initially defined for this project as *any action(s) with the ultimate aim of reducing suicidal ideation or suicidal behaviors*. Suicidal ideation is defined as "thoughts of engaging in suicide-related behavior" and suicidal behaviors as defined as "behaviors related to suicide, including preparatory acts, suicide attempts, and deaths" (US Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012, p. 14). Attitudes toward suicide prevention were initially defined for this study as *an individual's tendency to hold positive or negative evaluations toward suicide prevention in general.*

This study attempts to create a unidimensional scale of the above construct for three reasons. Firstly, the measure aims to be brief and thus comprised of relatively few items. The inclusion of additional dimensions would potentially add considerable length to the measure and negatively impact its usability in busy organizational contexts like schools. Secondly, a theoretical framework for attitudes toward suicide prevention as a multi-dimensional construct has not yet been articulated in the literature. The one measurement project in the area also used a unidimensional structure and obtained acceptable levels of internal consistency (Herron, Ticehurst, Appleby, Perry, & Cordingley, 2001). Lastly, the initial development of a unidimensional construct (in the

absence of a literature to suggest otherwise) will allow for the most parsimonious exploration of the construct.

Item Drafting

In drafting the initial item pool, attention was given to best practices in item design including avoiding double-barreled questions, avoiding double negatives, using straight-forward language, avoiding leading questions, and avoiding questions for which response options would be illogical or ambiguous (Krosnick, Judd, & Wittenbrink, 2005; Wolfe & Smith, 2007). As is typical of attitudinal research measures, a Likert-style response option was chosen for use in the SPARS. In summarizing the research on the appropriate number of response options in Likert scaling, McCoach, Gable, & Madura (2017) recommend no less than five response categories and no more than eleven, with the advantages of higher numbers leveling off at seven categories. It seems reasonable that some respondents may not have developed positive or negative evaluations of all attitudes toward suicide prevention represented in the items. Thus, a middle "neither agree nor disagree" option was included. The Likert response categories used in the SPARS are as follows: (1) *very strongly disagree*, (2) *strongly disagree*, (3) *disagree*, (4) *neither agree nor disagree*, (5) *agree*, (6) *strongly agree*, (7) *very strongly agree*. An initial item pool was drafted from the literature review and construct definitions to meet the above specifications.

Expert Review

Twenty-six experts in suicide prevention were contacted via email to complete a review of the items. Six experts completed the review. Experts were defined as those having published in suicidology, and/or have significant clinical experience with suicidal

clients, and/or meaningful involvement in national suicidology organizations like the American Association of Suicidology. Using the online survey tool Qualtrics, experts were asked to provide feedback on the definition of the construct, whether items cover the full range of the construct, and suggestions for improving items. Using the sample questions and the sample content validity survey format adapted from McCoach, Gable, & Madura (2017), experts in suicide prevention rated their degree of certainty that the item represents the construct and the degree of relevance of the item. The content validity form used in this study can be found in Appendix A.

Descriptive statistics were calculated from the expert responses. The degree of certainty that the item represents the construct was calculated as the percentage of experts rating the item either a 3 or a 4 (out of four) using the Content Validity Index method at the item (I-CVI) level and scale (S-CVI/Ave) level (Polit & Beck, 2006). I-CVI is an average at the item level of how experts rate the relevance of each item. S-CVI/Ave is the average of the percentage of items from the scale rated as relevant by the expert reviewers. Following the recommendations of Polit, Beck, and Owen (2007), any I-CVIs of less than 0.78 were considered for revision and removal and a final S-SVI/Ave of 0.90 or greater was considered excellent. Polit, Beck, and Owen (2007) point out that the CVI has been criticized as not accounting for chance agreement. To account for chance agreement, Polit, Beck, and Owen (2007) calculated a modified multi-rater *kappa* coefficient (k^*) to measure agreement of a certain type (i.e., agreement on the relevance) accounting for chance. In a series of simulations, they found that differences between I-CVIs and k^* were mostly negligible, especially when there were 5 or more raters (Polit, Beck, & Owen, 2007). Accordingly, k^* was not calculated for this development study.

Responses to open answer questions in the content validity form were examined. All expert rater feedback regarding item issues were thoroughly considered by the researcher.

Cognitive Interviews

Expert agreement on adequate evidence of content validity does not ensure subjects will interpret and respond to items as intended. By engaging a small sample of school principals in a cognitive (or 'think aloud') response process protocol, data can be obtained on how items and responses are understood in the moment by the respondent. The cognitive interview process also collects data on the user friendliness of the measure – including acceptability, formatting, and readability. Evidence of response process validity is established when the respondents read, interpret, and respond to the questions as intended.

Pre-pilot testing was conducted to collect evidence regarding response process validity from five local principals using convenience sampling. Response process validity can be conceptualized as the degree of "fit between the construct and the detailed nature of the performance or response actually engaged in by the test takers" (AERA/APA/NCME, 2014, p. 14). The cognitive interviewing method was used to generate data regarding how the intended population might respond to the measure's items (Peterson, Peterson, & Powell, 2017). Data collection in this phase will consisted of cognitive interviews while respondents read over the measure while they verbalized their thoughts and ended with semi-structured exit questions. Exit questions included inquiries about readability, unclear items, and measure length. Respondents were recruited from a convenience sample of school administrators in Massachusetts. Peterson, Peterson, and Powell (2017) recommend a sample size of $N = 5$ to $N = 15$ for cognitive interview

response process data collection. This phase of data collection can be thought of as a means of checking for "misalignment between participant interpretation and the developer's intentions and to identify ways to modify those items based on participant response" (Peterson, Peterson, & Powell, 2017, p. 217). Items that do not function as expected were identified for potential modification or removal. If the principals felt something important was left out, additional items were written. The cognitive-interview protocol can be found in Appendix B and the cognitive-interview measure viewed by the principals can be found in Appendix C.

Data Collection

Sampling Frame

The study sample was recruited from a publicly-available contact list of all public-school administrators in California maintained by the CA Department of Education. All principals from the above list were invited to participate via email. The sampling frame consisted of $N = 10{,}518$ administrators. California was chosen because of a combination of its publicly available contact list, large number of schools, and racial, economic, and political diversity. Although California has a slightly below average annual age-adjusted incidence rate of suicide of 10.24 for every 100,000 people (national average is approximately 12.26), this average obscures substantial variability at the county level (CDC WISQARS, 2018). County level rates in CA range from a low of 6.68 to a high of 29.51 (CDC WISQARS, 2018). This range is very similar to the national range by state (6.19 to 22.90; CDC WISQARS, 2018). Thus, California provides an ideal state to capture a large yet highly variable sample on a variety of important dimensions.

Given that much of school-based suicide prevention work happens in middle and

high schools and given the suicide rate increases dramatically starting at 12 years old, it might be argued that the measure should be targeted toward middle and high school administrators only; however, elementary school principals were included for three key reasons. Firstly, elementary schools can and do have important roles to play in suicide prevention. Although the research data to date is slim, it is hypothesized that implementation of positive behavioral supports, social emotional learning programs, family outreach, and prevention programs (especially those targeting depression) might prevent future suicide. This hypothesis is bolstered by a randomized controlled trial of the Good Behavior Game in elementary school that led to reduced suicide attempts in adolescence (Wilcox et al, 2008). Secondly, although very rare, acute suicide risk does exist in elementary schools. For example, 59 children 11 years old and younger died by suicide in 2017 (CDC WISQARS, 2018). Lastly, the larger sample will allow for greater confidence in the psychometric analysis, potentially provide a wider response spread, and allow for the potential analysis of the attitudinal differences between the populations.

Recruitment

All principals from the sampling frame were emailed an invitation to participate in the research via the Qualtrics online platform. Principals were sent follow up emails at one week, two weeks, three weeks, and four weeks following the initial email to increase response rates. At the completion of the survey, respondents were able to choose to enter their contact information to enter a raffle for a chance to win one of four $100 Amazon gift cards. Contact information was not linked to the responses of the research survey to help maintain anonymity. Respondents were also offered the contact information for the National Suicide Prevention Lifeline throughout the survey. No other clinical follow up

was made available to participants due to the large sample.

Sample Demographics

In total, 342 administrators completed the survey. This is roughly equal to a 3% response rate, which is quite low. Current heuristics suggest at least a 50% response rate, with some suggesting 80% or greater to increase confidence in the results (Baruch & Holtom, 2008). Of the 342 administrators, 307 were principals. The 307 principals form the sample for study analysis. Respondents were asked to report their gender, race, years as a principal, number of hours of suicide prevention training received, if they have experienced a suicide of a student or someone close to them other than a student, and to select from a list of suicide prevention practices that are currently in place at their school. Sample demographics are provided below in Table 1. Table 2, discussed below, shows the available population demographics for CA administrators for comparison. Table 3 shows a breakdown of which suicide prevention practices are in place at the principals' schools. The data on school practices suggest that practices to target for increased uptake include written policies for responding to suicide, involving students, involving parents, and sharing safe gun storage information.

Table 1: Sample Demographics, N = 307

Category	*n*	%	Mean	S.D.
Male	176	57.30	--	--
Female	130	42.30	--	--
White	206	68.40	--	--
Latino / Hispanic	63	20.90	--	--
Black	11	3.32	--	--
Asian	6	1.99	--	--
Experienced suicide of a student	127	41.40	--	--
Experienced a suicide of a non-student	142	46.30	--	--
Years as principal	--	--	7.63	5.89
Hours of suicide prevention training received	--	--	9.20	14.98
Number of suicide prevention practices	--	--	5.54	2.23
Elementary (grades 1-5)	107	34.86	--	--
Middle (grades 6-8)	50	16.29	--	--
High (grades 9-12)	62	20.20	--	--
Other grade configuration	88	28.7	--	--

Note: Gender and race categories with $n < 5$ are not displayed to preserve the anonymity of the sample.

Accurate principal demographic data for the state of California are not publicly available. However, demographic information for the larger category of 'administrators' in CA is publicly available via the website of the CA DOE. Table 2 presents demographics for all CA administrators who are coded as having a Full Time Employment (FTE) designation greater than 0. While these demographics are not directly comparable with the study sample, they are the closest approximation available. The study sample is more heavily male and has less African American respondents than the

rough population demographic comparison. The study sample also has a less experienced (measured in years served) make up than the administrator comparison, but this is likely due to the administrator category potentially including more senior positions beyond principals.

Table 2: CA Administrator Demographics, N = 26,861

Category	*n*	%	Mean	S.D.
Female	17,017	63.30	--	--
Male	9,851	36.7	--	--
White	16,017	59.6	--	--
Latino	6,042	22.5	--	--
African American	2,009	7.5	--	--
Asian	1,132	4.2	--	--
Not Reported	909	3.4	--	--
Multi-Racial	249	0.9	--	--
Native	144	0.6	--	--
Pacific Islander	74	0.5	--	--
Years of service	--	--	17.3	9.1

Note: Administrator demographics are not directly comparable to study principal demographics as administrators include positions other than principal. Limitations in the data do not allow for the separation of principals from the administrator category. *Source: CA DOE (2019).*

Table 3: Prevention Practices in Place, N = 307

Type of practice currently in place	Count	%
Referrals for students in need of counseling	297	96.7
Mental health professional trained in suicide risk assessment	264	86.0
School and/or district crisis team	241	78.5
Written suicide risk assessment protocols	225	73.3
Teachers receive suicide prevention training	166	54.1
Universal social-emotional learning curriculum	165	53.7
Written procedures for responding to a suicide	121	39.4
Students receive suicide prevention training	92	30.0
Most students are screened for depression	51	16.6
Most students are screened for suicidality	36	11.4
Parents receive suicide prevention training	35	11.4
Sharing safe gun storage information with parents	9	2.9
None	1	0.3

Measures

To investigate the validity evidence based on relations to other variables, this study investigates the relationship of the SPARS to three other latent variables: Stigma toward suicide (using the Stigma of Suicide Scale – Short Form Stigma Subscale), knowledge about suicide (using the Literacy of Suicide Scale – Short Form), perceived mental health stigma (using the Stigma-9 Questionnaire).

Stigma of Suicide Scale (SOSS – Short Form Stigma Subscale)

To investigate discriminant validity, the survey included a scale to measure the related but distinct construct of suicide stigma. The short form stigma subscale of the Stigma of Suicide Scale consists of eight Likert items on a five-point scale from strongly disagree to strongly agree. For example, one item is “In general, people who die by

suicide are immoral" with the response options strongly disagree, disagree, neutral, agree, or strongly agree. The measure has been found to have an alpha of $\alpha = 0.88$ in a sample of university staff and students in Australia, an $\alpha = 0.89$ in a community sample of Australian adults, and an alpha of $\alpha = 0.86$ in a clinical sample of Australian adults (Batterham, Calear, & Christensen, 2013a; Batterham, Calear, & Christensen, 2013b; Batterham, Han, Calear, Anderson, Christensen, 2018). The construct validity of the subscale is evidenced by having an $r = -0.66$ correlation with the converging construct measured in the Suicide Opinion Questionnaire (SOQ) Stigma Subscale, an $r = -0.46$ discriminant correlation with the Depression Stigma Scale, and research findings with the SOSS that show a clinical population having less stigma toward suicide and greater glorification of suicide (negative correlations reflect that the scales are scored in opposite directions; Batterham, Calear, & Christensen, 2013a; Batterham, Calear, & Christensen, 2013b; Batterham, Han, Calear, Anderson, Christensen, 2018). To date, neither the measure as a whole nor the SOSS stigma subscale have been examined with a U.S. population. In the study sample, the SOSS evidenced a unidimensional structure (via a parallel analysis using principal axis factoring) and an alpha of 0.95 (95% CI: 0.94-0.96).

Literacy of Suicide Scale (LOSS – Short Form)

To further investigate discriminant validity, the survey also included the Literacy of Suicide Scale (LOSS – Short Form; Chan, Batterham, Chirstensen, & Galletly, 2014; Batterham, Calear, & Christensen, 2013b; Batterham, Han, Calear, Anderson, Christensen, 2018). The LOSS is a 27-item scale built from 12 items on the Hubbard and McIntosh Revised Facts on Suicide (RFOS) Quiz. The short form of this scale contains 12 questions with the response options of true, false, or do not know. Do not know

responses are scored as incorrect. For example, one item on the measure is "People who talk about suicide rarely kill themselves" with response options of true, false, or don't know. The factor structure of the LOSS has not been examined in the literature, however, the authors state that the items fall into four separate domains (signs/symptoms of suicidality, causes or nature of suicide, risk factors, and treatment/prevention) and use total sum scores in prior research – and thus this convention is followed within the current study (Batterham, Han, Calear, Anderson, & Christensen, 2018).

