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Distinguishing types of knowledge and the relationship to behavioral intentions in a student gatekeeper suicide prevention program

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Suicide is a critical public health concern which nationally accounts for approximately 34,000 deaths per year and is considered the 11th leading cause of death in the U.S, outranking even homicide (CDC, 2010; McIntosh, 2009). In Florida, suicide is the 9th leading cause of death. The prevalence of suicide among youth is especially startling; according to the Centers for Disease Control (2010), suicide is the third leading cause of death among 15-24 year olds with nearly 14 percent of high schools students having considered suicide within the past year (YRBS, 2010). More specifically, in Duval county, FL, approximately 14 percent of students had seriously considered suicide, and ten percent of these individuals had a suicide attempt that resulted in a visit to a health-care professional (YRBS, 2010). Given these concerning statistics, a great effort is being made to increase awareness and prevention of youth suicide.

One strategy that appears to be potentially beneficial in suicide prevention efforts is the implementation of a school-based gatekeeper training programs. The purpose of these programs is to educate the peers of at risk youths on how to identify, talk to, and refer suicidal youth to the proper channels to receive help. In other words, gatekeeper trainings are designed to raise awareness of suicide in communities and to implement an “identification and early intervention” plan (Capp, Deane, & Lambert, 2001). Schools provide a community wide access point in which to reach youths, which has led to student gatekeeper programs becoming one of the leading approaches for adolescent suicide prevention. Student gatekeeper programs are believed to increase knowledge about the warning signs and risk factors for suicide, and improve attitudes relating to depression and suicide (Aseltine & DeMartino, 2004; Aseltine, James, Schilling, & Glanovsky, 2007; Kalafat & Elias, 1994; Portzky & van Heeringen, 2006). In theory, these increases are believed to be associated with higher levels of peer referral behaviors; although, to

date, there is no empirical evidence to support this. However, one of these gatekeeper programs, the Signs of Suicide program (SOS), has shown to be effective in reducing suicidal ideation and self-reported suicide attempts through a randomized control study (Aseltine & DeMartino, 2004; Aseltine et al., 2007).

The Signs of Suicide Program

The Signs of Suicide program, a universal prevention program, contains both a screening component, along with an educational component (Aseltine & DeMartino, 2004; Aseltine et al., 2007). Students are asked to anonymously complete the Brief Screen for Adolescent Depression (BSAD), a screening tool derived from the DISC IV, to determine the student's level of depression, if any. If a student scores 4 or higher – considered clinical depression – he or she is strongly encouraged to immediately seek help from a trusted adult, such as a teacher or school counselor (Aseltine et al., 2007). The educational aspect of the SOS program emphasizes teaching students how to recognize the warning signs for depression and suicide among themselves and their peers. Additionally, the program promotes strategies on how to refer these peers to the appropriate individuals, such as a responsible adult, to receive help. Students are taught the acronym ACT: Acknowledge, Care, and Tell; Students must first *acknowledge* the signs of suicide that the peer displays, then express to the identified peer that he or she *cares* and wants to help, and finally *tell* a responsible adult (Aseltine & DeMartino, 2004; Aseltine et al., 2007).

Two randomized control studies have shown the Signs of Suicide program to be effective in increasing knowledge about depression and suicide in a diverse sample of high-school students (Aseltine & DeMartino, 2004; Aseltine et al., 2007). The first randomized control trial contained a sample of over 2,000 students from five different high schools in two different states

(Georgia and Connecticut). The control and the treatment group were comprised of just over 1,000 students each. Results show that those in the treatment group had higher knowledge and more adaptive attitudes about depression and suicide. The treatment group also showed significantly lower rates of suicide attempts, in comparison to the control group three months following the training (Aseltine & DeMartino, 2004).

The second randomized control study of the SOS program was a replication and extension of the first study yielding a sample size of 4,000 students from nine different high schools in three different states (Georgia, Connecticut, and Massachusetts). This large sample size provided an extensively, racially mixed and economically and geographically diverse sample. Similar to the first study, participants were randomly assigned to either a control or a treatment group. This study reinforced the findings of the first RCT finding that those in the treatment group showed higher levels of knowledge about depression and suicide and more adaptive attitudes towards these issues. Most importantly, in comparison to students in the control group, students who participated in the SOS training were 40% less likely to report attempting suicide in the three months following the training (Aseltine et al., 2007). To date, the SOS program is the only universal school-based prevention program that has been shown to be effective in reducing self-reported suicide attempts through two randomized control studies (Aseltine & DeMartino, 2004; Aseltine et al., 2007).

Despite much evidence supporting the effectiveness of school based suicide prevention programs, such as the SOS program, in increasing knowledge, there are limited findings that support the effectiveness of the programs in increasing the specific behaviors that are being taught (Wyman et al., 2008). In the two randomized control trials of the SOS program, there was a lack of support for the program in increasing a participants' behavior of seeking help for

themselves or for peers (Aseltine & DeMartino, 2004; Aseltine et al., 2007). Given this lack of literature supporting increases in referral behavior, more research is needed to examine the relationship between the variables that have already been demonstrated to be increased by these gatekeepers programs and factors related to referral behavior. In particular, some researchers have suggested that it is important to examine the mechanisms by which such a program may be influencing behavior through the use of a theory driven investigation (Brown et al., 2009; Shemanski Aldrich & Cerel, 2009). One such theory to explain how an individual chooses to participate in a behavior is the Theory of Planned Behavior.

Theory of Planned Behavior

Azjen's Theory of Planned Behavior (TPB) has been suggested as providing a sound theoretical basis for why people make behavioral choices (Brown et al., 2009; Shemanski Aldrich & Cerel, 2009). This theory and its various components have been widely supported across many fields, including smoking cessation, obesity studies, physical activity studies, and healthy eating habit studies (Eto, Koch, Contento, & Adachi, 2011; Høie, Moan, Rise, & Larsen, 2012; Macy, Middlestadt, Seo, Kolbe, & Jay, 2011; White, Terry, & Hogg, 1994). In addition, TPB has been explored in the field of suicide prevention (Brown et al., 2009; Capp, et al., 2001; Shemanski et al., 2009).

For the purpose of this study, the TPB is used as a framework to guide the application of perceived behavioral control (PBC) in our distinction of knowledge types. The immediate precursor to behavior is the individual's *intention* to perform it; the stronger the intentions, the higher the probability of performing the given behavior (Azjen, 1986). Intentions are influenced by PBC, attitudes towards the behavior, and subjective norms. PBC is defined as the individual's confidence in performing the behavior in question. Attitudes toward a behavior are defined as the

positive or negative appraisals of the behavior by the individual, and subjective norms are defined as the social influences and pressures involved in the actual performance of the given behavior. According to TPB, subjective norms are determined by normative beliefs, or the concern for approval or disapproval by influential groups, experts, or authoritative figures (with respect to the behavior) for performing the behavior. Attitudes are determined by beliefs about the consequences of the given behavior, while the resources, past experience, and opportunities available to the individual, determine PBC.

PBC can be affected by multiple external factors including opportunity, time, and the cooperation of others in some cases, as well as internal factors including planning, abilities, skills, and knowledge (Ajzen, 1986). In particular, the internal factor of knowledge has been shown to be an important concept in improving an individual's self-efficacy, a construct that has been considered closely related to perceived behavioral control (Ajzen, 2002). Self-efficacy is defined as an individual's confidence in their ability to perform a given action (Bandura, 1977). In a study examining preadolescent females' preventative behavior for osteoporosis, knowledge was found to be a predictor of greater self-efficacy (Ievers-Landis et al. 2003).

