Active Shooter Protocols: Perceptions, Preparedness, and Anxiety

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ABSTRACT. The national concern about active shootings has pushed schools to implement intense drills without considering unintended consequences. Studies have found that, although training had the potential to increase preparedness, it also increased anxiety. These findings apply to short-term effects, but there is a lack of empirical research on long-term effects of active shooter drills. The present study investigated whether active shooter training completed in high school impacts current levels of anxiety and preparedness of undergraduates. Collegiate participants ($N = 364$) completed an online survey and answered questions about their perceived knowledge of protocols, protocol actions, and training methods from high school followed by the same set of questions, this time referring to their current university. Participants then completed an anxiety measure (Spielberger, 1983) and a preparedness measure. Two hierarchical regression analyses were conducted to predict anxiety and preparedness. This study expanded findings on the effects of active shooter training by demonstrating long-term effects for high school training. Evacuation protocols ($\beta = -.13$, $p = .03$; $\beta = .16$, $p = .007$) and perceived knowledge ($\beta = -.16$, $p = .004$; $\beta = .14$, $p = .01$) positively impacted anxiety and preparedness, respectively, of university students. Experiences at the university level had an additional, larger impact on student anxiety, $\Delta R^2 = .11$, $F(8, 347) = 5.88$, $p < .001$, and preparedness, $\Delta R^2 = .26$, $F(8, 347) = 17.32$, $p < .001$, which seems to overshadow the effects from high school. This may be problematic because the perceived knowledge that leads to higher feelings of preparedness may not translate into appropriate actions in a real-life situation, potentially risking lives.

Keywords: active shooter protocols, long-term effects, anxiety, preparedness, knowledge

Most schools implement protocols for a range of potential emergencies and have done so for years. Students routinely run through drills for emergencies such as a fire, earthquake, or tornado, to minimize any potential chaos and harm if an emergency were to occur. In recent years, school shootings have been an increasing concern, causing many schools to implement another type of emergency drill: active shooter drills. Active shooting situations differ from other types of emergency situations. Natural disasters, such as hurricanes or tornadoes, do not occur specifically to kill people, but active shootings do. Whereas active shootings are more intentional, they do not occur as often as the media might portray. Schafer et al. (2010) found that only 1.5% of public safety departments had responded to an active shooting event in the past five years, whereas 34% responded to weather related incidents and 40% responded to bomb threats. Although active shooting situations are not as prevalent as the media portrays, schools' immediate reactions and push for more in-depth and intense drills are increasing (Peterson et al., 2015; Schafer et al., 2010). Existing research has solely focused on short-term effects, specifically regarding effects on knowledge, anxiety, and preparedness, which leaves the question of possible long-term consequences unanswered.

Types of Protocols

Due to the national concern about active shootings in schools, several types of protocols to prepare for a potential active shooting situation have been developed. For the purpose of the present study, protocols are guidelines that are to be used when faced with an active shooting situation. The National Association of School Psychologists (NASP) and the National Association of School Resource Officers (NASRO) have stated that lockdowns are the most common active shooter protocol and are proven most effective thus far when performed based on best practice guidelines (Blad, 2018; NASP, 2018; NASP & NASRO, 2017). These guidelines advise using developmentally appropriate drills and informing students and staff that a drill is occurring (NASP & NASRO, 2017). Lockdown drills involve announcing that there is no real emergency, relocking the door, moving students out of sight, and remaining quiet in a room (NASP & NASRO, 2017). According to D. Brock, school psychologist and national expert on school safety and crisis response at California State Sacramento (personal communication, May 9, 2019), only .004% of violent deaths in schools occurred when a student was behind a locked door.

Options-based protocols are becoming increasingly popular throughout schools and provide students and staff with a range of alternative procedures to implement depending on the emergency situation (NASP & NASRO, 2017). These protocols provide people with the training and information to decide on the best course of action to take during an emergency, rather than learning one type of response that may not be applicable to every situation (NASP & NASRO, 2017). Options-based protocols allow students and staff to make independent decisions regarding evacuation, lockdowns, or countering an intruder (NASP & NASRO, 2017). Lockdowns are more beneficial for kindergarten through 12th grade (K–12) schools due to the simple single building layout that most schools have, but when other factors arise, such as a more open layout or older students with more decision-making abilities who can better understand how and when to use different steps, then options-based protocols may be more beneficial (NASP & NASRO, 2017).