The Stigma-9 Questionnaire (Stig-9)

The Stig-9 is a nine-item Likert-style questionnaire that captures cognitive, behavioral, and affective components of perceived mental-health stigma. For example, one item states "I think most people consider mental illness to be a sign of personal weakness" with the response options disagree, somewhat disagree, somewhat agree, and agree. Previous research has found that the measure is unidimensional and internally consistent ($\alpha = 88$), evidenced no ceiling or floor effects, and covered a range of item-difficulty (Gierk, Löwe, Murry, & Kohlmann, 2019). In the current sample, the measure had an alpha level of 0.91 (95% CI: 0.89 – 0.92) and scree-plot evidence of unidimensionality.

Power Analysis

The sample size needed for EFA and CFA depends on a large number of characteristics of the data. For example, different combinations in the number of subjects, the number of factors, the number of items, the number of items per factor, and the item variances can all influence model stability (Wolf, Harrington, Clark, & Miller 2013). Wolf, Harrington, Clark, and Miller (2013) conducted a series of simulations and found

that under various EFA models, sample sizes of 30 cases to 460 cases were needed. Many heuristics for appropriate sample sizes have been proposed both in terms of number of participants and in terms of the ratio of participants to items (for EFA) or the number of participants for the number of estimated parameters (CFA/SEM; McCoach, Gable, & Madura, 2017). In reviewing the evidence, McCoach, Gable, and Madura (2017) recommend a minimum sample size of 200 respondents and to aim for a 10:1 ratio of respondents to items when conducting an EFA. DeVellis, also recognizing the complexities of calculating sample sizes for EFA, states that the guidelines proposed by Comrey (1973/2013) are likely appropriate for most scenarios: 100 subjects as poor, 200 as fair, 300 as good, 500 as very good, and 1,000 as excellent. For SEM, Kline (2016) suggests that a 10:1 ratio of respondents to estimated parameters (*N:q*) is the minimum.

A power analysis was conducted to determine the total sample size for both an initial exploratory sample and secondary confirmatory sample. Using the guideline of 10 respondents for 1 item in EFA, a minimum sample size of 100 would be needed (assuming, for simplicity, that the final SPARS has 10 items). However, following the recommendation of McCoach, Gable, and Madura (2017), EFA is safest with a minimum sample size of 200. Assuming the final SPARS consists of 10 items and one latent factor, the model would have 19 estimated parameters and 16 degrees of freedom (9(9+1)/2=16). Following the 10:1 *N:q* guideline, the necessary sample size would be 190. A minimum sample size calculation for whole model Root Mean Square Error of Approximation (RMSEA) with the test-of-close-fit method (see MacCallum, Brown, & Sugawara, 1996) for the above model with an alpha set to $\alpha = 0.05$, the degrees of freedom at $df = 16$, power at 0.80, Null $RMSEA_0 = 0.05$, and the alternative $RMSEA_1 = 0.08$ gives a

minimum sample size of 528 (Preacher, & Coffman, 2006). However, the RSMEA statistic does not perform well with models with low degrees of freedom (Kenny, Kaniskan, & McCoach, 2014). The same model with 15 items would have 29 estimated parameters 91 degrees of freedom (15(15+1)/2=91). The same test of close fit with the 15-item model would require a sample size of only 142. Thus, for a 10-15 item unidimensional model to be evaluated with the RSMEA statistic using a test of close fit method (desired power = 0.80, alpha = 0.5, $RMSEA_0 = 0.05$, $RMSEA_1 = 0.08$) a sample size of between 149 and 528 would be sufficient depending on the number of items for the confirmatory analysis. Combining the estimated exploratory sample needed of approximately 200, the total sample size for the study would need to be between 728 and 349 to be adequately powered for both exploratory and confirmatory analysis. This would require a response rate of between 7% and 3%.

Given 307 principals completed the survey, the current sample does not support the creating of separate exploratory and confirmatory samples. However, based on the above calculations, the model is likely to be sufficiently powered for exploratory analyses (i.e. using both EFA and CFA techniques in an exploratory fashion in the same data without a confirmation sample).

Data Analysis

To gather evidence on internal structure, this study uses the psychometric techniques described below to examine the performance of the measure's internal structure. Internal structure analyses will examine internal consistency, item and factor loadings, model fit, test information, test reliability, item information, and response trace-lines.

Descriptive and Classical Item Analysis

Item descriptive statistics were calculated and examined using the *R* statistical software program (Version 3.5.1; R Core Team, 2018). Means, standard deviations, item-total correlations, and item response distributions were examined to explore measure function. Additionally, the data were checked for approximations to multivariate normality to inform the statistical techniques used in model estimation.

Exploratory Factor Analysis

An EFA was conducted to examine dimensionality of the SPARS and item functioning. Prior to factor analysis, the Kasier-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Test of Sphericity were conducted to determine whether the data were appropriate for factor analysis (McCoach, Gable, Madura, 2013; DeVellis, 2017). Principal axis factoring (PAF) and oblique rotation were used to conduct the EFA (McCoach, Gable, Madura, 2013; DeVellis, 2017) using *R* 3.5.1 (R Core Team, 2018). Next, a scree plot and visual analysis of dimensionality was conducted to examine the number of factors to be extracted. To bolster the visual analysis, a parallel analysis using PAF was conducted. Based on the convergence of evidence from these two approaches, the initial dimensionality was determined.

Confirmatory Factor Analysis

A CFA specifying the structure obtained from the above EFA was used to further examine the structure of the measure in an exploratory paradigm. All calculations were performed using the *lavaan* package for R (Rosseel, 2012). Following the recommendations of Kline (2004), the model chi-square statistic, degrees of freedom, *p*-value, RMSEA, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and

Standardized Root Mean Square Residual (SRMR) are reported. The above methods and analyses rely heavily on the technical information on CFA provided by Brown (2015). Given the exploratory nature of the analysis, examinations of items and fit lead to revisions in the final CFA model proposed. Cronbach's coefficient alpha and omega statistics were calculated to examine internal consistency (Rodriguez, Reise, & Haviland, 2016a, Rodriguez, Reise, & Haviland, 2016b). The final proposed model should be considered purely exploratory until it is tested in an independent sample.

Item Response Theory

Item response theory analyses, using Samejima's (1969) graded response model, was implemented using the *mirt* package for R (Chalmers, 2012). Test information plots, item information plots, and item response trace lines were produced to evaluate the functioning of the SPARS at both the test and item levels.

Relations to Other Variables

SPARS scores were compared for statistically significant differences across groups including by race, gender, whether the principals lost a student or other close person to suicide, and the number of prevention practices in place at their schools. These analyses are purely exploratory in nature. Of note, measurement invariance has not been established across groups for the SPARS.

Correlations between factor scores on the SPARS and related measures were analyzed for evidence of statistical significance and of convergent and discriminant validity. Related measures include the SOSS, LOSS, and Stig-9 as described above.

CHAPTER 4

RESULTS

Overview

The following sections provide the results of the data collection and analysis procedures described in Chapter 3. The results are organized around the areas of test content validity evidence examined in this study: Test content evidence, response process evidence, internal structure evidence, and evidence related to other variables (AERA, APA, NCME, 2014, p. 14).

Evidence Based on Test Content Results

Test content validity evidence was gathered through a literature review and an expert review of draft items. The literature review spanned the assessment and treatment of youth suicide, the prevention science of youth suicide, and limitations and measurement challenges present in the current literature. The results of the literature review are presented in Chapter 2.

Twenty-six experts in suicidology were invited to participate in the review of the items. Experts were defined as those having published on suicidology, and/or have significant clinical experience with suicidal clients, and/or involvement in national suicidology organizations like the American Association of Suicidology. Six experts completed the review. These experts spanned numerous areas of suicidology and experience. Of note, experts that completed the review included researchers with experience in measurement and in school-based suicide prevention.

I-CVI was calculated for each item for both certainty and relevance. Based on the recommendations of Polit & Beck (2006), items with an I-CVI of 0.83 or higher were

included for further development. An I-CVI of 0.83 for six raters allows for one rater to disagree on the certainty or relevance. Using this standard, 26 out of 60 items were retained. These 26 items collectively had an S-CVI/Avg of 0.897 for certainty and 0.917 for relevance. These S-CVI/Avg results meet or exceed the suggested standard of 0.90 (Polit & Beck, 2006). The results of the I-CVI and S-CVI/Avg calculations suggest that the retained items represent and are relevant to the current construct.

Of the 26 retained items, only two of the negatively worded items passed the above threshold. To increase ease of usability of the scale and decrease the likelihood that these two negatively worded items would introduce dimensional artifacts, the two negatively worded items were dropped from the scale. This left a total of 24 items retained out of the original 60. The removal of these two items did not meaningfully alter the S-CVI/Avg calculations. The final S-CVI/Avg for the 24-item scale is 0.903 for certainty and 0.924 for relevance – above rule of thumb levels (Polit & Beck, 2006).

The expert ratings of original 60 items produced anomalous results for five items: experts rated these five items as highly relevant to the construct but were uncertain whether they represented the construct. These items were not included in the final 24 due to the difficulty of meaningfully interpreting these results. Most of these items were close in meaning to items that were retained. However, one of these items ("I feel uncomfortable with suicide prevention") was not represented in any of the retained items. Comfort with suicide prevention may prove an important aspect of the construct and therefore was retained. However, in order to keep with the above decision to exclude negatively worded items, this item was reworded to be positively scored ("I feel comfortable with suicide prevention"). Because the item was reworded, no I-CVI for this

item or of S-CVI/Avg for the 25-item scale is available.

A review of the answers to open-ended questions provided by the expert reviewers was also conducted. Two to four experts provided brief answers for each of the four open response questions. This limited feedback is insufficient for formal qualitative analysis methods. However, the feedback largely fell into two categories: feedback on the construct and opinions on individual items. Opinions on individual items were consistent with quantitative ratings. Multiple experts felt that the construct was not sufficiently defined because 'suicide prevention' was not defined in the construct. The construct definition for attitudes toward suicide prevention used in this iteration of the study was: "an individual's general tendency to hold positive or negative evaluations about suicide prevention". Three of the experts questioned whether suicide prevention in this definition referred to the goal / aspiration of suicide prevention or the community / activities that that comprise this work. The intent of the measure is to capture the former – although these in some regards are not mutually exclusive – and thus the definition of suicide prevention was updated to "the overarching goal and collective process of reducing the number of deaths by suicide."

Evidence Based on Response Process Results

Five principals from a local, convenience sample participated in individual response process interviews using the questions outlined in Appendix B with a draft of the SPARS that is available in Appendix C. The principals varied with respect to experience, gender, school level (elementary versus high school), degree of exposure to populations of students with intensive emotional and behavioral needs, and the degree to which suicide loss has impacted their lives. Given the small and local sample used in this

process, demographics are not reported in order for participants to remain de-identified. All interviews lasted approximately 30 minutes. An exploratory analysis of the qualitative feedback was undertaken in order to inform measure revisions.

A number of consistent themes emerged from the feedback. All participants found the measure and items easily readable. No participants (including principals who have been personally impacted by suicide loss) felt the measure to be distressing. All participants at some point expressed uncertainty about what 'counted' as suicide prevention in the context of this measure. For example, the principals wondered whether suicide prevention meant programs that mention and target suicide directly (e.g., gatekeeper programs or crisis procedures) or if upstream initiatives (e.g., fostering positive relationships, social emotional learning programs, or employing school-based mental health professionals) should be considered in their answers. Based on this feedback, the definition of suicide prevention in the measure was expanded to include the following sentence: "Here, suicide prevention does not refer to any specific initiatives or type of program but rather includes the full range of processes that may directly or indirectly prevent suicides." Item-specific feedback was compiled and used to inform whether each item was retained, edited, or removed and in the creation of additional items. From the original 25 items on the cognitive interview, nine items were retained without revision, 13 items were revised, three items were removed, and six items were added for a total of 28 items. These changes are catalogued in Appendix D.

Evidence based on Internal Structure

Descriptive Statistics

Descriptive statistics for the 28 piloted items are listed in Table 3. A histogram of

each item is shown in Figure 1. Item analysis at the descriptive level revealed strong ceiling effects and non-normal data. Item-total correlations (reported as r.cor from the *psych* package in R) ranged from 0.48 to .83 and thus are either within or above recommended levels for affective scales (0.30-0.60; McCoach, Gable, Madura, 2013). Statistical analyses confirmed that the items are not univariate normal (the Shapiro-Wilk test returning a p-value of < 0.001 for each item) nor multivariate normal (Mardia tests of skewness and kurtosis with p-values < 0.001). A Q-Q plot examining multivariate normality is displayed in Figure 2. No items were dropped as a result of the descriptive analyses. Scale scores for each measure were calculated for descriptive purposes using the 'scoreItems' function within the *psych* package in R. The scale mean scores are presented in Table 4a and scale sum scores are presented in Table 4b.