A particularly important characteristic of PBC, and the related construct of self-efficacy, is that it is exclusive to a specific type of behavior (Brown, et al., 2011; King, Strunk, & Sorter, 2011). That is to say, one has a perception of control over the individual processes leading up to the behavior in question – in the case of this study, referral behavior. For instance, in our study, there is PBC over identifying a suicidal individual, over talking to a suicidal individual or to an adult about a suicidal individual, and over referring the suicidal individual to a responsible adult. Given this information, we believe that specific knowledge is a key concept in providing

individuals with a higher sense of control over the performance of a specific behavior, ultimately increasing the likelihood of performing the specific, individual behaviors.

The Theory of Planned Behavior has been employed in the field of suicide prevention to help assess the performance of future behaviors. For example, in a study implementing a suicide gatekeeper training in an Aboriginal community, the TPB was applied to examine intentions of future help seeking and help giving behaviors (Capp et al., 2001). Prior to developing and implementing the gatekeeper training, discussion groups were conducted in order to determine the current level of knowledge about suicide, attitudes toward suicide, and to address the core issues for not offering and/or seeking help. This evaluation particularly focused on PBC, which the authors referred to as “the barriers of help seeking behaviors” (Capp et al., 2001, p. 317). The measure contained six PBC questions relating to internal and external control factors including knowledge, intentions, and confidence. The results indicated a significant increase in knowledge and confidence over time; however, these gains were not significantly related to increases in intentions to refer a suicidal individual (Capp et al., 2001). This lack of relationship is disconcerting, since the purpose of gatekeeper programs is not to increase knowledge and confidence per se, but rather to translate that knowledge and confidence into actual suicide prevention behaviors, such as making referrals. However, studies in the suicide prevention field such as this one may be obscuring potential relationships due to a methodological flaw – nearly all studies have analyzed knowledge as a single construct.

Inconclusive evidence as to whether knowledge gain has any relation to intended referral behavior may be in part due to the way knowledge has been examined in this field. While researchers in the suicide prevention field have mostly examined knowledge gain as a single construct, researchers in other areas of study have suggested that knowledge gain is a multilevel

construct and should be examined as such in order to maximize efficient learning (Cross, Matthieu, Cerel, & Knox, 2007; Keller et al., 2009; Rittle-Johnson, Star, & Durkin, 2009). Unfortunately, this differentiation of knowledge has not yet been explored in student gatekeeper programming. However, in fields such as education (Rittle-Johnson et al., 2009), business psychology (Weitz, Sujan, & Sujan, 1986) cognitive science (ten Berge & van Hezewijk, 1999), and even sports sciences (Elferink-Gemser, Kannekens, Lyons, Tromp, & Visscher, 2010), we have learned the importance of distinguishing between declarative (*fact-based*), and procedural (*how to*) knowledge in examining behavioral outcomes.

Knowledge

Knowledge is defined as “the fact or condition of being aware of something” and “the range of one's information or understanding.” (“Knowledge,”) Knowledge has further been differentiated into declarative and procedural knowledge. According to Ellis (1993), the terms “declarative” and “procedural” knowledge were originally coined in 1949 by philosopher Gilbert Ryles. These terms were subsequently adopted by cognitive psychologist John Anderson, who also made the distinction between the knowledge types in his studies (Anderson, 1982; Ellis, 1993). Previous research has shown that procedural knowledge is more closely related to actual behavior in comparison to declarative knowledge (Ellis, 1993; Weitz et al., 1986). However, the significance of procedural knowledge for behavior has been often disregarded in comparison to the attention that declarative knowledge has received amongst the available cognitive psychological research (ten Berge & van Hezewijk, 1999).

Several theories have tried to explain the importance of procedural knowledge and its relation to behavior. Originally developed by John Anderson, the ACT Theory of Cognition is a cognitive framework for skill acquisition that includes two types of knowledge, Declarative and

Procedural Knowledge. In this framework, declarative knowledge is associated with facts that individuals describe to others and are aware of; alternately, procedural knowledge is knowledge on how to perform an action (Anderson, Matessa, & Lebiere, 1997; ten Berge & van Hezewijk, 1999). The ACT Framework posits two stages in the skill acquisition process, beginning with the declarative stage which progresses to the procedural stage (Anderson, 1982; Weitz, et al., 1986). Anderson suggests that all knowledge initially begins as declarative knowledge, which is later transformed into procedural knowledge (Anderson, 1982). The second stage of knowledge acquisition is referred to as the “knowledge compilation” stage (Anderson, 1982; Weitz, et al., 1986). According to the stages of knowledge acquisition, the final procedural stage is where one refines or perfects the knowledge gained into information that can be used to guide action (Anderson, 1982; Weitz, et al., 1986). Interestingly, this distinction in knowledge type has been supported by research in other fields.

Declarative Knowledge. Declarative knowledge is defined as the type of knowledge relating to facts, concepts, definitions, and rules within a specific field (de Jong, & Ferguson-Hessler, 1996). Also recognized as conceptual knowledge (de Jong, & Ferguson-Hessler, 1996; Glasson, 1989; Rittle-Johnson, Siegler, & Alibali, 2001), declarative knowledge is fact-based knowledge that can be verbally expressed; however, it cannot be physically performed (de Jong, & Ferguson-Hessler, 1996, ten Berge & van Hezewijk, 1999). Therefore, declarative knowledge can be more closely related to covert behaviors which cannot be observed by others (Miltenberger, 2008; ten Berge & van Hezewijk, 1999). An example of declarative knowledge would be *knowing that* Florida is in the Southeastern United States on a map (Camerer & Hogarth, 1999). It is important to note that declarative knowledge primarily guides the learning

of a behavior; this has been supported by previous research (Anderson, 1982; Ellis, 1993; McPherson & Thomas, 1989; Rittle-Johnson et al., 2009).

One theory that suggests that declarative knowledge is the initial guide to the learning process is the concept-first theory of knowledge development. This theory proposes that individuals initially gain conceptual knowledge, which is another term used for declarative knowledge (Glasson, 1989; Rittle-Johnson et al., 2001). Another study that supports this theory is one by Matthews and Rittle-Johnson (2009) which found that knowledge gain depends partly on the type of instruction given. In a study examining the influence of instruction type on mathematical equation knowledge, conceptual instructions resulted in higher levels of conceptual knowledge, while procedural explanations yielded higher levels of procedural knowledge (Glasson, 1989; Rittle-Johnson et al., 2009). Although this study concluded that conceptual instruction could be slightly more efficient than procedural instruction, accurately solving a mathematical equation does not require a physical action. In this context declarative knowledge can be potentially more relevant. However, in other fields that are more closely related to physical behaviors, declarative knowledge is not a distinguishing factor.