Training Methods

There are numerous ways to prepare individuals for an active shooter situation, and each can vary in intensity. The U.S. Department of Education (2013a, 2013b) provided guidelines about what students and staff should know and do regarding active shooter drills, and NASP & NASRO (2017) provided information on different ways to implement training that follows those guidelines. Some of the simpler methods are more informational-based and include email communications, online training modules, and printed materials like signs throughout a school (NASP & NASRO, 2017). Each of these methods do not include any direct, hands-on training and are passive ways of training employees or students. For the current study, these training methods have been categorized as uninvolved training because these are among the least intensive methods.

Other training methods that are more discussion-based involve orientations and walk-through drills. These discussion-based training methods are categorized as involved trainings and are more intense than uninvolved methods but are not the most intense method available. Orientations involve verbally describing the actions to be taken during a potential active shooter situation, which can be completed by teachers or professors with students (NASP & NASRO, 2017). Walk-through drills are untimed, and individuals calmly walk through a school building while discussing the actions to be taken and asking questions for clarification (NASP & NASRO, 2017).

There are also operations-based trainings, which include preannounced and unannounced drills, and functional and full-scale exercises (NASP & NASRO, 2017). These training methods have been categorized as real-time training to account for the direct, hands-on involvement of participants, which is the most intense method of training. Preannounced drills are an announced rehearsal of emergency responses, so participants know it is just a practice drill and there is no real emergency. Unannounced drills provide no notifications and allow for a rehearsal of real-time responses (NASP & NASRO, 2017). Functional exercises often incorporate actors and other parties to simulate a real experience, and full-scale exercises include multiple agencies that would be involved in a real crisis, including the school, police, fire, first responders, and community response agencies (NASP & NASRO, 2017). First responders and law enforcement can also be engaged in discussion-based exercises and drills, through lessons or workshops on school safety.

The Federal Commission on Student Safety (2018) proposed seven cognitive developmental

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JOURNAL OF
PSYCHOLOGICAL
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levels that impact safety awareness: early (pre-K and kindergarten), developing (early elementary), practiced (upper elementary), proficient (intermediate/middle school), independent (high school, adult), advanced (professionally trained adults or staff members), professionals (first responders, military, security professionals). These developmental levels differentiate what students can and should do. Younger students heavily rely on adult directives and cognitively are not able to make independent decisions (Federal Commission on Student Safety, 2018). Older students and adults are capable of learning various protocols and then making independent decisions of which protocol(s) are best to execute given the circumstances, especially regarding protocols related to fighting an intruder (Federal Commission on Student Safety, 2018). The intensity of training can increase as developmental levels increase but not without risk. More intensity increases risk for greater traumatic impact as a result of participating in the training (NASP & NASRO, 2017).

Training Outcomes
Knowledge and Preparedness
Research has shown that knowledge of emergency protocols and the ability to respond in a real event differ depending on the type of training that is implemented. For example, children can gain behavioral skills through training and role-play simulations for emergencies such as fires (Jones & Randall, 1994; Miltenberger et al., 2005), but little research has focused on intruder or active shooter drills. Zhe and Nickerson (2007) found that children gained knowledge about intruder crisis drill procedures through participation in a training session that involved developmentally appropriate, preannounced drills utilizing discussion and operations-based techniques paired with practice based on best practice guidelines. Although children who participated in an intruder crisis drill had increased knowledge about the procedures, they applied that knowledge only to the exercise from the study, and it did not generalize to real-life crisis events (Zhe & Nickerson, 2007). Therefore, children can gain theoretical or perceived knowledge, but that knowledge may not translate into appropriate actions during a real-life crisis event (Zhe & Nickerson, 2007).

Research has also shown that different types of training can impact feelings of preparedness. Dorn (2018) found that options-based training had the potential to cause faculty and staff to have strong psychological reactions or physically become harmed when "fighting" the intruder, thus causing more harm than helping preparedness. Thus, the U.S. Department of Education, NASP, and NASRO recommend lockdowns be the foundation of active shooter protocols based on evidence of increasing skills for responding, as lives have been saved when students and staff were secured behind a locked door (Federal Commission on Student Safety, 2018; NASP, 2018; NASP & NASRO, 2017).

While Lui et al. (2015) found that staff (e.g., janitors, office staff) had higher levels of perceived feelings of preparedness compared to faculty (e.g., professors), little research has addressed preparedness among students. Peterson et al. (2015) compared an active shooting protocol training video to a control video of a documentary about an actual school shooting incident and found that both videos have the potential to increase feelings of preparedness. However, the training video produced higher feelings of preparedness compared to the control video.