Table 4: Item-level descriptive statistics

Item	Mean	S.D.	Median	Min	Max	Skew	Kurtosis	S.E.	r.cor
i01	6.66	0.78	7	1	7	-4.05	22.14	0.04	0.66
i02	5.99	1.16	6	1	7	-1.37	1.98	0.07	0.59
i03	6.8	0.54	7	1	7	-5.04	41.83	0.03	0.71
i04	4.95	1.62	5	1	7	-0.62	-0.39	0.09	0.55
i05	6.55	0.83	7	1	7	-2.72	10.45	0.05	0.73
i06	6.47	0.91	7	1	7	-2.42	7.9	0.05	0.67
i07	6.84	0.51	7	1	7	-5.95	55.56	0.03	0.67
i08	6.13	1.05	6	1	7	-1.92	5.57	0.06	0.65
i09	5.5	1.3	6	1	7	-0.96	0.63	0.07	0.54
i10	5.92	1.12	6	1	7	-1.28	1.88	0.06	0.73
i11	5.83	1.11	6	1	7	-1.22	2	0.06	0.66
i12	6.33	0.98	7	1	7	-2.08	5.78	0.06	0.68
i13	5.44	1.41	6	1	7	-0.94	0.51	0.08	0.66
i14	5.71	1.24	6	1	7	-0.92	0.51	0.07	0.69
i15	6.7	0.66	7	1	7	-3.99	25.46	0.04	0.77
i16	6.35	0.95	7	1	7	-2.23	7.34	0.05	0.73
i17	6.68	0.69	7	1	7	-3.7	21.42	0.04	0.82
i18	6.56	0.77	7	1	7	-2.65	10.93	0.04	0.81
i19	6.42	0.88	7	1	7	-2.54	10.14	0.05	0.73
i20	6.7	0.63	7	1	7	-3.78	24.27	0.04	0.75
i21	6.01	1.26	6	1	7	-1.38	1.48	0.07	0.58
i22	6.37	0.85	7	1	7	-2.12	8.01	0.05	0.83
i23	6.14	1.06	6	1	7	-1.6	3.22	0.06	0.61
i24	5.83	1.07	6	1	7	-1.03	1.64	0.06	0.7
i25	4.5	1.76	5	1	7	-0.4	-0.88	0.1	0.48
i26	6.17	0.93	6	1	7	-1.6	4.58	0.05	0.79
i27	6.18	0.91	6	1	7	-1.67	5	0.05	0.75
i28	6.22	0.95	6	1	7	-1.62	3.85	0.05	0.68

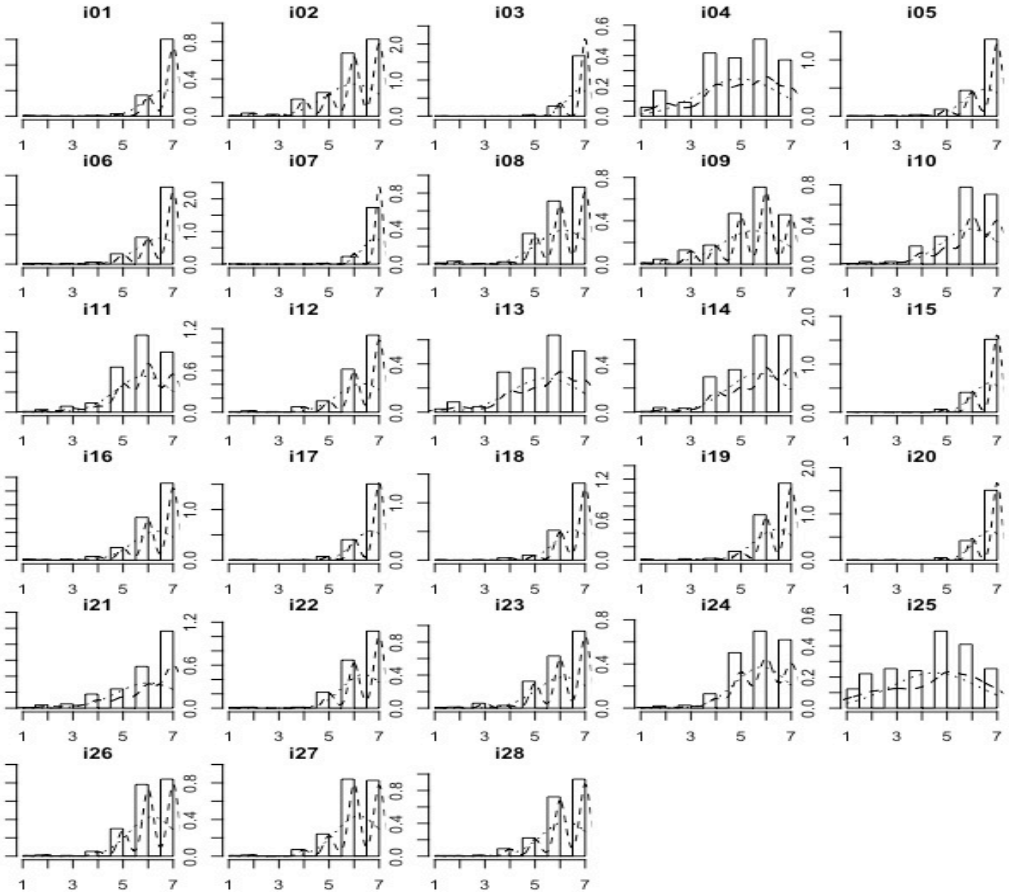


Figure 1: Item response histograms for the 28 pilot items.

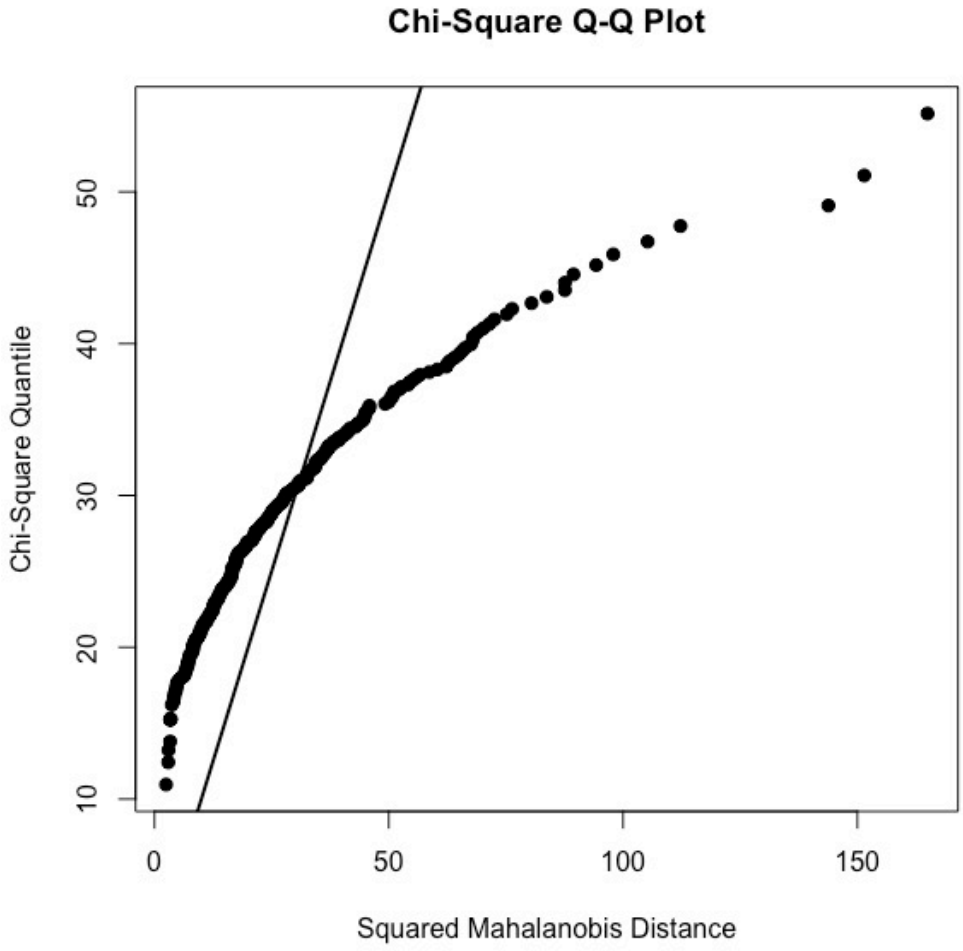


Figure 2: Q-Q plot showing multivariate non-normality.

Table 5a: Scale Mean Scores, $N = 307$

Measure	Scale	Mean	SD	Median
SPARS	1 - 7	5.97	0.76	6.07
SOSS Stigma Subscale	1 - 5	1.45	0.65	1.00
STIG9	1 - 4	2.49	0.64	2.56
LOSS	0 - 1	0.67	0.19	0.67

Table 5b: Scale Sum Scores, $N = 307$

Measure	Scale	Mean	SD	Median
SPARS	1 - 98	83.51	10.60	85
SOSS Stigma Subscale	1 - 40	11.59	5.22	8
STIG9	1 - 36	22.45	5.77	23
LOSS	0 - 12	8.23	2.22	8

Exploratory Factor Analysis

Prior to conducting the EFA, the Kaiser-Meyer-Olkin test was used to test the suitability of the data for factor analysis. The overall MSA value was 0.95, suggesting the data is appropriate for factor analysis. Item-level MSA values ranged from 0.93-0.98. Barlett's test of sphericity also shows that the data is suitable for factor analysis ($p < 0.001$). A parallel analysis was conducted using principal axes factoring (PAF) to determine the number of factors to extract. The results of the parallel analysis are displayed in Figure 3 and suggest the presence of three factors.

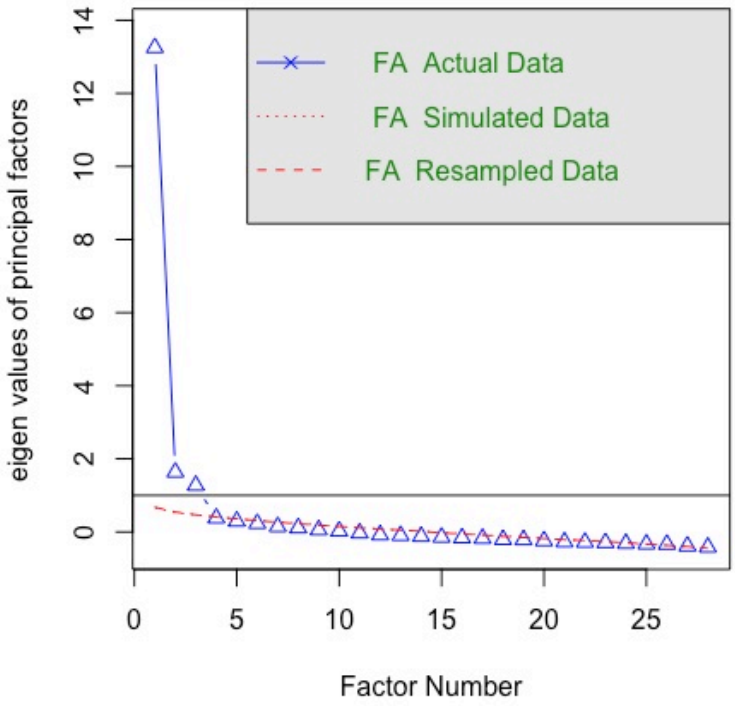


Figure 3: Parallel analysis scree plot

An EFA for three factors was conducted using PAF and promax rotation. The first, second, and third factors accounted for 0.29, 0.17, and 0.14 of the variance respectively. The three factors were highly correlated (factor 1 and 2 at 0.68, 1 and 3 at 0.67, 2 and 3 at 0.64). Standardized item loadings, communalities (h2), uniqueness (u2), and item complexity (com) for the 28 pilot items are shown in Table 5.

Table 6: EFA Results

	PA1	PA2	PA3	h2	u2	com
i17	0.97	-0.11	0	0.82	0.18	1
i20	0.96	-0.06	-0.11	0.73	0.27	1
i07	0.94	-0.04	-0.22	0.63	0.37	1.1
i15	0.92	-0.07	-0.04	0.73	0.27	1
i03	0.92	-0.07	-0.11	0.65	0.35	1
i05	0.74	-0.08	0.13	0.61	0.39	1.1
i01	0.66	0.01	0.04	0.48	0.52	1
i18	0.65	0.05	0.19	0.68	0.32	1.2
i22	0.64	0.12	0.16	0.72	0.28	1.2
i16	0.61	0.01	0.18	0.56	0.44	1.2
i06	0.55	-0.04	0.22	0.48	0.52	1.3
i19	0.49	0.43	-0.11	0.58	0.42	2.1
i12	0.34	0.29	0.14	0.46	0.54	2.3
i11	-0.15	0.96	-0.03	0.72	0.28	1
i24	-0.06	0.95	-0.08	0.75	0.25	1
i27	0.2	0.74	-0.09	0.69	0.31	1.2
i09	-0.15	0.67	0.11	0.42	0.58	1.2
i08	0.14	0.66	-0.07	0.52	0.48	1.1
i25	-0.15	0.63	0.1	0.36	0.64	1.2
i21	0.08	0.57	0.01	0.4	0.6	1
i28	0.41	0.42	-0.08	0.49	0.51	2.1
i14	-0.04	0	0.89	0.74	0.26	1
i13	-0.13	0.05	0.89	0.7	0.3	1
i02	0.02	-0.12	0.81	0.56	0.44	1
i04	-0.08	-0.01	0.77	0.51	0.49	1
i10	0.12	0.12	0.62	0.63	0.37	1.2
i26	0.4	0.09	0.41	0.65	0.35	2.1
i23	0.25	0.12	0.32	0.38	0.62	2.2

Confirmatory Factor Analysis

CFA techniques were used in an exploratory, iterative process to refine the measure. As the dataset is not multivariate normal, robust maximum likelihood estimation was used across all CFAs (MLR; Brown, 2015). The recommended estimator for ordered Likert-style items is the robust weighted least squares technique (WLSVM; Brown, 2015). However, the use of this estimator did not converge on a solution – potentially due to the low numbers of responses in certain response categories across all items or the multiple additional estimated parameters for each item response threshold. Given the seven response options and the ability of MLR to handle non-normal data, the use of the MLR estimator was judged to also be permissible. Fit statistics were interpreted following the guidelines of Hu and Bentler (1999) with acceptable fit indicated by the following: root mean square error of approximation (RMSEA) ≤ 0.06, standardized root mean square residual (SRMR) ≤ 0.08, comparative fit index (CFI) ≥ 0.95, and a Tucker-Lewis index (TLI) ≥ 0.95.

The final CFA model was built through a series of iterative revisions as follows. First, items with a complexity of 1.2 or greater were dropped and the remaining items were fit into the three-factor solution suggested by the EFA. This solution resulted in a poor to moderate fit: Robust $\chi 2\ (167) = 357.880$, $p = 0.000$, Robust CFI = 0.942, Robust TFI = 0.934, Robust RSMEA = 0.071, SRMR = 0.059. In this model, items 3 and 7 did not load strongly onto their factor and were dropped. Item text content was analyzed to examine the conceptual nature of the factors. Factor one was a group of items about the worth/importance of suicide prevention, factor two was a group items about the possibility of preventing suicides, and factor three was a group of behavioral tendency

questions about engaging in suicide prevention – thus the factorings are plausible based on item content. Only items 5 and 10 did not fit this content pattern and were dropped. The resulting model (with items 3, 5, 7, & 10 dropped) led to improved fit: Robust $\chi 2$ (101) = 184.376, p = 0.000, Robust CFI = 0.965, Robust TFI = 0.959, Robust RSMEA = 0.06, SRMR = 0.050.

Next, a bifactor model was tested. A bifactor solution was chosen because the research questions of this study are interested in the broad construct of attitudes toward suicide prevention (i.e., not the specific factors that resulted in the data), because no specific factors were hypothesized a priori, and due to the correlations between the three factors (0.63, 0.60, 0.57). Additionally, modification indices from the above model suggested common variance between items 15 and 17 (both items have similar wording about suicide prevention being "important) and items 8 and 11 (both items are concerned with the preventability of "most" suicides). The bifactor model with the two additional shared item variances fit the data well: Robust $\chi 2$ (86) = 111.282, p = 0.000, Robust CFI = 0.99, Robust TFI = 0.986, Robust RSMEA = 0.031, SRMR = 0.03. The items loaded well onto the general factor, ranging from 0.43 to 0.83. Factor one (worth/importance) had low item loadings (0.13 - 0.34) suggesting the factor cannot be independently interpreted beyond the general factor, again providing evidence of the utility of the bifactor model. Factor two (possibility/likelihood) had moderately strong loadings (0.38 - 0.74) and factor three (behavioral tendencies) had strong loadings (0.65 – 0.87).