A study by Elferink-Gemser et al. (2010) examined the relationship between self-assessed tactical skills and performance differences amongst young field hockey players. Tactical skills were assessed by measuring players' knowledge of the sport using the Tactical Skills Inventory for Sports (TACSIS; (Elferink-Gemser, Visscher, Richart, & Lemmink, 2004). The TACSIS scale measured procedural and declarative knowledge across three different performance levels including average (regional), high (sub-elite), and very high (elite) levels of performance. There were no significant differences in the levels of declarative knowledge between the elite and the sub-elite groups. In other fields that focus more on the performance of a

behavior, studies have demonstrated that declarative knowledge may not be adequate enough to change behavior. On the other hand, these fields have found procedural knowledge to be more relevant in determining actual behaviors.

Procedural Knowledge. Procedural knowledge is defined as that type of knowledge relating to actions or procedures; knowledge on how to do something, how to operate, or how to perform specific behaviors (Anderson, 1982; Ellis, 1993). This type of knowledge is also considered instruction oriented knowledge (Turban & Aronson, 1988). It is considered more of a skill acquired to execute a behavior that can be acted out. This type of knowledge can be more closely related to overt behaviors which can be observed and recorded by others (Anderson, 1989; Miltenberger, 2008; Rittle-Johnson et al., 2001; ten Berge & van Hezewijk 1999). An example of procedural knowledge would be *how to* use a map to get around in Florida (Camerer & Hogarth, 1999). As mentioned previously, procedural knowledge has been supported by previous research as a positive indicator of actual behavior.

Weitz et al. (1986) found a positive correlation between the efficiency of adaptive selling and increased levels of procedural knowledge. In sales, it is imperative to develop an expert level of *knowledge structures* based on previous sales behaviors, sales situations, and the possible link between particular behaviors and their situations. When a salesperson engages with a customer, he/she must tactfully gather information about the customer in order to relate their prior knowledge to the current sales situation. Therefore, higher levels of procedural knowledge appear to be the discriminating factor of *expert knowledge structures* (Weitz et al., 1986). In fact, the procedural knowledge questions were significantly correlated with ratings of work effort performance. Procedural knowledge has also been shown to be a valid predictor of internship and job performance among Belgian medical students (Lievens & Sackett, 2011). Researchers

have concluded that procedural type questions were accurate predictors of actual job performance (Motowidlo, Crook, Kell, & Naemi, 2009).

Previous research in the sports field has also suggested that higher procedural knowledge is associated with improved performance. In the same study mentioned previously examining performance differences in hockey players, no differences were found in the level of declarative knowledge amongst the highest performance levels of hockey players. However, on procedural knowledge questions, elite level athletes significantly outscored both of the other levels (Elferink-Gemser et al., 2010). A recent study examining talent development in soccer players by Kannekens and colleagues also found that those with higher procedural knowledge relating to tactical skills were seven times more likely to reach professional soccer performance levels than those with lower levels of procedural knowledge (Kannekens, Elferink-Gemser, & Visscher, 2011). Furthermore, the authors of this study declared procedural knowledge “the factor that best differentiates between the more and the less successful players in the future”(p.850). Based on the findings from these studies, it seems likely that examining procedural and declarative knowledge separately in suicide prevention trainings may lead to clarification of the relationship between knowledge and subsequent behavior.

Current Study

While past research has demonstrated that suicide prevention gatekeeper trainings do indeed increase knowledge, no studies to date have examined the specific types of knowledge gained in an adolescent population (Aseltine & DeMartino, 2004; Aseltine et al., 2007; Cusimano & Sameem, 2011). In order to investigate how different types of knowledge may be related to suicide prevention outcomes, this study examined the relationships between procedural

knowledge, declarative knowledge, and perceived behavioral control of referral behavior following a school-based suicide prevention program.

Specific Aim 1. As detailed above, previous research in other fields suggests that initial learning of a behavior is guided primarily by declarative knowledge (Anderson, 1982; Ellis, 1993; McPherson & Thomas, 1989; Rittle-Johnson et al., 2009). Building on this existing research in other fields, we proposed the following hypotheses:

Hypothesis 1: Immediately following the training, declarative knowledge will be significantly higher than procedural knowledge

Hypothesis 2: From post-training to follow up, participants' procedural knowledge will decline less than participants' declarative knowledge.

Specific Aim 2. Past studies have shown increased knowledge to be related to increased self-efficacy, or perceived behavioral control (Ievers-Landis et al., 2003). Additionally, recent research has also demonstrated that perceived behavioral control (PBC) is highly specific in relation to intended behaviors (Brown et al., 2011; King et al., 2011). Given this postulation, in this study perceived behavior control was separated based on behavior type. For the purpose of this study, the various PBCs were categorized as being associated with either declarative or procedural knowledge. Behaviors which require a higher level of action were classified as procedural in type (i.e. talking and referring), while more covert behaviors that rely primarily on facts were considered declarative in type (i.e. identifying), since declarative knowledge is defined as being “fact-based”(Anderson, 1982).

Hypothesis 3a: Procedural knowledge will be significantly related to PBC over the behaviors of talking and referring at follow up.

***Hypothesis 3b:** Procedural knowledge will not be significantly related to PBC over the behavior of identifying an at-risk peer at follow up.*

***Hypothesis 4a:** Declarative knowledge will be significantly related to PBC over the behavior of identifying an at-risk peer at follow up.*

***Hypothesis 4b:** Declarative knowledge will not be significantly related to PBC over the behaviors of talking and referring at follow up.*

Method

Participants

Participants for this study were 1095 students from four high schools trained in the Signs of Suicide (SOS) program. The majority of students in this sample identified as Caucasian (35.9%); approximately 27.6% of students were African American, approximately 12% identified as Hispanic/Latino/a, 5% identified as Asian, 2% identified as Native Hawaiian, less than 1% identified as American Indian or Alaskan Native, and 9% were of an unlisted identification. The age range was between 14-19 years old; the majority of students were in 11th grade, making up 49.3% of our sample while only 12.5% were in 9th grade, 7% were in 10th grade, and 21.2% were in 12th grade. Females constituted 51.2% percent of the sample, whereas 41.8% percent were male, and .5% identified as transgender. Participants were recruited as part of the Florida Adolescent Suicide Awareness and Prevention (ASAP) project, a SAMSHA funded project to implement and evaluate suicide prevention efforts in Florida.

Measures

The survey used for this study was developed explicitly for the ASAP project based on the research literature and the prior work of the ASAP research team (Elzy et al., 2011). Three different versions of the survey were created – pre-test, post-test, and follow up; the surveys

included 26, 35, and 24 items, respectively, relating to the following constructs: (1) Demographics, (2) Attitudes towards SOS training, (3) Intention to take action, (4) Subjective norms regarding taking action, (5) Intentions to participate, (6) Perceived behavioral control, (7) Knowledge about depression and suicide, (8) Behavioral participation, (9) Perceived peer participation/Climate, (10) Perceived teacher engagement, (11) Alliance, (12) Training fidelity, and (13) Action taking behavior (Elzy et al., 2011). Only the constructs of knowledge about depression and suicide and perceived behavioral control over referral behavior were examined in this study.