Anxiety
Although training has been shown to increase knowledge and preparedness, unintended consequences also arise. Even following best practice guidelines, some lockdowns may produce stress, anxiety, and traumatic symptoms in students or staff (NASP, 2018). Christakis (2019) reported anecdotal accounts from students who experienced stress and anxiety. One young boy wrote his parents a goodbye letter during an unannounced drill, and many others sobbed and even became physically ill (Christakis, 2019). Fieldstadt (2015) provided anecdotal instances of teachers who went through highly sensorial active shooter training drills being physically harmed or emotionally traumatized, with some suffering from posttraumatic stress disorder. Additionally, school staff reported feeling vulnerable and nervous about going into work (Will & Blad, 2018). In support of these anecdotal accounts, Peterson et al.'s (2015) comparison of a training video to a control video about school shootings found that both videos increased students' anxiety along with fear that a shooting would happen on campus, with higher feelings of fear and anxiety demonstrated specifically by female students. On the contrary, Zhe and Nickerson (2007) found that, when children participated in drills that incorporate best practice recommendations and preventative measures, the children experienced anxiety comparable to normal, everyday levels of

anxiety. Whereas there is an abundance of anecdotal accounts portraying the negative impact of active shooter training, the few empirical studies that have investigated the impacts of active shooter training had conflicting results.

In active shootings that have occurred, such as the shooting at Marjory Stoneman Douglas High School, Columbine High School, and Virginia Tech, the total casualties might have been higher if the school had not provided active shooter training, but there is no research that specifies that functional, highly sensorial drills saved more lives than discussion-based or operations-based conducted drills (Federal Commission on Student Safety, 2018). The findings on how training can impact anxiety are conflicting. In addition, research has only focused on the immediate effects on students and staff in K–12 schools who have been exposed to training, but previous research has not addressed any long-term effects of training, or any effects found within university students.

Present Study

The current study examined the effects of training at one specific university. The purpose of the current study was to expand on previous findings by exploring the long-term effects that active shooter training may have on feelings of anxiety and preparedness when measured in college-aged students.

Although no research has examined the long-term effects of active shooter training, research on trauma has shown that traumatic events can have lingering negative effects on mental health (Steel et al., 2002). These findings showcase how negative events can have lasting negative effects. Because there have been some findings of short-term effects from active shooter training (Christakis, 2019; Fieldstadt, 2015; Lui et al., 2015; Peterson et al., 2015; Zhe & Nickerson, 2007), there may be a possibility that these effects could be long-term, which leads into the first hypothesis: Active shooter protocols and drills that were completed in high school would impact current levels of anxiety and preparedness in college students at the present university.

All participants in the current study have had limited formal training at the university level, and the primary source of training is through printed signs around campus. Previous findings found that participants with no training have lower levels of knowledge and preparedness (Peterson et al., 2015; Zhe & Nickerson, 2007). With no new training to replace what was learned at the K–12

level, students' current levels of knowledge may decrease from the levels in high school, which leads into the second hypothesis: Limited training at the university level may not provide students with enough updated information to apply to a university setting, therefore causing students to have lower levels of knowledge about their current campus active shooter protocols than their high school active shooter protocols.

Method

Participants

There were 364 total student participants who attended a midsize public university in the Southeast. All volunteered to participate in the study with some participants receiving extra credit from their professors. Due to the relatively recent development of active shooter training, participants had to be 18–30 years old. Of the total 463 participants, data from 99 had to be discarded because they skipped one or more items. Participants included 281 women, 74 men, and nine who identified as other. Participants were 204 White/European American, 111 Black/African American, 22 Multiracial, 14 Hispanic/Latino(a), 10 Asian, two identified as Other, and one Native Hawaiian/other Pacific Islander. The type of high school attended by participants was 339 public, 16 parochial (Christian, Jewish, other religious affiliation), and nine private/independent. There were 72 participants who attended a high school with less than 500 students, 170 participants with a high school of 501–1,500 students, and 122 participants with a high school of more than 1,501 students. All participants attended the same university. Ages ranged from 18–29 years of age ($M = 20.30$, $SD = 1.98$).

Materials

The survey measured three knowledge variables (perceived knowledge, protocol knowledge, type of training received), current anxiety about active shooter situations, and perceived preparedness for an active shooting occurrence on campus. Any modifications made to existing scales were made with an effort to ensure that the new scales have comparable meaning, reliability, and validity. Although efforts were made, any modifications to an existing scale have the potential to change its psychometric properties.