The items in the above model were again examined for conceptual clarity and redundancy. It was determined that the wording of items 8 and 11 as well as 15 and 17 (i.e. the ones previously modeled with common shared variances) were close enough to

be considered redundant. The items from the pairs with the lowest loadings were removed (11 and 15). This final, 14-item bifactor model resulted in improved fit: Robust $\chi 2$ (63) = 80.67, p = 0.066, Robust CFI = 0.991, Robust TFI = 0.987, Robust RSMEA = 0.034, SRMR = 0.028. Bifactor models tend to overfit the data, resulting in potentially artificially improved fit statistics (Bonifay, Lane, & Reise, 2017). Thus, a correlated factors model is also presented below. Fit statistics for the correlated factors version of this model are as follows: Robust $\chi 2$ (74) = 116.726, p = 0.001, Robust CFI = 0.978, Robust TFI = 0.973, Robust RSMEA = 0.049, SRMR = 0.038. As expected, these are lower than the bifactor model fit statistics, but are none-the-less still within an acceptable range. Item loadings and factor covariances for the correlated factors model are presented in Table 6 while item loadings for the bifactor model are presented in Table 7. Reliability statistics for the correlated factors model are presented in Table 8 and for the bifactor model in Table 9. The path diagram for the final correlated factors model is found in Figure 4 and the path diagram for the final bifactor model is found in Figure 5.

Table 7: Correlated Factors Model Loadings

Factor	Item	Estimate	Std.Err	z-value	P(>|z|)	ci.lower	ci.upper
f1	=~						
	i17	0.606	0.109	5.56	0	0.393	0.82
	i20	0.508	0.114	4.47	0	0.285	0.73
	i22	0.733	0.081	9.064	0	0.574	0.891
	i16	0.745	0.083	8.969	0	0.582	0.907
	i01	0.548	0.12	4.547	0	0.312	0.784
f2	=~						
	i24	0.908	0.066	13.827	0	0.779	1.037
	i27	0.775	0.083	9.35	0	0.612	0.937
	i08	0.723	0.096	7.533	0	0.535	0.911
	i25	0.981	0.083	11.796	0	0.818	1.144
	i21	0.805	0.091	8.858	0	0.627	0.983
f3	=~						
	i14	1.095	0.068	16.195	0	0.962	1.227
	i13	1.187	0.072	16.541	0	1.047	1.328
	i02	0.855	0.08	10.698	0	0.699	1.012
	i04	1.154	0.085	13.506	0	0.987	1.322
Factor Covariances							
f1	~~						
	f2	0.707	0.073	9.679	0	0.564	0.851
	f3	0.638	0.043	14.765	0	0.553	0.723
f2	~~						
	f3	0.582	0.059	9.927	0	0.467	0.696

Table 8: Bifactor Model Loadings

Factor	Item	Estimate	Std.Err	z-value	P(>|z|)	ci.lower	ci.upper
g	=~						
	i17	0.516	0.11	4.683	0	0.3	0.732
	i20	0.414	0.108	3.853	0	0.204	0.625
	i22	0.724	0.093	7.743	0	0.541	0.907
	i16	0.709	0.106	6.707	0	0.502	0.916
	i01	0.482	0.112	4.29	0	0.262	0.702
	i24	0.655	0.088	7.448	0	0.482	0.827
	i27	0.643	0.091	7.039	0	0.464	0.822
	i08	0.615	0.109	5.659	0	0.402	0.829
	i25	0.76	0.101	7.49	0	0.561	0.959
	i21	0.675	0.095	7.113	0	0.489	0.86
	i14	0.802	0.086	9.314	0	0.633	0.971
	i13	0.83	0.085	9.762	0	0.663	0.997
	i02	0.57	0.096	5.919	0	0.381	0.759
	i04	0.845	0.106	7.976	0	0.637	1.052
f1	=~						
	i17	0.348	0.099	3.53	0	0.155	0.541
	i20	0.329	0.08	4.134	0	0.173	0.485
	i22	0.181	0.093	1.961	0.05	0	0.363
	i16	0.226	0.127	1.77	0.077	-0.024	0.476
	i01	0.254	0.105	2.426	0.015	0.049	0.459
f2	=~						
	i24	0.731	0.074	9.937	0	0.587	0.875
	i27	0.396	0.075	5.289	0	0.249	0.543
	i08	0.379	0.071	5.339	0	0.24	0.518
	i25	0.616	0.133	4.642	0	0.356	0.877
	i21	0.393	0.123	3.19	0.001	0.152	0.635
f3	=~						
	i14	0.739	0.072	10.219	0	0.597	0.881
	i13	0.851	0.086	9.955	0	0.684	1.019
	i02	0.647	0.082	7.936	0	0.487	0.807
	i04	0.793	0.106	7.47	0	0.585	1.001

Table 9: Correlated Factors Model Reliability

	f1	f2	f3	total
alpha	0.894	0.804	0.865	0.9008
omega	0.900	0.807	0.867	0.9269
omega2	0.900	0.807	0.867	0.9269
omega3	0.901	0.808	0.864	0.9152
ave var	0.649	0.459	0.624	0.5591

Table 10: Bifactor Model Reliability

	g	f1	f2	f3	total
alpha	0.90	0.89	0.80	0.87	0.90
omega	0.91	0.63	0.61	0.77	0.93
omega2	0.77	0.16	0.29	0.43	0.93
omega3	0.76	0.16	0.29	0.43	0.92
ave var	NA	NA	NA	NA	0.57

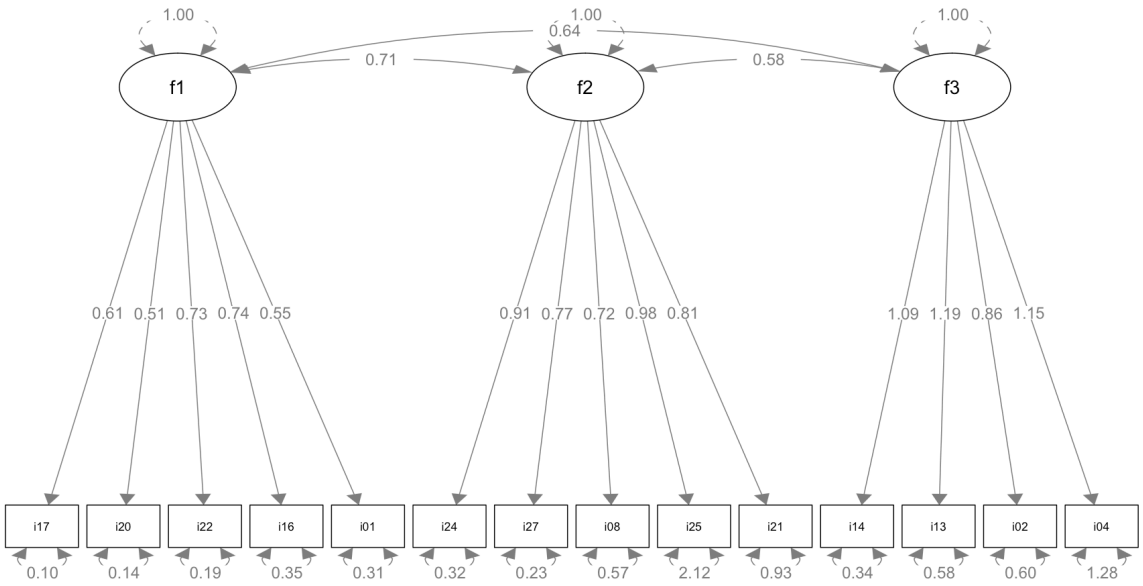


Figure 4: Correlated factors path model of the SPARS.

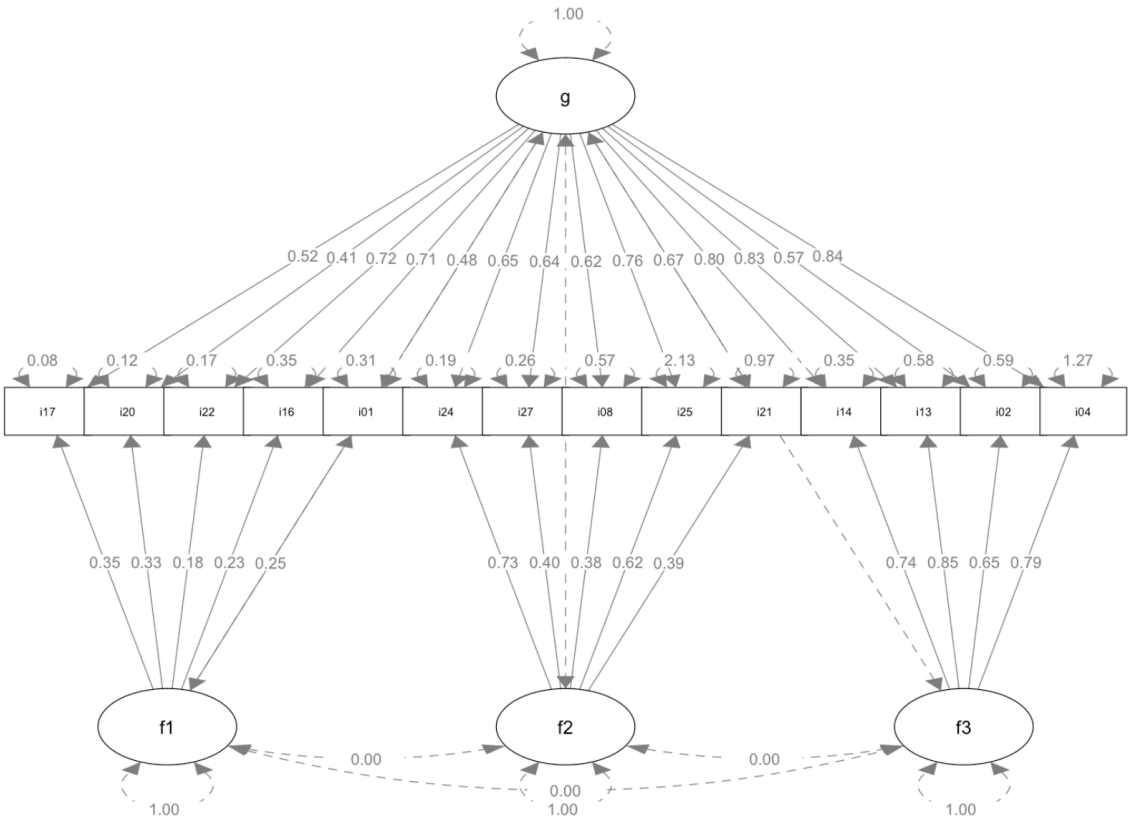


Figure 5: Bifactor path model of the SPARS.

Item Response Theory Analyses

Samejima's (1969) grade response model was used to analyze item and test level performance of the SPARS using the *mirt* package for R (Chalmers, 2012). For the purposes of the IRT analyses, each factor on the SPARS was treated as a separate unidimensional scale. In this analysis, all items were automatically re-coded by the *mirt* package so that each response has a distance of 1. Figure 6 displays the test information plot for the 3 subscales. As would be expected from items evidencing a high ceiling effect, the SPARS appears to only provide adequate information at the lower end of the attitudes scale (i.e. disagreement). Figure 7 displays test reliability by subscale.

Reliability is strong for lower agreement levels, where test information is the strongest. Figure 8 presents item information plots by subscale. Lastly, Figure 9, Figure 10, and Figure 11 provides item response trace lines for each item, grouped by subscale.

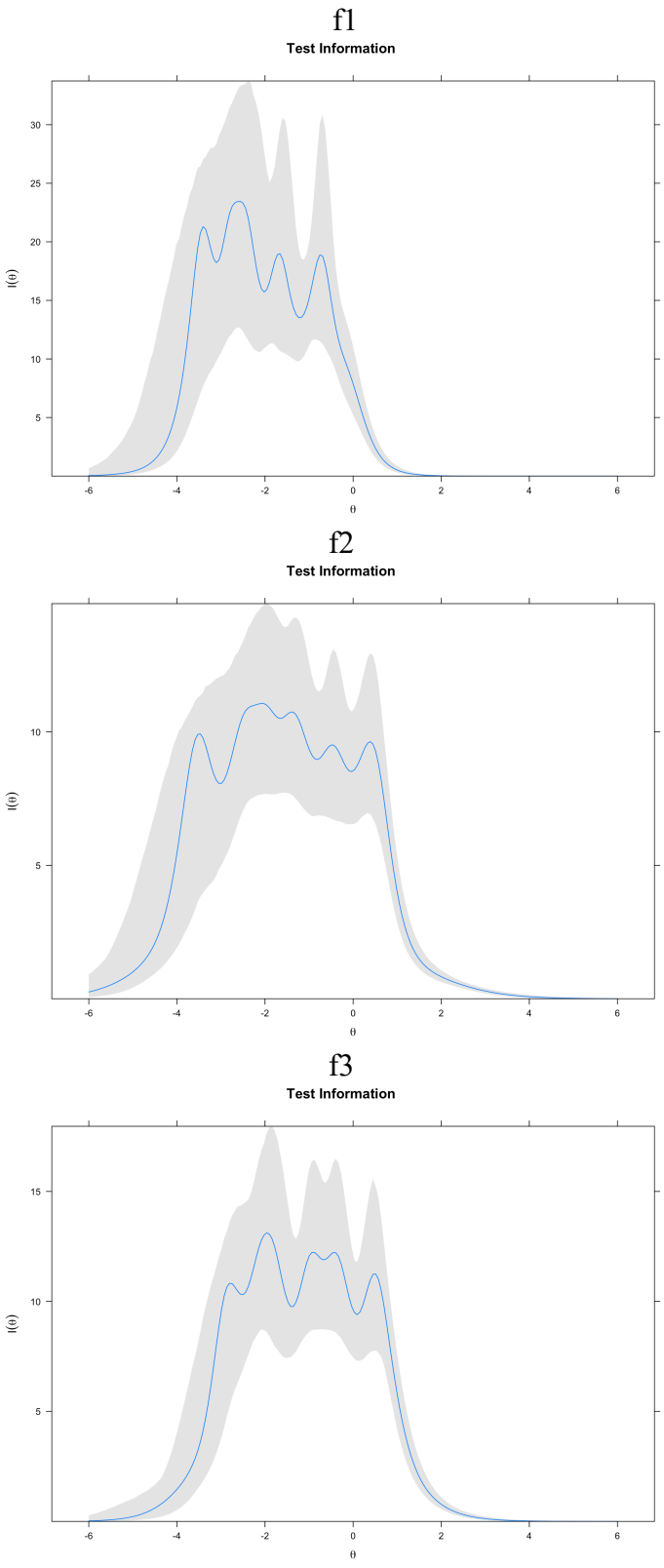


Figure 6: Test information plots by factor with 95% confidence intervals. Note the different scales on the y-axes.