Knowledge About Depression and Suicide. Participants' knowledge about depression and suicide was assessed using six multiple-choice items and one true/false item. Items contained questions relating to warning signs of suicide, risk factors for suicide, and referral sources. Knowledge items were classified as either procedural or declarative knowledge by 19 suicide prevention researchers. These researchers included faculty members, graduate students, and research assistants with previous experience in the field of suicide prevention. Knowledge items 4 and 7 were coded as procedural knowledge questions by 94.7% of researchers while questions 1 and 3 were categorized as procedural knowledge by only 57.4% of raters. Although items 1 and 3 were not clearly within either domain according to the suicide prevention raters, the primary investigator decided to classify the items as procedural knowledge since the majority of raters made this classification, and this classification was consistent with what was theorized by the primary investigator. Questions 2, 5, and 6 were coded as declarative knowledge questions by 100% of researchers.

Procedural Knowledge. Surveys contained four items relating to procedural knowledge (See Appendix A below). The first three items were multiple choice items, examining referral

sources and strategies on how to talk to a suicidal youth. For example, the items inquire about the suitable locations to which youths can refer a suicidal friend, whether or not youths should ask about suicidal thoughts, and the best way to respond to a suicidal friend. The fourth item measuring procedural knowledge was a true or false item asking the youth if he or she should keep their friend's suicidal contemplations a secret if their friend asked them not to tell.

Declarative Knowledge. Three multiple choice items assessed declarative knowledge, including questions about the risk factors for suicide and warning signs of depression and suicide. (See Appendix B Below).

Perceived Behavioral Control. Perceived behavioral control over referral behavior was assessed with five items (three items at pre and post training and five items at follow up time-points; See Appendix C below). Participants rated statements on a 5-point scale, ranging from 1 (strongly agree) to 5 (strongly disagree). Surveys contained items relating to a student's perceived behavioral control over various referral behaviors, including identifying and talking to a suicidal youth.

Procedure

Data used for this study was part of the evaluation of The Florida Adolescent Suicide Awareness and Prevention project (ASAP), a three year SAMHSA funded project to implement and evaluate the state of Florida's suicide prevention plan in Duval County, Florida. As part of the ASAP grant, an adult gatekeeper program, "Question Persuade and Refer (QPR)", was implemented in four high schools in Duval County, beginning in the fall of 2009, prior to the administration of the SOS program. The SOS training was implemented in the first school beginning in the fall of 2010, the second and third schools in the spring of 2011, and the fourth school in the fall of 2011, once 60% of the school staff was trained through the QPR program.

QPR trained staff members, specifically health education teachers in each school, delivered the SOS trainings in the classrooms and were supervised by trained community partners affiliated with the ASAP program. These programs train both staff and students in the schools to recognize signs of suicidality in youth with whom they come in contact. Prior to implementing the student gatekeeper trainings in the high schools, an adult gatekeeper training is implemented to train school staff and other adults in the community in suicide awareness and prevention. In addition to the pre-existing community resources, the newly trained staff and community members are able to serve as supplementary resources to subsequently trained students who may identify a potentially suicidal peer in the school setting.

Signs of Suicide Training.

Trainer Characteristics. Trainers consisted of 9 health teachers; including 5 white females, 3 black or African-American females, and one white male between the ages of 28-55. As mentioned previously, all SOS trainers had been previously trained through the adult gatekeeper program (QPR), which was delivered under the same grant. The majority of the trainers (66.7%) held a Bachelor's degree, while the remaining 33.3% held a Master's degree.

Gatekeeper Training. In the gatekeeper component of the SOS program, students watched a 50 minute *Friends for Life* video with a guided classroom discussion, which contained various vignettes depicting teens suffering from depression and suicidality. The video lists several warning signs as well as ways to respond to an identified peer by using the ACT (*acknowledge* the signs of suicide, *express* to the identified peer that he or she *cares*, and *tell* a responsible adult) mechanism. The video also included real interviews with individuals who have been affected by suicide.

Screening Component. At the completion of the discussion of the *Friends for Life* video, members of the ASAP team distributed screening cards to all students who participated in the training. In these cards, students could anonymously check if they wanted to speak to a guidance counselor about either themselves or a friend they were concerned. To ensure anonymity, all students, regardless of whether or not they marked to speak to a guidance counselor, were instructed to turn in their screening cards. Immediately following the completion of the training, members of the ASAP staff reviewed the response cards in a separate room and students who marked that they would like to speak to a guidance counselor were contacted by the school guidance counselor within 24 hours of the training.

Data Collection

High-school students in select health classes were invited to participate in the Signs of Suicide (SOS) training. Parental consent and youth assent were obtained prior to the youth participating in the training. Trainings were part of regularly scheduled classes and were taught by QPR trained health instructors. Trainings were completed within a normal class period, and were evaluated for accurate delivery of core components of the training. Pre- and post-tests were administered to participants prior to and following the SOS training. Follow up measures were obtained through the completion of phone and on-line surveys one and three months following the SOS training. Surveys were administered at four time points (pre-training, immediately following the training, and one- and three- months following the training). Items pertaining to knowledge about suicide and depression and perceived behavioral control relating to referral behavior were measured at all four time points; subsequent referral behavior was evaluated at one- and three-month follow up. For the purposes of this study, only the first three time points (pre-, post, and one month follow up) were utilized in analyses.

Data Analysis

Descriptive statistics were computed to determine the means, standard deviations, and ranges of each variable in this sample. To test hypotheses one and two, paired-sample t-tests were conducted to compare levels of declarative and procedural knowledge, both immediately following the SOS training and one-month following the training, in order to determine which type of knowledge is greater at each time point. For hypothesis three, Pearson product-moment correlations were used to examine the relationships between procedural knowledge and perceived behavioral control over the behaviors of talking to, referring, and identifying a suicidal individual at one-month follow-up. Similarly, for hypothesis four, Pearson product-moment correlations were used to examine the relationships between declarative knowledge and perceived behavioral control over all three referral behaviors at follow-up.

Results

Descriptive Statistics

Descriptive statistics are presented in Table 1.

Knowledge about depression and suicide. Participants' total knowledge of suicide prevention information scores were highly negatively skewed prior to training ($M=0.74$, $SD=0.18$; See table 1), meaning that the distribution had a longer left tail consisting of a greater number of larger values than expected within a normal distribution. Their knowledge improved significantly as a result of participation in training ($M=0.89$, $SD=0.14$; $t(797)=-23.06$, $p<.001$), demonstrating an increase of 14.9%. Students retained high levels of knowledge at one-month follow-up ($M=0.85$, $SD=0.16$), maintaining statistically significant improvement from pre-test ($t(589)=-12.5$, $p<.001$), but a small but significant decrease from post-test ($t(583)=5.67$, $p<.001$).

The distribution of the scores at both post-test and at one-month follow-up remained highly negatively skewed.

Procedural knowledge. Participants' knowledge of procedural suicide prevention information was moderately negatively skewed and platykurtotic, indicating a lower peak with shorter, thinner tails, prior to training ($M=0.69$, $SD=0.25$). There was a significant increase in procedural knowledge as a result of participation in training ($M=0.88$, $SD=.17$; $t(797)=-20.60$, $p<.001$), with scores demonstrating an increase of 18.5%. Scores for this variable were highly negatively skewed. Students retained high levels of procedural knowledge at one-month follow-up ($M=0.84$, $SD=0.19$), maintaining statistically significant improvement from pre-test ($t(589)=-12.45$, $p<.001$), but a small but significant decrease from post-test ($t(583)=5.67$, $p<.001$; See table 1). However, at follow-up scores were highly negatively skewed.