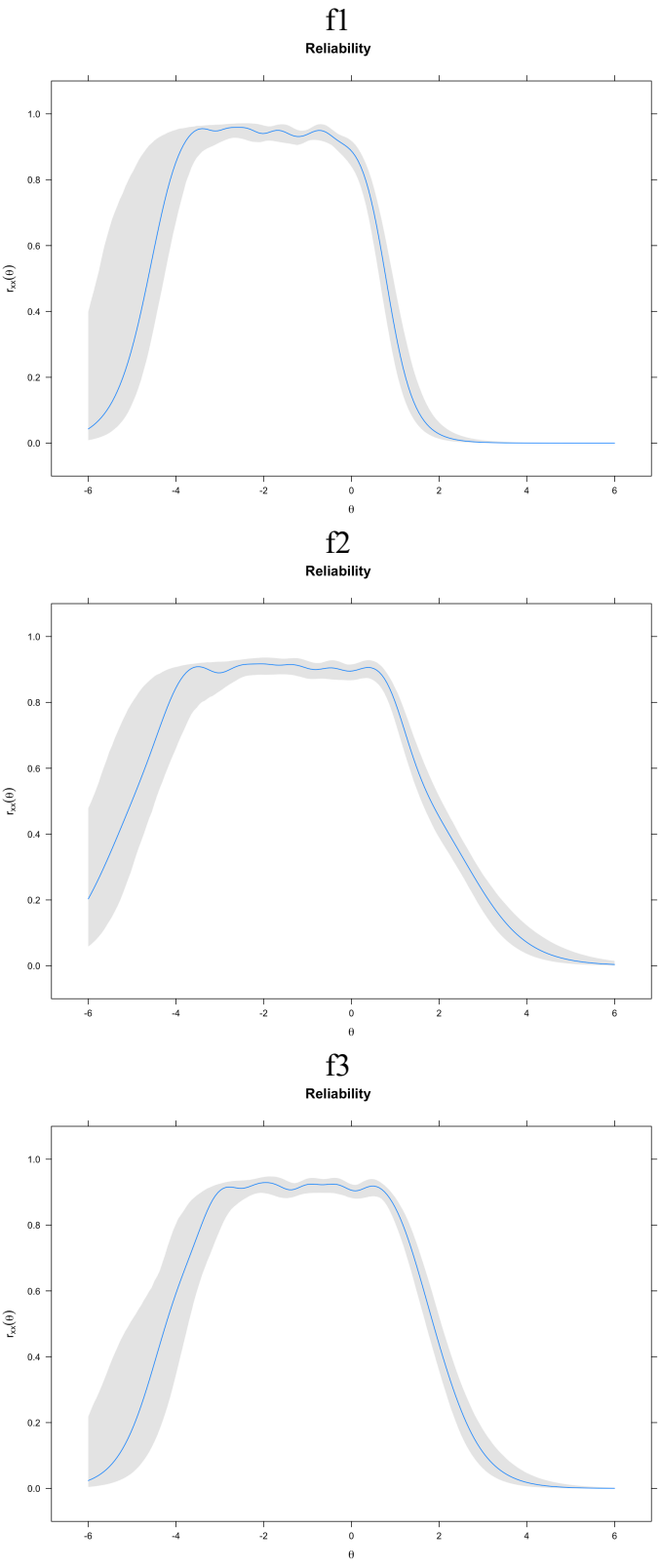


Figure 7: Test reliability plots by factor with 95% confidence intervals. Note the different scales on the y-axes.

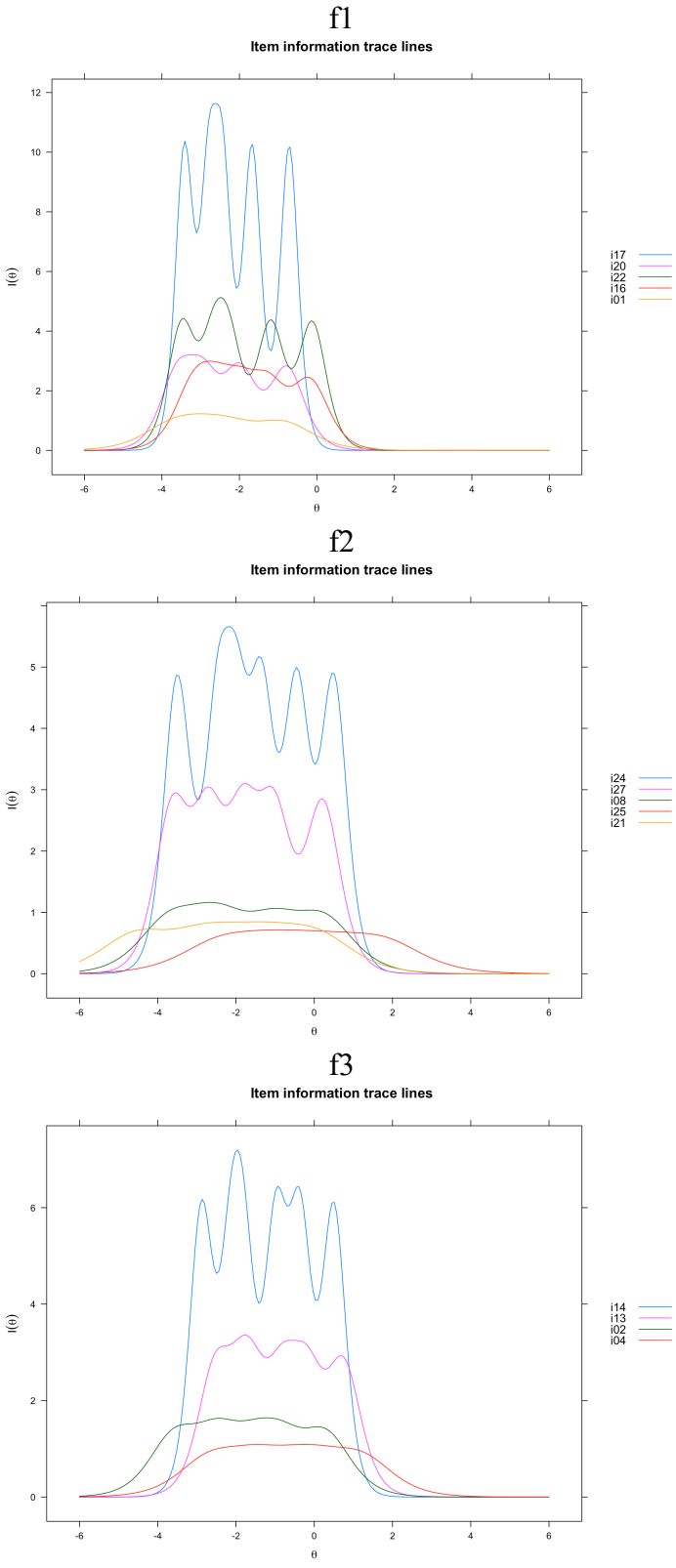


Figure 8: Item information trace lines by factor. Note the different scales on the y-axes.

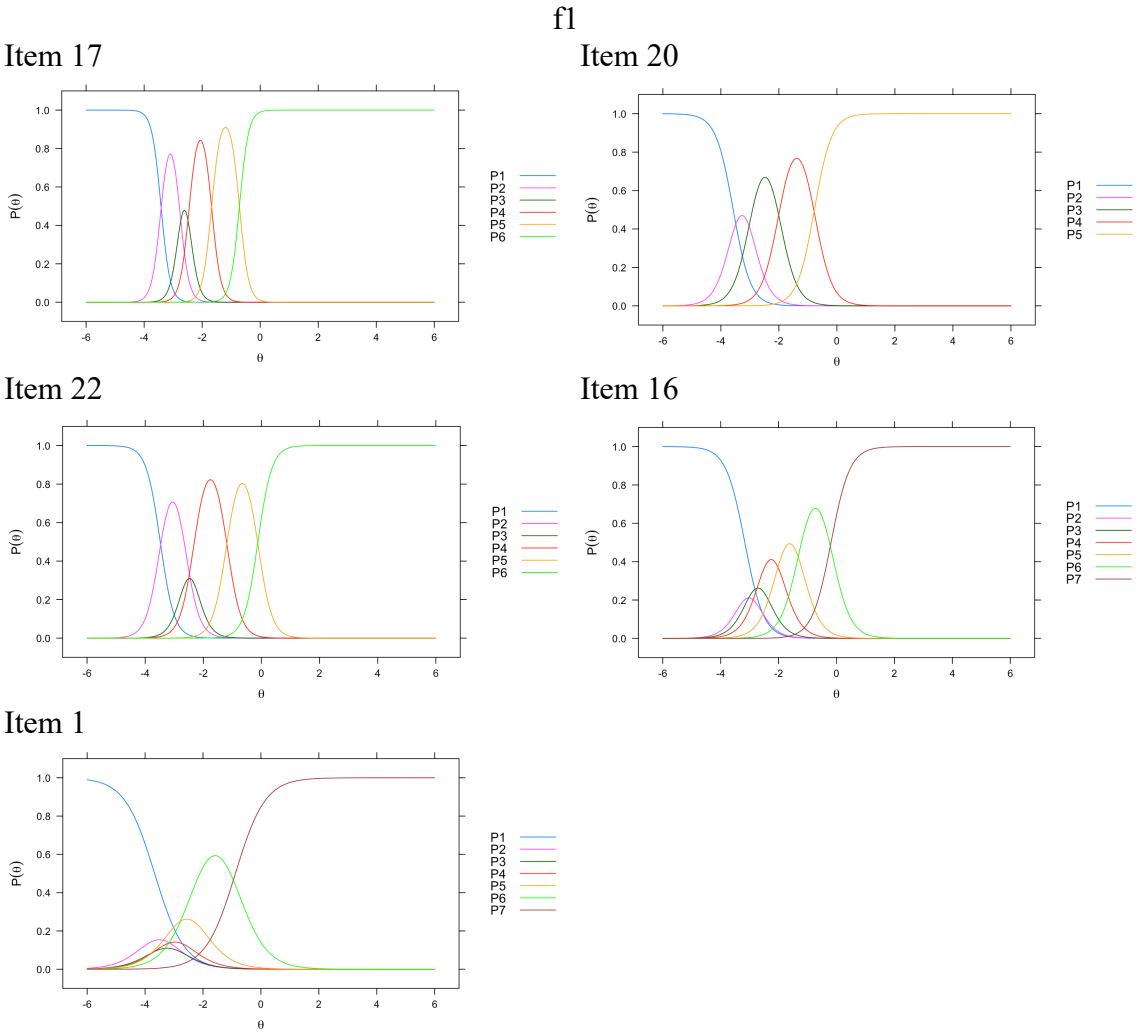
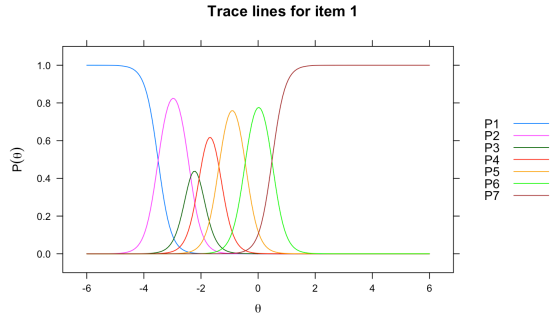


Figure 9: Item response curves for Factor 1

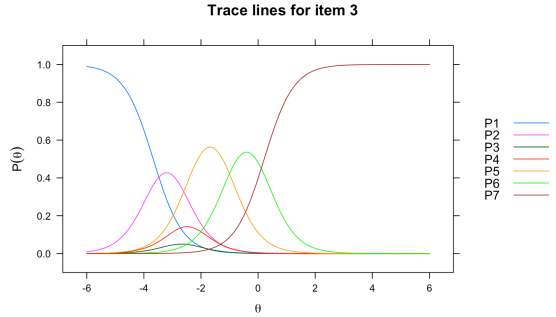
f2

Item 24

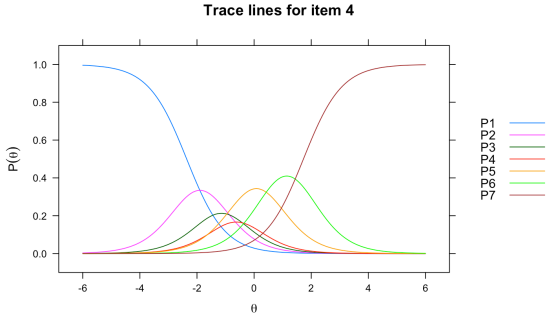


Item 27

Item 8



Item 25



Item 21

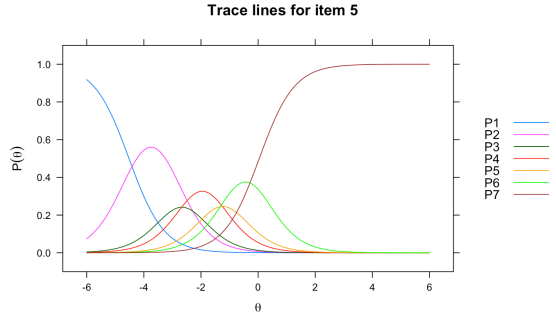


Figure 10: Item response curves for factor 2.