Declarative knowledge. Participants' knowledge of declarative suicide prevention information was high even prior to training ($M=0.81$, $SD=0.22$); scores showed moderate negative skewness. However, there was still a significant increase in declarative knowledge as a result of participation in training ($M=0.91$, $SD=.17$; $t(796)=-12.55$, $p < .001$), with scores demonstrating an increase of 10.3%. Scores at this time point showed high negative skewness. Students retained high levels of knowledge at one-month follow-up ($M=0.86$, $SD=0.21$), maintaining statistically significant improvement from pre-test ($t(588)=-4.24$, $p < .001$), but a small but significant decrease from post-test ($t(582)=4.98$, $p<.001$; See table 1). Students' scores at follow up remained highly negatively skewed.

Perceived behavioral control. Due to time constraints associated with conducting evaluations in school settings, only procedural perceived behavioral control was assessed at pre-

and post- time points; both procedural and declarative perceived behavioral control were measured at the one-month follow up time point. As such, descriptive statistics for overall perceived behavioral control are not discussed across time points as pre- and post- time points are identical to procedural PBC (See Table 1 for more information).

Procedural Perceived Behavioral Control (over the behaviors of talking and referring).

Participants' procedural perceived behavioral control (over the behaviors of talking to or referring an at-risk youth) was moderate prior to training (79.2%; $M=3.96$, $SD=0.81$); Scores showed moderate negative skewness. There was a significant increase in procedural perceived behavioral control as a result of participation in training (85.4%; $M=4.27$, $SD=.77$; $t(842)=-11.79$, $p < .001$), with scores demonstrating an increase of 6.2%. The distribution for students' post-test scores remained highly negatively skewed. Students retained high levels of procedural perceived behavioral control at one-month follow-up (86.0%; $M=4.30$, $SD=0.70$), maintaining statistically significant improvement from pre-test ($t(628)=-10.58$, $p < .001$). Scores were highly negatively skewed. There was no change from post-test to follow up ($t(624)=-1.60$, $p=.11$; See table 1).

Declarative Perceived Behavioral Control (over the behavior of identifying). Due to time constraints associated with conducting evaluations in school settings, declarative perceived behavioral control was only assessed at follow up. Participants scores of declarative perceived behavioral control (over the behavior of identifying an at-risk youth) at one month post training were highly negatively skewed (87.0 %; $M=4.35$, $SD=0.83$).

Table 1.

Descriptive statistics and statistical assumption information for measures of knowledge and PBC.

Subscales	N	Mean (SD)	Min / Max	Range	Skewness	Kurtosis
<i>Overall Knowledge</i>						
Pre-Test	927	0.74 (0.18)	0.00 / 1.00	1.00	-7.85	0.64
Post-Test	908	0.89 (0.14)	0.14 / 1.00	.86	-1.86	5.40
1Month Follow-up	659	0.85 (0.16)	0.00 / 1.00	1.00	-1.51	3.41
<i>Procedural Knowledge</i>						
Pre-Test	927	0.69 (0.25)	0.00 / 1.00	1.00	-0.59	-0.19
Post-Test	908	0.88 (0.17)	0.00 / 1.00	1.00	-1.45	2.70
1Month Follow-up	659	0.84 (0.19)	0.00 / 1.00	1.00	-1.47	3.11
<i>Declarative Knowledge</i>						
Pre-Test	926	0.81 (0.22)	0.00 / 1.00	1.00	-0.84	0.28
Post-Test	908	0.91 (0.17)	0.00 / 1.00	1.00	-2.05	4.85
1Month Follow-up	658	0.86 (0.21)	0.00 / 1.00	1.00	-1.44	1.95
<i>Perceived Behavioral Control (PBC)</i>						
Pre-Test ¹	976	3.96 (0.81)	1.00 / 5.00	4.00	-0.87	0.91
Post-Test ¹	961	4.27 (.077)	1.00 / 5.00	4.00	-1.14	1.42
1Month Follow-up (Procedural)	703	4.30 (0.70)	1.00 / 5.00	4.00	-1.00	0.96
1Month Follow-up (Declarative)	701	4.35 (0.83)	1.00 / 5.00	4.00	-1.29	1.60

¹ Due to time constraints associated with conducting evaluations in school settings, only procedural perceived behavioral control was assessed at pre- and post- time points; both procedural and declarative perceived behavioral control were measured at the one-month follow up time point.

Correlations

Procedural knowledge was slightly positively correlated with declarative knowledge at all time points (Pre-test: $r=.16, p < .001$; Post-test: $r=.14, p < .001$; Follow-up: $r=.16, p < .001$).

Procedural perceived behavioral control was highly positively correlated with declarative PBC at follow up ($r=.75, p < .001$). Correlations for all constructs can be found in Table 2.

Hypothesis Testing

Hypothesis 1: *Immediately following the training, declarative knowledge will be significantly higher than procedural knowledge.*

A paired-samples t-test was conducted to compare the levels of declarative and procedural knowledge immediately following the training. There was a small but significant difference in the scores for declarative knowledge ($M = 0.91, SD = 0.17$) and procedural knowledge ($M = 0.88, SD = 0.17$) immediately following the SOS training, $t(907) = -4.52, p < .001; d = 0.19$, indicating that declarative knowledge is 3% higher than procedural knowledge immediately following training².

Hypothesis 2: *From post-training to follow up, participants' procedural knowledge will decline less than participants' declarative knowledge.*

A second paired-samples t-test was conducted to compare the change in declarative and procedural knowledge from immediately after to one month following the SOS training. Contrary to what was hypothesized, there was no significant difference in participants' change in knowledge scores from post-test to follow-up for procedural ($M = .03, SD = 0.17$) and declarative knowledge ($M = .05, SD = 0.22$), $t(582) = 1.56, p = .12, d = -0.23$, indicating that there was no significant difference in participants' rate of decline in procedural and declarative knowledge.

² This significant difference was also maintained when examining pre- to post-change scores for procedural ($M = 0.18, SD = 0.24$) and declarative ($M = 0.10, SD = 0.24$) knowledge, $t(796) = 6.44, p < .001$.

Participants demonstrated no significant differences between levels of procedural ($M = .84$, $SD = 0.19$) and declarative ($M = .86$, $SD = 0.21$) knowledge one month following the training ($t(657) = -1.90$, $p = .06$; $d = -0.11$; see figure 1).