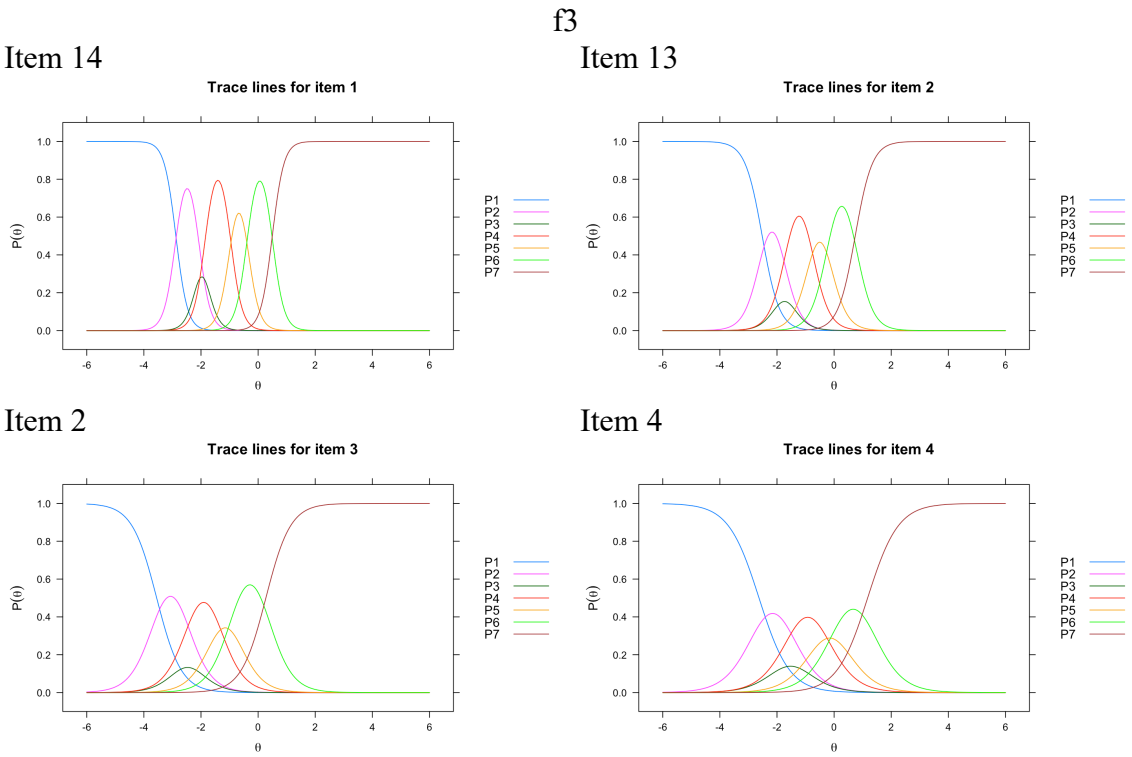


Figure 11: Item response curves for factor 3

Relations to Other Variables Analyses

A series of exploratory linear regressions examined the relationship between SPARS g factor scores obtained from the bifactor model and demographic characteristics. Due to the small number of cases with missing data (i.e. in which participants chose not to disclose all or some demographic data), missingness was handled through case-wise deletion. No significant differences were found between SPARS g factor scores and gender ($F(2, 304) = 1.704$, $p = 0.183$), race ($F(6, 294) = 1.406$, $p = 0.212$), years as principal ($F(1, 303) = 2.239$, $p = 0.136$), hours of training on suicide prevention ($F(1,$

294) = 0.968, p = 0.326), having lost a student to suicide (F(1, 305) = 0.618, p = 0.435), having lost someone close to suicide other than a student (F(1, 305) = 0.822, p = 0.365), the number of prevention practices in place at the school (F(1, 305) = 2.58, p = 0.110), nor the school level (elementary grades 1-5, middle grades 6-9, or high grades 9-12, with other combinations of grades excluded; F(2, 249) = 0.90, p = 0.406)).

Pearson correlations between SPARS g factor scores and the scores of three related measures were calculated to examine evidence of convergent and divergent validity. As discussed in the method section above, both the SOSS short form stigma subscale and the STIG9 have prior evidence of unidirectionality. Thus, factor scores from the SOSS and STIG9 were used to investigate correlations. Following the conventions of the literature (and because factor analytic studies of the scale are not available), sum scores were used for the LOSS (Batterham, Han, Calear, Anderson, & Christensen, 2018).

The SPARS g factor scores were significantly correlated with both the SOSS short form stigma measure scores (r = -0.27, p = 0.000) and the STIG9 scores (r = -0.16, p = 0.004). The SPARS was not significantly associated with the LOSS scores (r = 0.08, p = 0.170). Graphs of the correlation data are displayed below in Figure 12. Visual inspection of the correlation plots revealed the presence of outliers in both the SPARS and SOSS scores. A sensitivity analysis was conducted by removing the four outliers identified through visual inspection. Removal of the outliers did not meaningfully affect the results. Graphs of the correlation data with the outliers removed are displayed in Figure 13.

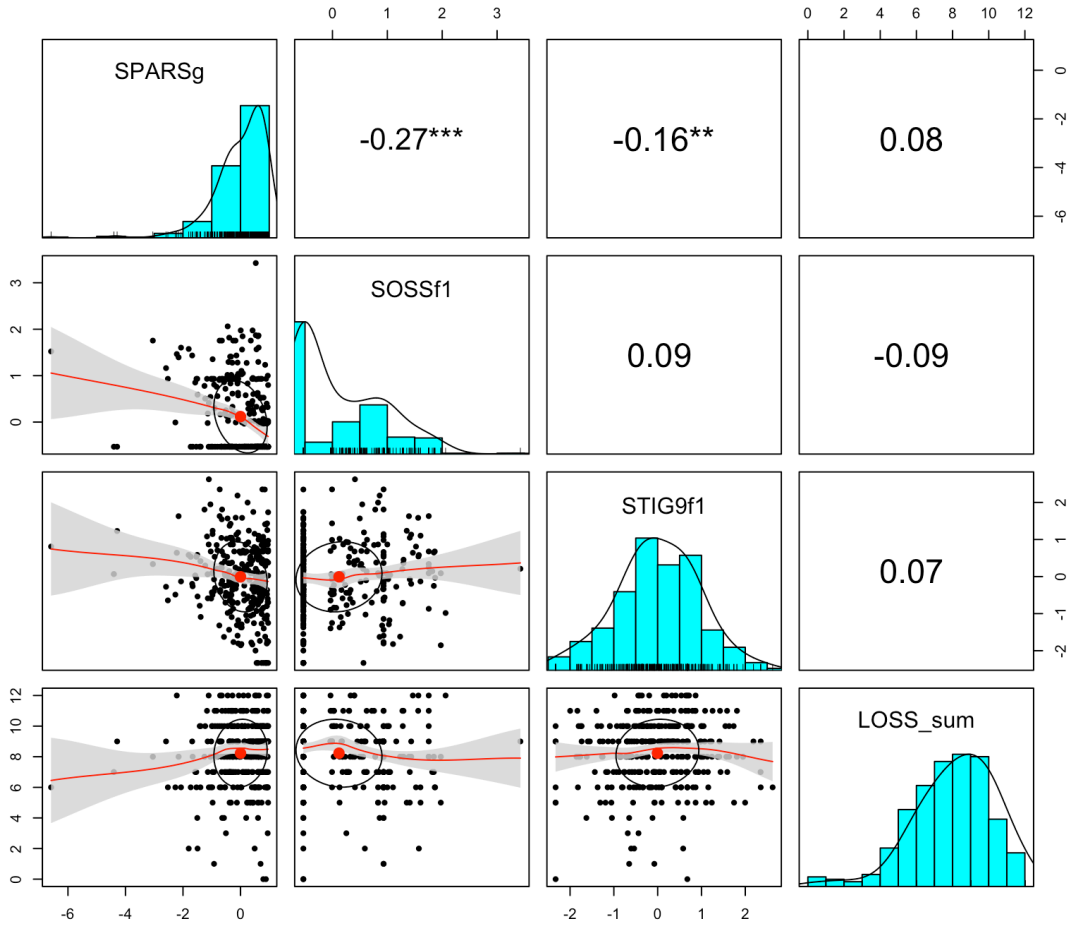


Figure 12: Correlations between the SPARS g factor scores, SOSS short form stigma subscale factor scores, STIG9 factor scores, and LOSS sum scores. Statistical significance at the p = 0.001 level is indicated by three asterisks (***) and statistical significance at the p = 0.01 is indicated by two asterisks (**).

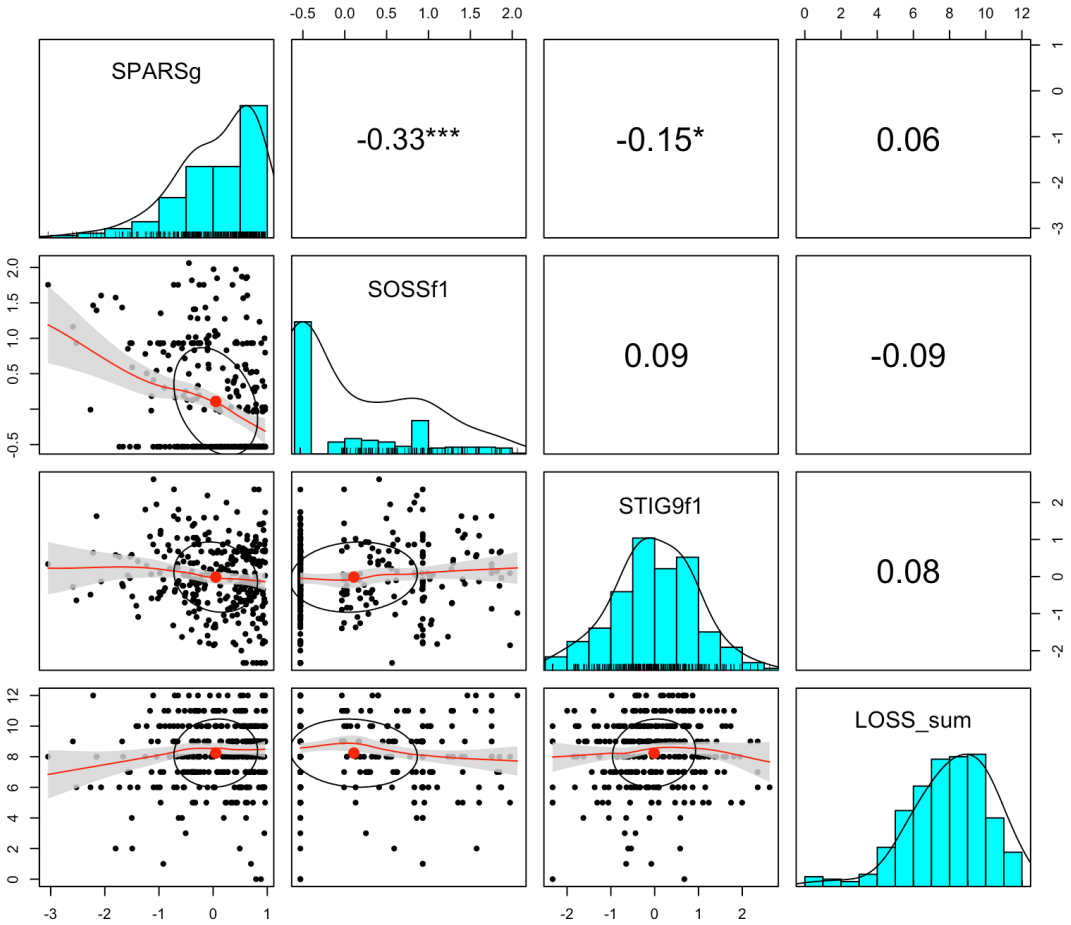


Figure 13: Correlations between the SPARS g factor scores, SOSS short form stigma subscale factor scores, STIG9 factor scores, and LOSS sum scores with four outlying cases removed based on visual inspection. Statistical significance at the p = 0.001 level is indicated by three asterisks (***) and statistical significance at the p = 0.05 level is indicated by one asterisk (*).

CHAPTER 5

DISCUSSION

Summary of Present Study

This study began the iterative process of developing the SPARS, a rating scale aimed at measuring the attitudes held by public school principals toward suicide prevention. Additionally, initial validity evidence was collected and analyzed through expert review, response process interviews, psychometric analyses (descriptive, EFA/CFA, & IRT), and through comparisons with other variables. Given the stark increases in youth suicide rates despite unprecedented national efforts toward suicide prevention in the U.S., new tools are needed to examine how efforts can be improved. Examining the attitudes school leaders hold toward suicide prevention may allow school implementation of prevention programs to be more effectively tailored in future. The following sections discuss the validity evidence gathered in the present study as well as the limitations of the evidence. The chapter closes with a discussion of potential future research involving the SPARS and suicide prevention attitudes research more generally. The results of the current study are a promising first step in measure development. However, additional research is needed before use of this measure outside of a research context.

Discussion of Validity Evidence

Test Content Validity Evidence

The present study sought expert feedback on the proposed construct and measure items. Both quantitative and qualitative expert feedback data were collected. From this feedback, the construct definition was revised, items were dropped or modified, and the

initial item set was chosen from the larger pool of items. The quantitative CVI data were indicative of reasonable agreement among experts in the initial item set chosen from the feedback. The qualitative data were consistent in recommending more specificity in the construct definition and the construct definition was modified accordingly.

There are important limitations to the content validity evidence presented in this study. The addition and modification of items following the feedback to develop initial itemset means that CVI statistics cannot be calculated for the itemset. However, the original items included in the initial set all passed CVI thresholds from the expert review at both the item and scale level. Content validity evidence could be strengthened by having experts subsequently review the final scale and construct as presented in the current study. Additionally, given the current psychometric data discussed below, experts could also provide feedback on the dimensionality of the scale. For example, experts could provide feedback on whether the bifactor model or the correlated factors model best fits conceptually.

Response Process Validity Evidence

Response process data were collected from a convenience sample of five local principals. The principals represented multiple levels (elementary and high), variability in years of experience, and variability in personal connections to suicide. The results of the response process cognitive interviews were uniform in agreement that the measure was easy to read and was not distressing. The principals also uniformly questioned how broadly they should think of the construct. Thus, the construct definition was again made more specific before the next phase of the project. Principals made a variety of item-level suggestions that led to changes, removals, or additions to the item set. As a whole, the

data collected suggest that the principals understood the items as intended – a conclusion that is likely bolstered by the iterative construct and item refinement to the item set used to obtain the final item set presented in the study.

The response process validity evidence is limited by several factors. First, the convenience sample is not drawn from the larger population sample. The sample used for the response process interviews were Massachusetts principals while the population targeted in the subsequent analyses is California principals. Secondly, the response process evidence collected could be strengthened by conducting a second round of interviews in which the principals respond to the revised measure. Lastly, the small number of principal interviews did not allow for formal qualitative analysis of the feedback nor for meaningful quantitative analysis of the measure.

Internal Structure Validity Evidence

The present study used descriptive statistics, exploratory and confirmatory factor analyses, and item-response theory to examine the internal structure of the SPARS, based on data from a sample of responses from California principals. Descriptive statistics revealed strong item-total correlations. However, the descriptive statistics also showed evidence of strong ceiling effects and non-normality of residuals at the univariate and multivariate levels (discussed further below in the discussion of internal structure validity limitations). An important limitation of the data is that it represents a small fraction of the population sample, and it is unclear to what extent the respondents are representative of the population despite best efforts at demographic comparisons. It seems likely that those who are interested or invested in suicide prevention would be more likely to answer the current survey – thus the responses are likely positively elevated. There were only very

limited missing data across categories and no missing data on SPARS items, which improved confidence in the results and did not necessitate advanced statistical techniques for dealing with missing data. Another limitation is the uncertainty regarding the degree to which socially desirable responding may have influenced the results. Given that this study did not collect identifying data, was voluntary, did not involve face-to-face scale administration, and was not linked to any accountability measures, it is hypothesized that socially desirable responding would not be a major influence on the results. However, this is an empirical question that could be investigated in future research through the inclusion of a measure designed to capture desirable responding, such as the Marlow-Crowne Social Desirability Scale (Lambert, Arbuckle, Holden, 2016; Perinelli & Gremigni, 2016; Reynolds, 1982).

Scale scores for each measure used in the study were then calculated for purely exploratory descriptive purposes as results cannot be generalized outside of this sample. Overall, the principals in the sample held very positive attitudes toward suicide prevention on the SPARS. Principals also evidenced low levels of stigma toward suicide as measured by the SOSS stigma subscale. Further, principals endorsed that people with mental illness are stigmatized in society at large. On average, principals answered 69% of questions correctly on the LOSS short form. On average, principals in the sample had received over 9 hours of suicide prevention training in their career. Approximately 41% had experienced a student death by suicide during their career. These positive attitudes held on average by the principals in the sample may suggest that implementation strategies that target principals' attitudes toward suicide prevention for improvement might not be necessary on a universal level but could potentially be useful for principals

who scored low on the SPARS.