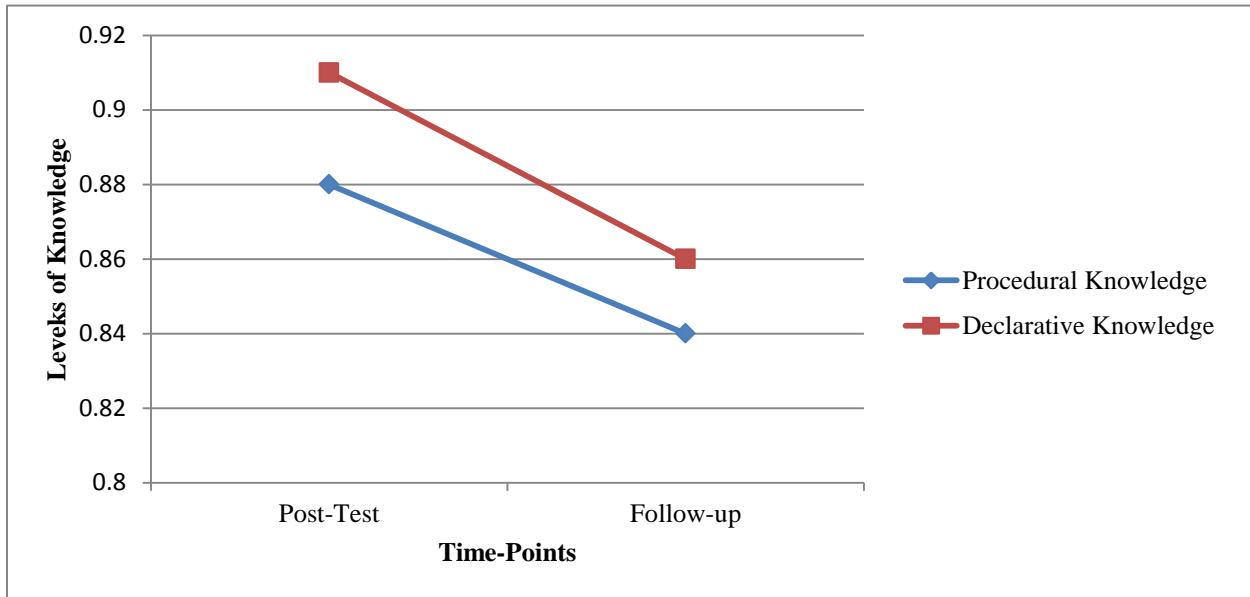


Figure 1. Levels of knowledge at post and follow up time points.

Hypothesis 3a: *Procedural knowledge will be significantly related to procedural PBC (over the behaviors of talking and referring) at follow up.*

Pearson product-moment correlations were used to determine the level of association between procedural knowledge as measured immediately after the training and procedural perceived behavioral control at follow-up. There was a small but significant positive correlation between procedural knowledge and procedural perceived behavioral control ($r = .11$, $p < .05$), indicating that higher levels of procedural knowledge at post-test were associated with greater perceptions of behavioral control over the behaviors of talking to a suicidal individual, talking to a responsible adult, and referring a suicidal youth

Hypothesis 3b: *Procedural knowledge will not be significantly related to declarative PBC (over the behavior of identifying an at-risk peer) at follow up.*

Similarly, Pearson product-moment correlations were used to determine the level of association between procedural knowledge as measured immediately after the training and declarative perceived behavioral control at follow-up. Contrary to what was hypothesized, a small but significant positive relationship was found between procedural knowledge and declarative perceived behavioral control ($r = .18, p < .001$), indicating that higher levels of procedural knowledge at post-test were associated with greater perceptions of behavioral control over the behavior of identifying a suicidal peer.

Hypothesis 4a: Declarative knowledge will be significantly related to declarative PBC at follow up.

Pearson product-moment correlations were used to determine the level of association between declarative knowledge as measured immediately after the training and declarative perceived behavioral control at follow-up. Contrary to what was hypothesized, there was not a significant association between the two variables ($r = .02, p = .59$), indicating that higher declarative knowledge is not associated with greater perceptions of behavioral control over the behavior of identifying an at-risk peer.

Hypothesis 4b: Declarative knowledge will not be significantly related to procedural PBC at follow up.

Pearson product-moment correlations were used to determine the level of association between declarative knowledge as measured immediately after the training and procedural perceived behavioral control at follow-up. As hypothesized, there was not a significant association between the two variables ($r = .01, p = .83$), indicating that higher declarative knowledge is not associated with greater perceptions of behavioral control over the behaviors of talking to and referring an at-risk peer.

Table 2. *Correlations between all variables.*

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Pre-Test Knowledge Overall	-	.38	.32	.86	.34	.27	.64	.26	.24	.20	.15	.11	.09
2. Post-Test Knowledge Overall		-	.43	.32	.85	.43	.25	.74	.24	.04	.20	.08	.14
3. Follow-up Knowledge Overall			-	.32	.43	.85	.13	.23	.76	.08	.12	.25	.22
4. Pre-Test Procedural Knowledge				-	.35	.34	.16	.14	.16	.24	.16	.16	.12
5. Post-Test Procedural Knowledge					-	.52	.14	.28	.13	.05	.19	.11	.18
6. Follow-up Procedural Knowledge						-	.02	.12	.29	.11	.15	.25	.25
7. Pre-Test Declarative Knowledge							-	.28	.22	.03	.06	-.02	-.00
8. Post-Test Declarative Knowledge								-	.26	.01	.12	.01	.02
9. Follow-up Declarative Knowledge									-	.01	.03	.15	.09
10. Pre-Test Procedural Perceived Behavioral Control ⁱ										-	.48	.38	.30
11. Post-Test Procedural Perceived Behavioral Control ⁱ											-	.52	.48
12. Follow-up Procedural Perceived Behavioral Control												-	.75
13. Follow-Up Declarative Perceived Behavioral Control													-

Note: Correlations significant at the $p < .001$ level are highlighted in bold

Discussion

The purpose of this study was to determine if different types of knowledge serve different roles relative to an individual's confidence in performing different types of referral behaviors following a student gatekeeper training. While suicide prevention research shows that student gatekeeper trainings have proven to be effective in increasing knowledge, there has been a lack of evidence supporting increases in actual referral behaviors (Aseltine & DeMartino, 2004; Aseltine et al., 2007). This suggests that more needs to be learned about the mechanisms by which this prevention program works. Ajzen's Theory of Planned Behavior provides potential mechanisms for examining the relationship between knowledge gained and referral behaviors. One construct of Ajzen's theory, in particular, which is defined by an individual's confidence in performing a behavior is Perceived Behavioral Control. This construct has the unique ability to influence behaviors directly "serving as a partial substitute for a measure of actual control (Ajzen, 1986)." This construct in particular may be very important in looking at knowledge and referral behavior given that knowledge is seen as an important contributor to an individual's sense of self-efficacy (Ievers-Landis et al. 2003). Further, when looking at other fields of research, different types of knowledge, declarative knowledge and procedural knowledge, have been found to have differential influence on behavior (Cross, Matthieu, Cerel, & Knox, 2007; Keller et al., 2009; Rittle-Johnson, Star, & Durkin, 2009). Thus, this study explored the relationships between declarative knowledge, procedural knowledge, and perceived behavioral control over different referral behaviors following a student gatekeeper suicide prevention program.

Levels of Knowledge over Time

Contrary to what was hypothesized, declarative knowledge was found to be only slightly higher than procedural knowledge immediately following the training. These findings imply that

a student may find it slightly more difficult to remember the procedures related to a behavior as opposed to the facts about the topic when initially learning about suicide prevention. Therefore, higher levels of declarative knowledge following the training may be expected until students are presented with the opportunity to refine the knowledge gained into information that can be applied to behavior (Anderson, 1982; Weitz, et al., 1986). It is also possible that there was not more of a dramatic disparity in levels of declarative and procedural knowledge at post-test due to the irregular distribution of the data which indicated that students in this study already had high levels of knowledge prior to participating in the program. This is unlike past studies in which students had low prior knowledge (Schneider, Star, & Rittle-Johnson, 2011). Additionally, other authors suggest that multiple-choice questions may inflate participants' level of knowledge, in comparison to open-ended questions (Labouliere, Tarquini, Gunderson, Totura, Karver, & Kutash, 2011). It is also possible that the process by which each knowledge type was assessed does not accurately portray students' actual level of knowledge. For example, previous studies assessed the two knowledge types with separate formats; declarative knowledge typically being measured using multiple choice questions, while procedural knowledge is measured through more applied questions which require showing the steps in finding a solution (Glasson, 1989; Rittle-Johnson et al., 2009). Moreover, the results may have been limited by the low internal consistency (not surprising considering the low number of items per knowledge domain) within the items that were categorized as either procedural or declarative in type.

As expected, knowledge, in this case declarative knowledge, decreased somewhat from post-test to follow-up, which is consistent with findings from previous gatekeeper trainings (Matthieu, Chen, Schohn, Lantinga, & Knox, 2009). However, contrary to what was hypothesized; there was not a significant difference in rate of decline for declarative and procedural knowledge. At follow-up, declarative knowledge remained slightly higher than

procedural knowledge after the training. Other research states that procedural knowledge develops further over time yielding higher levels of procedural knowledge and more effective behaviors (Anderson, 1982; Weitz et al., 1986), but there is inconclusive data as to how far in the future this knowledge shift should occur ultimately translating into actual behavior. For example, in elite soccer players between the ages of 17-18, higher levels of procedural knowledge predicted a higher probability of professional athletic status by the time they reached the age of 21 (Kannekens, Elferink-Gemser & Visscher, 2011); however, in learning mathematical equations, procedural knowledge and flexibility knowledge were substantial predictors of greater flexibility levels in solving equations at only the post-test time point (Rittle-Johnson, Star, & Durkin, 2011). In both cases, athletes and scholars were presented with opportunities to practice their sport or practice solving mathematical equations over longer periods of time. Therefore, it is possible that this studies suicide prevention participants may continue to solidify the concepts taught in the training about the referral behaviors in the future as they get to attempt the skills taught; a one month follow-up after the training may not allow sufficient time to detect this especially given the sporadic nature of suicidal behavior over the course of a year.

These finding also suggest that students may need more than one class period to adequately learn the strategies needed to properly refer an at-risk peer. It is proposed that procedural knowledge is further developed and strengthened when it is practiced over time (Elferink-Gemser et al., 2010; Kannekens, Elferink-Gemser, & Visscher, 2011; Weitz et al., 1986).

Knowledge Types and Perceived Behavioral Control

There was a small but weak, significant relationship between procedural knowledge and the PBC over the overt behaviors of talking to suicidal individuals and referring them for help. These findings indicate that there is a potential relationship between higher levels of procedural

knowledge and increased levels of confidence for performing these specific referral behaviors; however, the effect size is too small to confirm the relationship. For hypothesis 3b, another very weak relationship was found between procedural knowledge and the PBC over the behavior of identifying an at-risk peer. Neither hypothesis was confirmed which is inconsistent with previous research that states that knowledge is a predictor of increased confidence in performing a behavior (Ajzen, 1986; Bandura, 1977; Ievers-Landis et al., 2003). Furthermore, the findings for both of our hypotheses do not support the literature across multiple fields suggesting that procedural knowledge, in particular, has been shown to be more closely related to actual behavior (Elferink-Gemser et al., 2010; Ellis, 1993; Kannekens, Elferink-Gemser, & Visscher, 2011; Lievens & Sackett, 2011; Motowidlo, Crook, Kell, & Naemi, 2009; Weitz et al., 1986). However, data for this study was extremely limited by the restricted variability and lack of internal consistency within the constructs of knowledge and it is likely that the effect of procedural knowledge on the PBC over all behaviors was also affected by the insufficient amount of items for PBC. Also, results may have been weakened by the non-normal distribution of the data. For instance, effects sizes may have been stronger had students entered the training with lower levels of knowledge. As mentioned previously the initial high levels of knowledge could be a result of the possible inflation of knowledge scores by using the multiple-choice questions format as opposed to the open-ended format, which have been used for procedural type questions in past studies (Glasson, 1989; Labouliere, et al., 2011; Rittle-Johnson et al., 2009).

There was a lack of support for hypotheses 4a, the relationship between declarative knowledge and the PBC over the behavior of identifying an at-risk peer. This is inconsistent with the research that has shown that declarative instruction is slightly more effective than procedural instruction in solving mathematical equations, a covert behavior that is not easily observed by others (Matthews & Rittle-Johnson, 2009). It is likely that declarative knowledge is more

relevant for achieving academic behaviors but not referral behaviors. That is to say, declarative knowledge could only be effective in influencing a specific type of covert behaviors that is unrelated to the covert behaviors within our study. In the field of education, for instance, students are required to learn multiple procedures to accurately solve a range of math problems. These are essentially encompassed by knowledge about concepts and facts. Math students are often obligated to routinely practice solving mathematical equations in order to master various algorithms and theorems; these students ultimately benefit more from higher levels of declarative knowledge (Matthews, & Rittle-Johnson, 2009; Hallett, Nunes, & Bryant, 2010). It can be assumed that students, who have mastered the correct use of such academic tools within the allotted class periods given to learn them, may feel more confident about receiving a high score on the next test. On the other hand, the covert behavior of identifying at risk suicidal peers can be more closely related to action related behaviors, similar to those in sports. For example, when a student is identifying a suicidal peer, they have to listen to, and carefully observe the peer. The next step would be to compare their observations with the information they have been given within the training; then they must determine whether the peer is exhibiting the signs of suicide that they have been taught to expect. With experience, students may begin to recognize these warning signs more effortlessly if and when their friends display them in the future. Upon receiving a pass, soccer players are taught to read their opponents, mark their team members on the field then make a rapid decision to pass the ball, move forward with it, or shoot for a goal (depending on their position). Their decisions are based off of techniques and skills that they have been taught during practices. After playing several games, players gradually acquire more experience enabling them to execute more appropriate, prompt and fluid maneuvers. Given the nature of such behaviors, they require longer periods of time to practice and perfect (Cross et al., 2011; Elferink-Gemser et al., 2010; Kannekens, Elferink-Gemser, & Visscher, 2011). Often

these behaviors go through refining stages of trial and error where individuals discover more efficient ways of achieving the same or a similar behavior. Over time, the more the behavior is practiced, the more confident individuals feel about performing it (Cross et al., 2011; Elferink-Gemser et al., 2010; Kannekens, Elferink-Gemser, & Visscher, 2011; Weitz). Students may not feel confident about identifying an at risk peer following the training because knowledge about the facts are not sufficient; perhaps they need to lend more time to practicing the component of the covert actual behavior therefore transforming the on the surface declarative knowledge actually into procedural knowledge that is more concrete.

As hypothesized, declarative knowledge was not related to the PBC over the behaviors of talking and referring a potentially suicidal peer. Our findings were consistent with previous research that indicates that declarative knowledge is not related to the performance of a behavior (Elferink-Gemser et al., 2010; Kannekens, Elferink-Gemser, & Visscher, 2011). While it is important to teach the facts about suicide, it may be that declarative knowledge should not be the main focus of future gatekeeper programs given that it may not be related to increasing an individual's confidence in performing any aspect of referral behaviors. Declarative knowledge has been shown to be an inconsequential predictor of future success in the field of soccer. Even though the knowledge about the rules of the game are imperative, the knowledge about proper positioning and quick decision making were the determining factors in predicting professional athletic status in the future (Cross et al., 2011; Kannekens, Elferink-Gemser, & Visscher, 2011; Weitz et al., 1986).