A parallel analysis scree plot was created to assist in determining the dimensionality of the scale. The parallel analysis scree plot suggested the presence of three factors. However, the first factor had an eigenvalue approximately seven times greater than the subsequent factors. While it is possible that this represents three distinct factors, it may also suggest the primacy of one factor with subsequent measurement artifacts due to item wording or introduced through the non-normality of the data. In running an EFA with three factors, multiple items did not appear to be highly specific to one factor. These items (with commonalities of greater than or equal to 1.2) were excluded in the subsequent analyses.

A series of iterative CFA models were run with the remaining items in an exploratory fashion, as the sample size did not allow for the separation of the data into adequately sized exploratory and confirmatory subsets. The iterations of CFA models were based on both quantitative and conceptual bases. Two final models are presented with strong fit statistics – one correlated factors model and one bifactor model. While caution is needed in interpreting bifactor fit statistics as they tend to exaggerate true model fit, the bifactor model has a number of advantages. Most prominently, it allows for an examination of the general factor – which has practical utility in scoring and interpretation. The general factor also fits with the original unidimensional conceptualization of the construct. The bifactor model also allows for potential measurement artifacts to be parceled out from the score. For example, the low loadings of items on the first factor outside of the loadings on *g* suggest that this factor may not be meaningfully separate from *g*. However, a correlated factors model may be meaningful in

future research that desires to examine potential sub-areas of attitudes toward suicide prevention. Thus, both are presented in the present study.

The factor analytic analyses in the present study have a number of limitations. All of the results should be viewed as exploratory in nature as they were conducted within the same sample. A separate sample is needed to test these models in a confirmatory framework. While a robust ML estimator was used to better address non-normality, issues with non-normality may nonetheless influence the model results. Additionally, robust ML treats the response data as continuous. While this is potentially justifiable given the seven-point response scale, this analysis could be strengthened by the use of SEM techniques for ordinal data. For example, current recommendations suggest the use of the WLSMVS estimator for non-normal ordinal response data (Brown, 2006). However, this estimator was not able to converge on a model in the current dataset. This is likely due to the high number of response categories with few or no responses and/or limited sample size. Future research may choose to examine the use of ordinal SEM techniques by collapsing response categories or if future data (and/or future measure revisions) show less extreme ceiling effects.

IRT was also used to examine the internal validity evidence of the measure. As IRT is traditionally a unidimensional technique, each factor in the correlated factors model was treated as a separate dimension in the analyses. While this is not an ideal representation, IRT analyses of the separate scales can provide useful information none-the-less. Future research may explore the application of more advanced IRT techniques like bifactor IRT and multifactor IRT. While these advanced techniques may provide more accurate modeling, visual analyses of IRT results is severely limited in these

techniques and thus precludes a primary advantage of IRT. As expected given the high ceiling effects, the results of the IRT analyses show that the scales primarily provide information about respondents who score in the low range. Item trace lines also confirm that the response scaling does not always function as expected – again as would be expected from the highly skewed data and limited-to-zero responses in the disagree categories of many of the items. The results of the IRT analyses should be interpreted with caution given the limitation of treating each correlated factor as a unidimensional scale.

Validity Evidence Regarding Relations to Other Variables

A series of exploratory comparisons across demographic groups were conducted. There were no statistically significant differences between any of the demographic categories tested. This suggests that attitudes toward suicide prevention do not vary between the demographic categories selected for this study. However, in order to make a stronger claim about the measure's functioning across demographic groups, measurement invariance analyses would need to be conducted in larger samples. There was also no statistically significant relationship between SPARS scores and the number of suicide prevention practices in place at the school where the principal worked. This suggests that attitudes toward suicide prevention held by principals, as captured in this measure, do not seem to be related to the number of prevention practices in place in schools. However, in order to make a stronger claim about this relationship, the measure would have to be improved to have less extreme ceiling effects as these effects may mask true associations.

Associations of SPARS scores with three existing latent variable measures were calculated to examine convergent/divergent validity evidence. The SPARS and the SOSS,

a measure of suicide stigma, were found to have a significant but weak relationship (r = -0.27, $p < 0.0001$). This suggests that the constructs are marginally related, yet they examine distinct constructs. This relationship is smaller than expected given the conceptual overlap of the constructs, however, ceiling effects on the SPARS and floor effects on the SOSS may mask the true relationship. The SPARS and the Stig-9, a measure of perceived mental health stigma, had a very weak but statistically significant relationship (r = -0.16, p = 0.0046). It is expected that the SPARS and the Stig-9 scores would be less strongly correlated than the SPARS and the SOSS, however, this low correlation suggests perceived mental health stigma is only very weakly associated with attitudes toward suicide prevention in this sample. Lastly, The SPARS and the LOSS, a measure of knowledge about suicide prevention, displayed an extremely weak and non-significant correlation (r = 0.08, p = 0.1703). This suggests that these two constructs are not related, which is an unexpected result. If this result holds, this would suggest the possibility that increasing knowledge about suicide alone is not sufficient to change attitudes toward suicide prevention. However, more research – and research going beyond correlational designs – would be needed to test this claim.

The correlations to other variables suggested above do not provide strong convergent/divergent validity evidence. Given the conceptual overlap between attitudes, stigma, and knowledge, it would be expected that these measures would have more moderate correlations. However, it is expected that the SPARS and the measure of suicide stigma would be more highly correlated than the SPARS and the measure of more general perceived mental health stigma – as was found in the present study. It is possible that floor and ceiling effects have tampered the strength of the correlations between the

measures. To make stronger claims about relationships to other variables, ceiling effects would need to be addressed in the SPARS and the other measures would need further psychometric evidence regarding their performance in a samples of principals.

Consequential Validity Evidence

Although consequential evidence was not collected during the course of this study due to the early stage of measure development and validation, potential consequential validity issues are discussed below. Consequential validity issues vary greatly depending on a given use of a measure. At the group level (e.g. district and/or state level), SPARS scores (after further measure development and validity evidence) could be used to inform both where and how to pursue the implementation of suicide prevention initiatives. However, this use would involve an important implementation dilemma: Should decision makers focus their implementation on areas with high scores (potentially reflecting high readiness for implementation) or with low scores (potentially reflecting greater need for intervention)? Another potential consequential validity issue might arise when using this measure at the individual level, given the group level development techniques. Furthermore, should individual scores be inadvertently made public, principals with low scores may face scrutiny following a suicide. On the other hand, principal scores may be used to target implementation efforts – potentially increasing implementation success and preventing suicides.

Future Research

There are multiple potential avenues for future research on SPARS. Additional iterative measurement development research to address the ceiling effects is needed. This would likely require item revision focusing on adding additional items for which strongly

agree would be a more 'difficult' response. All current analyses were conducted in an exploratory framework; thus, future research should collect an additional separate sample appropriate for confirmatory analyses. In future research, prioritizing populations with known demographics would be a benefit in regard to more rigorously examining self-selection bias. Future analyses could use additional advanced psychometric techniques like ordinal EFA/CFA, and multidimensional IRT. Future research could explore measure psychometrics in different populations such as different states or countries, different professional groups, parents, students, and/or suicidal youth. Larger samples in future research would allow for measurement invariance testing across groups. Future research could also conduct more in-depth psychometric analyses of the three previously existing measures used in this study and in studies with different populations. Much like the current study, future research could benefit the field of suicidology by collecting data on the function of pre-existing measures. Such data could be subsequently used to improve measurement accuracy in suicidology across both implementation studies and wider effectiveness/efficacy research.

Once validity evidence of the SPARS is more firmly established, future research could test whether using the measure to tailor implementation efforts improves implementation success (Fixsen, Blase, Naoom, & Wallace, 2009). For example, should measurement invariance over time be established, this measure could be used to monitor whether 1) attitudes can be meaningfully changed over time, 2) whether those changes correspond to changes in support behaviors (e.g., funding allocation, prioritizing suicide prevention, creating professional development opportunities for staff, and/or advocating for resources to address youth suicides), 3) whether the attitude change of school

principals 'trickles down' to attitude change for frontline staff, 4) whether changes in attitude lead to increased implementation success, and 5) ultimately whether these improvements in implementation success result in improvements to meaningful student outcomes (e.g. decreased attempts, decreased deaths, and increased quality of life). This change pathway could be examined at the school, district, county, specific population groups, or even state level provided measurement invariance is established across groups. Multiple levels of interest could also be included within the same study leveraging advanced statistical techniques like hierarchical linear modeling. If combined with other measures, the SPARS could also be used to examine whether changes in attitudes regarding one area (suicide prevention) result in changes in attitude in related categories (like support for mental health literacy or for evidence-based practices).

Conclusion

Suicide is a preventable public health problem that claims lives of nearly 6,800 young people in the US each year (CDC WISQARS, 2018). It is the second leading cause of death for the 10-24-year-old age group and the leading cause of death for 13-year-old girls and 14-15-year-old boys in the US (CDC WISQARS, 2018). Despite "unprecedented levels of suicide prevention activities," the youth suicide rate has increased by 50% between 1999 and 2017 (Substance Abuse and Mental Health Services Administration, 2017, p. 7; Hedegaard, Curtin, & Warner, 2018; CDC WISQARS, 2018). Given the scale of the problem, new tools are needed to examine how to increase the uptake and efficacy of various suicide prevention strategies. Measuring the attitudes school principals hold toward suicide prevention may be one avenue through which a new tool like the SPARS could enable greater implementation success.

The development of the SPARS aims to provide a tool to help explore the potential avenues offered by being able to measure attitudes toward suicide prevention. These include the potential ability to modify implementation strategies based on pre-existing attitudes and the potential of research studies to test whether changes in attitude are related to implementation success. To develop and collect initial validity evidence for the measure, multiple methods were used: a literature review, initial item drafting, quantitative and qualitative expert review, response process interviews with principals, and an examination of the psychometric properties of the measure using a sample of CA public-school principals. The psychometric analyses employed a variety of techniques drawn from descriptive psychometrics, exploratory and confirmatory factor analyses, and item response theory.

Overall, this study is a promising first step in articulating and operationalizing the construct of attitudes toward suicide prevention and its potential applications. The SPARS evidenced good internal consistency and model fit in an exploratory framework. However, it did not correlate with other measures as might be expected. A significant limitation of the current study is that the data collected showed prominent ceiling effects, potentially influencing the results of the various statistical analyses. Future measure development research is needed before the measure is used outside of the research context. This study hopes to inform next steps and new directions in creating tools to improve the implementation and success of suicide prevention initiatives, especially within the school context.

APPENDIX A

EXPERT REVIEW OF CONTENT VALIDITY

Construct Definition

Attitudes toward suicide prevention are defined as: *an individual's tendency to hold positive or negative evaluations toward suicide prevention in general.*

Instructions

Thank you very much for agreeing to serve as an expert reviewer for the initial items of a scale measuring people's attitudes toward suicide prevention. Please read the instructions below before proceeding.

Instructions

Attitudes toward suicide prevention are defined as: an individual's general tendency to hold positive or negative evaluations about suicide prevention. Using this construct definition above as a reference, please rate the following for each item.

How **certain** are you that the item represents the construct?

1. Not at all certain
2. Somewhat certain
3. Mostly certain
4. Very certain

How **relevant** do you think the item is to the construct?

1. Not at all relevant
2. Somewhat relevant
3. Mostly relevant
4. Very relevant

For example, it is possible that an item very **certainly** reflects the construct domain, but nonetheless be only slightly **relevant** overall.

	Certainty				Relevance			
	1	2	3	4	1	2	3	4
I feel anxious about suicide prevention.	○	○	○	○	○	○	○	○
I feel a sense of fulfillment from suicide prevention.	○	○	○	○	○	○	○	○
I think that any amount of effort is worth preventing one suicide.	○	○	○	○	○	○	○	○
I tend to participate in suicide prevention efforts.	○	○	○	○	○	○	○	○
I feel burdened by suicide prevention.	○	○	○	○	○	○	○	○
I think my actions can help prevent suicide.	○	○	○	○	○	○	○	○
I think suicide prevention is effective.	○	○	○	○	○	○	○	○

I feel engaged by suicide prevention.	○	○	○	○	○	○	○	○
I feel sad about suicide prevention.	○	○	○	○	○	○	○	○
I feel a sense of meaning from suicide prevention.	○	○	○	○	○	○	○	○
I feel frustrated by suicide prevention.	○	○	○	○	○	○	○	○
I tend to read about suicide prevention.	○	○	○	○	○	○	○	○
I feel a sense of safety from suicide prevention.	○	○	○	○	○	○	○	○
I feel motivated by suicide prevention.	○	○	○	○	○	○	○	○
I think I have a right to try to prevent suicides.	○	○	○	○	○	○	○	○
I tend to be involved in suicide prevention efforts.	○	○	○	○	○	○	○	○
I feel excited about suicide prevention.	○	○	○	○	○	○	○	○
I feel a sense of satisfaction from suicide prevention.	○	○	○	○	○	○	○	○
I think suicide prevention is worthwhile.	○	○	○	○	○	○	○	○
I tend to spend financial resources on suicide prevention.	○	○	○	○	○	○	○	○
I feel interested in suicide prevention.	○	○	○	○	○	○	○	○
I feel overwhelmed by suicide prevention.	○	○	○	○	○	○	○	○
I tend to spend time on suicide prevention.	○	○	○	○	○	○	○	○
I think talking openly about suicide prevention is important.	○	○	○	○	○	○	○	○
I feel embarrassed by suicide prevention.	○	○	○	○	○	○	○	○
I think suicide prevention is responsible.	○	○	○	○	○	○	○	○
I feel stressed about suicide prevention.	○	○	○	○	○	○	○	○
I think suicide prevention is realistic.	○	○	○	○	○	○	○	○
I feel scared by suicide prevention.	○	○	○	○	○	○	○	○
I tend to talk about suicide prevention.	○	○	○	○	○	○	○	○
I feel shameful about suicide prevention.	○	○	○	○	○	○	○	○
I feel hopeless about suicide prevention.	○	○	○	○	○	○	○	○
I feel optimistic about suicide prevention.	○	○	○	○	○	○	○	○
I feel passionate about suicide prevention.	○	○	○	○	○	○	○	○
I think preventing suicides is a reasonable goal.	○	○	○	○	○	○	○	○
I think everyone has a role to play in preventing suicide.	○	○	○	○	○	○	○	○
I feel empowered by suicide prevention.	○	○	○	○	○	○	○	○
I feel exhausted by suicide prevention.	○	○	○	○	○	○	○	○
I tend to encourage others to engage in suicide prevention.	○	○	○	○	○	○	○	○
I tend to advocate for suicide prevention.	○	○	○	○	○	○	○	○
I think preventing suicide is an important goal.	○	○	○	○	○	○	○	○
I feel uncomfortable with suicide prevention.	○	○	○	○	○	○	○	○
I tend to work toward preventing suicide.	○	○	○	○	○	○	○	○
I think suicide prevention is a good use of financial resources.	○	○	○	○	○	○	○	○
I think suicide prevention is important.	○	○	○	○	○	○	○	○
I think suicide prevention is necessary.	○	○	○	○	○	○	○	○
I tend to help others engage in suicide prevention.	○	○	○	○	○	○	○	○
I feel a sense of enjoyment from suicide prevention.	○	○	○	○	○	○	○	○
I feel worried about suicide prevention.	○	○	○	○	○	○	○	○
I tend to make decisions that support suicide prevention.	○	○	○	○	○	○	○	○
I tend to educate others about suicide prevention.	○	○	○	○	○	○	○	○
I think I have a responsibility to prevent people from dying by suicide.	○	○	○	○	○	○	○	○
I feel bored by suicide prevention.	○	○	○	○	○	○	○	○

I think preventing suicides is an obtainable goal.	○	○	○	○	○	○	○	○
I think suicide prevention is ethical.	○	○	○	○	○	○	○	○
I think suicide prevention is a good use of time.	○	○	○	○	○	○	○	○
I feel hopeful about suicide prevention.	○	○	○	○	○	○	○	○
I tend to take action to prevent suicide.	○	○	○	○	○	○	○	○
I think suicide prevention should be a priority.	○	○	○	○	○	○	○	○
I tend to include others in suicide prevention work.	○	○	○	○	○	○	○	○

Adapted from McCoach, Gable, & Madura, 2017

Qualitative Feedback

1. Should the construct definition be modified? If yes, how?
2. Should the wording of any item(s) be modified for clarity or readability? If yes, how?
3. Are important aspects of the construct not reflected by the items? If yes, what aspect(s)?
4. Are there other items that should be included? If yes, what do you suggest?