Evidently, in this study, declarative knowledge did not seem to work, but surprisingly procedural knowledge did not either; however, this prevention program may potentially lack sufficient exposure to procedural knowledge to display the differential effects of the distinct knowledge types. It is possible that students need adequate exposure to procedural knowledge in

order to gain the confidence needed to perform these given behaviors. Behavioral rehearsal, which is not used much in the SOS program, may provide the necessary exposure to this type of knowledge; research shows that incorporating behavioral rehearsal, such as role-play, following training could yield higher gatekeeper skill scores (Cross et al., 2011; Weitz et al., 1986). It is important to note these findings when implementing future gatekeeper trainings in order to make them even more effective in increasing referral behaviors.

Limitations

In considering the aforementioned conclusions, it should be noted that this study had several limitations. The most significant limitation of this study is that the measures were not created in order to be most applicable to the hypotheses examined in this paper. Because this is the first time in the field of suicide prevention that researchers have analyzed knowledge as two different constructs, the existing data set contained a limited number of knowledge items that were not originally designed to be declarative or procedural type questions. Although these seven items were later independently coded as declarative or procedural questions, some items were not reliably categorized as declarative or procedural and overall the limited number of items per knowledge domain resulted in scales with low internal consistency.

Furthermore, unlike procedural perceived behavioral control, the construct of declarative perceived behavioral control was only measured at the one month follow up time point; this limited the possibility of examining whether the training affected this construct, as it is also possible that students' level of confidence in identifying at risk peers was the same as before they started the training. The findings of this study were further limited by the lack of variability in responses for the majority of the variables as many of the variables were rated quite highly (ceiling effects). It is possible that this limited range in responses, in addition to the lack of normal-distribution throughout the variables, reduced the power needed to find more significant

results. Despite this limitation, a significant, although weak, correlation was still found between procedural knowledge and the PBC items.

Given that this study was a correlational study, rather than an experimental study, it is not possible to make conclusions as to whether or not different types of knowledge cause the various types of perceived behavioral control. The findings of this study were further limited in their ability to be generalized to other populations given that the sample used for this study was one from a few schools in north Florida. Additionally, several other study specific factors may have affected the sample, such as the trainers used in the study, or the specific training itself.

Strengths

Although this study does contain limitations, it also contained several strengths. A prominent strength of this study is that it was comprised of a large sample of over 1000 high-school students, a sample much larger than those utilized in previous studies. In addition, as suggested by much research, this study utilized hypotheses developed in accordance with leading theories from a variety of fields (e.g. Azjen's Theory of Planned Behavior, Anderson's ACT Theory of Cognition). There is a large body of literature supporting the importance of theory in program evaluation and development (Donaldson & Gooler, 2003); however, there is a lack of theory driven research in the suicide prevention field.

Implications

This study could have some important implications for youth suicide prevention programming and research evaluations. Given the lack of association between knowledge and perceived behavioral control over referral behaviors, this raises the possibility that gatekeeper programs may not be teaching the most useful information and that it should be considered whether or not they should be adapted to ensure better types of knowledge are being taught. Suicide prevention trainers teaching just facts relating to suicide prevention may not be enough

to prepare a student to feel confidence in their ability to make a referral, hindering the possibility of the actual behavior. As such, it may be beneficial for gatekeeper programs to incorporate more and better strategies geared towards enhancing procedural knowledge in order to increase the level of confidence in referring among trainees, which could then potentially increase the success of these programs. Similarly, evaluations should acknowledge these differences and improve their questions to better include the various types of knowledge and types of perceived behavioral control.

Future Directions

The preliminary research from this study suggests that more and better research is needed in the area of suicide prevention knowledge and its' relationship to intended training behaviors. First, future studies should develop measures with an increased number of knowledge items based off of definitions of declarative and procedural knowledge. This would allow for a much more complete examination of the role of different types of knowledge in suicide prevention. In addition, future studies should measure all relevant constructs equally at several time points, along with examining if differential effects of the different knowledge types exist at a longer follow-up time period.

Given that this study was developed in accordance to Azjen's Theory of Planned Behavior, future studies could also examine other variables included in the theory, such as intentions and actual behavior, and their relationships to the different types of knowledge. In addition, other constructs, not included in the theory, may have affected the outcomes of the study. For example, it is possible that external factors, such as school climate, trainer characteristics, as well as individual characteristics, including individual motivation, an individuals' expectation of the outcome, the individuals' intelligence, his or her empathy for others, and the individuals prior knowledge, may play an important role in the study. Future

studies with better constructed measures and larger samples could examine the pathways between the theorized variables, including mediation and moderation models. Similarly, future research should go beyond the preliminary findings of this study and explore these variables as possible predictors of referral behavior. Furthermore, while this study contained a sample of adolescent high school students from north Florida, future studies should explore this differentiation of knowledge among other populations (other regions of the country, juvenile justice populations, etc.) in the suicide prevention field. Lastly, to fully examine if there are causal relationships between the different knowledge types and perceived behavioral control, future studies should utilize an experimental approach assigning different participants to varying types of and amounts of knowledge embedded within the training.

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Appendix A. Procedural Knowledge Questions

1. Which of the following places can I go to get help for a suicidal classmate or friend?
 - Trusted teacher
 - Guidance counselor
 - Medical doctor
 - Suicide hotline or another local agency
 - All of the above

2. Asking a sad or upset person if he or she is having thoughts of death or suicide:
 - Should never be done.
 - Should only be done by a counselor.
 - May lower the risk of suicide.
 - Should have no effect on the risk for suicide.

3. If a friend tells you that he or she is thinking about suicide but wants you to keep it a secret you should ask the peer to promise not to attempt suicide and keep the secret so that they won't be angry with you.
 - True
 - False

4. You are talking to a friend that you know has been having a lot of problems lately and seems to be overwhelmed and sad. The friend sighs and says, "I just can't go on anymore. Life isn't worth living." The best thing to say is:
 - "Snap out of it, things will get better."
 - "What you just said frightens me, let's go talk to someone."
 - "You need to do something about your bad attitude."
 - "You're talking like a crazy person"

Appendix B. Declarative Knowledge Questions

1. Which of the following is NOT a risk factor for suicide?
 - Having lots of problems at home.
 - Having prior self harm behavior.
 - Moving out at 18.
 - Losing a close friend to suicide.

2. Which of the following are signs of depression?
 - Drinking to deal with uncomfortable feelings
 - Excessive guilt
 - Suicidal risk, such as stating someone wants to take a permanent nap
 - All of the above are signs of depression

3. Which of the following is not a possible warning sign of suicide?
 - Strong feelings of hopelessness
 - Giving away prized possessions
 - All or nothing thinking
 - Spending lots of money one doesn't have

Appendix C. Perceived Behavioral Control Questions

1. I feel that I can talk to someone who is suicidal.
2. I have the knowledge to refer someone who is suicidal for help in the future.
3. I feel I can talk to a responsible adult about someone who is suicidal.
4. I feel that I can refer someone who is suicidal to a responsible adult for help.
5. I have the knowledge to use the warning signs from the Signs of Suicide (SOS) presentation to identify someone who may be suicidal in the future.