APPENDIX B

COGNITIVE INTERVIEW PROTOCOL

Instructions

[Interviewer reads aloud the following instructions.]

Please read each question aloud. Next, please 'think aloud' to share your thought process of how and why you select your response. I will likely ask you some clarifying questions as we go.

For example, if I were to read an item about travel aloud like, "Travel is an important part of my life," I might then think aloud, "I have to travel a lot for work and most of those trips are pretty important. But, I also very much enjoy seeing new places when I have the opportunity to take a vacation – although of course I wish I could go on vacations more often. So, based on that, I'd select "Strongly agree".

Does that make sense? [Pause for questions and answer them.]

Let's try the first item. Go ahead and read it aloud and let me hear what you're thinking as you answer.

[As uncertainty arises, use probes found in Peterson, Peterson, & Powell 2017 based on suspected source of the confusion.]

1. Item text.
2. Item text.
3. Item text.
4. Item text.
5. Item text.
6. Item text.
7. Item text.
8. Item text.
9. Item text.
10. Item text.

…

[Interviewer asks]

Were there items that were difficult to read or unclear? How so?
Were there items that you didn't feel were relevant to suicide prevention? How so?
Are there things that you were expecting to be asked but weren't? How so?
Did you feel distressed while responding to any of the items? How so?

APPENDIX C

COGNITIVE INTERVIEW MEASURE

SUICIDE PREVENTION ATTITUDES RATING SCALE

Purpose

This scale is designed to measure your attitudes toward suicide prevention. For this scale, suicide prevention is defined as the overarching goal and collective process of reducing the number of deaths by suicide.

Instructions

Read each of the following items and select the choice that best fits your response using the following options:

SD	**D**	**SWD**	**N**	**SWA**	**A**	**SA**
Strongly Disagree	Disagree	Somewhat Disagree	Neither agree nor disagree	Somewhat Agree	Agree	Strongly Agree

		SD	D	SWD	N	SWA	A	SA
1	I think that any amount of effort is worth preventing one suicide.	○	○	○	○	○	○	○
2	I tend to participate in suicide prevention efforts.	○	○	○	○	○	○	○
3	I think suicide prevention is effective.	○	○	○	○	○	○	○
4	I think suicide prevention is worthwhile.	○	○	○	○	○	○	○
5	I tend to spend financial resources on suicide prevention.	○	○	○	○	○	○	○
6	I think talking openly about suicide prevention is important.	○	○	○	○	○	○	○
7	I think suicide prevention is responsible.	○	○	○	○	○	○	○
8	I think suicide prevention is realistic.	○	○	○	○	○	○	○
9	I feel optimistic about suicide prevention.	○	○	○	○	○	○	○
10	I feel passionate about suicide prevention.	○	○	○	○	○	○	○
11	I think preventing suicides is a reasonable goal.	○	○	○	○	○	○	○
12	I think everyone has a role to play in preventing suicide.	○	○	○	○	○	○	○
13	I tend to encourage others to engage in suicide prevention.	○	○	○	○	○	○	○
14	I tend to advocate for suicide prevention.	○	○	○	○	○	○	○
15	I think preventing suicide is an important goal.	○	○	○	○	○	○	○
16	I think suicide prevention is a good use of financial resources.	○	○	○	○	○	○	○
17	I think suicide prevention is important.	○	○	○	○	○	○	○
18	I think I have a responsibility to prevent suicide.	○	○	○	○	○	○	○
19	I think preventing suicides is an obtainable goal.	○	○	○	○	○	○	○
20	I think suicide prevention is ethical.	○	○	○	○	○	○	○
21	I think suicide prevention is a good use of time.	○	○	○	○	○	○	○
22	I feel hopeful about suicide prevention.	○	○	○	○	○	○	○
23	I tend to take action to prevent suicide.	○	○	○	○	○	○	○
24	I think suicide prevention should be a priority.	○	○	○	○	○	○	○
25	I feel comfortable with suicide prevention.	○	○	○	○	○	○	○

APPENDIX D

ITEM REVISION CHART FROM RESPONSE PROCESS INTERVIEWS

#	Original Item	Notes from Interviews	Decision	Final
1	I think that any amount of effort is worth preventing one suicide.	What is effort? By whom?	Revise	I think any amount of personal effort is worth preventing one suicide.
2	I tend to participate in suicide prevention efforts.	What are 'suicide prevention efforts'?	Revise	I tend to participate in initiatives that try to prevent suicide.
3	I think suicide prevention is effective.	What does effective mean? Suicide prevention is effective in that it's reducing deaths, but not effective in that people are still dying. might be knowledge based. depends. Possibly change to suicide prevention can be effective?	Remove	
4	I think suicide prevention is worthwhile.		Retain	I think suicide prevention is worthwhile.
5	I tend to spend financial resources on suicide prevention.		Retain	I tend to spend financial resources on suicide prevention.
6	I think talking openly about suicide prevention is important.	Talking with whom? Adults? Kids?	Revise and Add	I think talking openly with adults about suicide prevention is important. I think talking openly with young people about suicide prevention is important.
7	I think suicide prevention is responsible.	Responsible to teach kids? Responsible for what? what does that mean? Responsible thing to do? Responsible for what? Thing to do? Responsible approach?	Revise	I think trying to prevent suicides is the responsible thing to do.
8	I think suicide prevention is realistic.	Suicide prevention is an realistic depends on if this means zero or just a reduction. Eradicating suicides totally is not realistic but decreasing suicide deaths is. Could be two questions. Realistic is unclear. Outcome? Effort? Needs elaborating. What is realistic?	Revise	I think preventing most suicides is a realistic goal.
9	I feel optimistic about suicide prevention.	Possibly redundent with 23	Revise	I feel optimistic when thinking about suicide prevention.
10	I feel passionate about suicide prevention.		Retain	I feel passionate about suicide prevention.
11	I think preventing suicides is a reasonable goal.	Possibly redundant with 8 and 19	Revise	I think it is reasonable to believe that most suicides can be prevented.
12	I think everyone has a role to play in preventing suicide.		Retain	I think everyone has a role to play in preventing suicide.
13	I tend to encourage others to engage in suicide prevention.	how so? By doing what?	Revise	I tend to encourage others to get involved in opportunities for suicide prevention.
14	I tend to advocate for suicide prevention.	Tend to advocate – advocate for programming or advocate not to die by suicide?	Revise	I tend to advocate for initiatives that try to prevent suicide.
15	I think preventing suicide is an important goal.	Is the goal some suicides or all suicides	Revise	I think reducing the number of suicides is an important goal.
16	I think suicide prevention is a good use of financial resources.		Retain	I think suicide prevention is a good use of financial resources.
17	I think suicide prevention is important.		Retain	I think suicide prevention is important.
18	I think I have a responsibility to prevent suicide.		Retain	I think I have a responsibility to prevent suicide.
19	I think preventing suicides is an obtainable goal.	depends on what we are trying to obtain. Reduced deaths or zero? might tap knowledge	Revise	I think a world with less suicide is obtainable.
20	I think suicide prevention is ethical.		Retain	I think suicide prevention is ethical.
21	I think suicide prevention is a good use of time.	Wondering about use of time – can you really quantify? Would change – hard to quantify time.	Remove	
22	I feel hopeful about suicide prevention.	might tap knowledge. 10 and 23 might be redundant.	Revise	I feel hopeful that there will be less suicide in the future.
23	I tend to take action to prevent suicide.	Difficulty interpreting the 'tend to' questions because it raises questions about what that looks like. For example – take action to prevent suicide, is that taking a knife out of someone's hand or something way upstream like creating a welcoming school?	Remove	
24	I think suicide prevention should be a priority.		Retain	I think suicide prevention should be a priority.
25	I feel comfortable with suicide prevention.	addressing? Talking about it? Doing it? Comfortable with what part?	Revise	I feel comfortable talking about suicide prevention.

Total Changes
Items Retained: 9
Items Revised: 13
Items Removed: 3
Items Added: 6

New questions
I think it is possible to prevent most suicides.
I think all suicides are preventable.
I feel motivated to prevent suicides.
I think reducing the number of suicides is obtainable.
I think it is useful to aspire to a world without suicide.

APPENDIX E

SPARS USED IN PRINCIPAL SURVEY

Instructions

This scale is designed to measure your attitudes toward suicide prevention. For this scale, suicide prevention is defined as the overarching goal and collective process of reducing the number of deaths by suicide. Here, suicide prevention does not refer to any specific initiatives or type of program but rather includes the full range of processes that may directly or indirectly prevent suicides.

Read each of the following items and select the choice that best fits your response. Please provide a response for all items.

		Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
1	I think any amount of personal effort is worth preventing one suicide.	○	○	○	○	○	○	○
2	I tend to participate in initiatives that try to prevent suicide.	○	○	○	○	○	○	○
3	I think suicide prevention is worthwhile.	○	○	○	○	○	○	○
4	I tend to spend financial resources on suicide prevention.	○	○	○	○	○	○	○
5	I think talking openly with adults about suicide prevention is important.	○	○	○	○	○	○	○
6	I think talking openly with young people about suicide prevention is important.	○	○	○	○	○	○	○
7	I think trying to prevent suicides is the responsible thing to do.	○	○	○	○	○	○	○
8	I think preventing most suicides is a realistic goal.	○	○	○	○	○	○	○
9	I feel optimistic when thinking about suicide prevention.	○	○	○	○	○	○	○
10	I feel passionate about suicide prevention.	○	○	○	○	○	○	○
11	I think it is reasonable to believe that most suicides can be prevented.	○	○	○	○	○	○	○
12	I think everyone has a role to play in preventing suicide.	○	○	○	○	○	○	○
13	I tend to encourage others to get involved in opportunities for suicide prevention.	○	○	○	○	○	○	○
14	I tend to advocate for initiatives that try to prevent suicide.	○	○	○	○	○	○	○
15	I think reducing the number of suicides is an important goal.	○	○	○	○	○	○	○
16	I think suicide prevention is a good use of financial resources.	○	○	○	○	○	○	○
17	I think suicide prevention is important.	○	○	○	○	○	○	○
18	I think I have a responsibility to prevent suicide.	○	○	○	○	○	○	○
19	I think a world with less suicide is obtainable.	○	○	○	○	○	○	○
20	I think suicide prevention is ethical.	○	○	○	○	○	○	○
21	I feel hopeful that there will be less suicide in the future.	○	○	○	○	○	○	○
22	I think suicide prevention should be a priority.	○	○	○	○	○	○	○
23	I feel comfortable talking about suicide prevention.	○	○	○	○	○	○	○
24	I think it is possible to prevent most suicides.	○	○	○	○	○	○	○
25	I think all suicides are preventable.	○	○	○	○	○	○	○
26	I feel motivated to prevent suicides.	○	○	○	○	○	○	○
27	I think reducing the number of suicides is obtainable.	○	○	○	○	○	○	○
28	I think it is useful to aspire to a world without suicide.	○	○	○	○	○	○	○

APPENDIX F

SPARS – FINAL STUDY VERSION

Purpose

This scale is designed to measure your attitudes toward suicide prevention. For this scale, suicide prevention is defined as the overarching goal and collective process of reducing the number of deaths by suicide. Here, suicide prevention does not refer to any specific initiatives or type of program but rather includes the full range of processes that may directly or indirectly prevent suicides.

Instructions

Read each of the following items and select the choice that best fits your response using the following options:

SD	**D**	**SWD**	**N**	**SWA**	**A**	**SA**
Strongly Disagree	Disagree	Somewhat Disagree	Neither agree nor disagree	Somewhat Agree	Agree	Strongly Agree

		SD	D	SWD	N	SWA	A	SA
1	I think that any amount of effort is worth preventing one suicide.	○	○	○	○	○	○	○
2	I tend to participate in suicide prevention efforts.	○	○	○	○	○	○	○
4	I tend to spend financial resources on suicide prevention.	○	○	○	○	○	○	○
8	I think preventing most suicides is a realistic goal.	○	○	○	○	○	○	○
13	I tend to encourage others to get involved in opportunities for suicide prevention.	○	○	○	○	○	○	○
14	I tend to advocate for initiatives that try to prevent suicide.	○	○	○	○	○	○	○
16	I think suicide prevention is a good use of financial resources.	○	○	○	○	○	○	○
17	I think suicide prevention is important.	○	○	○	○	○	○	○
20	I think suicide prevention is ethical.	○	○	○	○	○	○	○
21	I feel hopeful that there will be less suicide in the future.	○	○	○	○	○	○	○
22	I think suicide prevention should be a priority.	○	○	○	○	○	○	○
24	I think it is possible to prevent most suicides.	○	○	○	○	○	○	○
25	I think all suicides are preventable.	○	○	○	○	○	○	○
27	I think reducing the number of suicides is obtainable.	○	○	○	○	○	○	○

Note: Item numbers correspond to study item numbers for ease of future research.

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