Knowledge and Perceived Knowledge

Students' perceived knowledge, protocol knowledge, and type of training received were measured

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to assess students' knowledge of active shooter protocols. Each set of questions was administered twice, once referring to high school and once for university. Perceived knowledge represented how much information participants felt they knew regarding high school/university active shooter training. It was measured using five statements from Wrench's Crisis Knowledge Index (Lui et al., 2015; Wrench et al., 2007) modified to address high school and college campus active shooter drills (e.g., "I know the details of my high school's/campus's active shooter training"). Participants indicated their agreement using a 5-point scale from 1 (*strongly disagree/not at all*) to 5 (*strongly agree/very much so/extremely*). The answers were averaged together, with higher scores indicating higher perceived knowledge of active shooter training. Reliability was very good; high school Cronbach's $\alpha = .93$, university $\alpha = .91$.

Protocol knowledge was measured with a 15-item *yes/no* checklist with details and actions that might have been a part of active shooter training. Protocol knowledge measured participants' actual knowledge of what to do in an active shooter situation. The checklist allowed participants to select the types of response options that were included in training they received. Protocol actions were divided into four main categories, three of which (i.e., lockdown, evacuate, fight) are included in different drill protocols that follow best practice guidelines (NASP, 2017). A fourth category contained several misconceptions. Sample responses included "get behind a locked door," (lockdown) "if run and/or evacuate report to a predesignated meeting location," (evacuate) and "take down intruder using physical force" (fight). Four common misconceptions were included to differentiate between actual protocols and what participants might have thought were actual protocols. Sample misconceptions included "immediately exit from farthest point" and "alert friends or family through phones or social media." Protocol knowledge was the number of *yes* answers for the protocols in each category.

How training was implemented was measured with a 10-item *yes/no* checklist that included descriptions for orientations, walk-through drills, preannounced drills, unannounced drills, functional exercise, full scale exercise, printed materials, online training, or email (NASP, 2017). These protocol methods were divided into three groups based on level of intensity: uninvolved (printed materials, online, email), involved (orientations, walk through),

and real time (preannounced, unannounced, functional, full scale). Participants were classified at the highest intensity level at which they reported experiencing one or more training method.

Anxiety
Anxiety about school shootings was measured using seven statements that were modified from Spielberger's (1983) State-Trait Anxiety Inventory from the State scale to address current anxiety related to active shooter situations. Students rated their agreement with statements like "I feel frightened of an active shooter at my school" and "I feel nervous about an active shooter coming to my school" using a 4-point Likert-type scale. Responses to the items were averaged and higher scores indicated greater anxiety, $\alpha = .79$.

Perceived Preparedness
Preparedness was measured using two questions based on a 10-point scale (Lui et al., 2015; Zhe & Nickerson, 2007). Questions included "Would you know what to do if a shooting happened on campus?" and "How prepared do you feel if a shooting happened on campus?" Items were summed, and higher scores indicated greater feelings of preparedness, $\alpha = .91$.

Procedure
Institutional review board approval at Winthrop University was received on May 7, 2019, prior to data collection. Participants were sent a link to an anonymous, online survey. After completing the informed consent form that stated that the purpose of the study was to explore how different active shooter protocols relate to people's perceptions and preparedness, participants were told to take a moment to think about the active shooter emergency training they received in high school. Participants then answered questions regarding what type of high school was attended to ensure that their focus was on training received in high school, followed by the questions about their perceived knowledge of active shooter protocols used in their high school. Next, participants indicated what types of responses were taught in their active shooter training by completing the protocol knowledge checklist. Then participants indicated how this training was implemented in high school. Participants then repeated the process with the next set of questions referring to the current college/university.

After the questions for both high school and college/university, participants completed the

anxiety measure followed by the preparedness questions. Last, participants completed demographic questions before viewing the debriefing form. The survey lasted about 10 minutes.

Results

A three-stage analysis was used. Bivariate correlations and two hierarchal linear regression analyses were used to examine the first hypothesis, the impacts of active shooter drills on current levels of anxiety, preparedness, and perceived knowledge. A dependent t test was used to examine the second hypothesis that students would have lower levels of knowledge about their current campus active shooter protocols than high school active shooter protocols.

Correlations Among Study Variables

Anxiety

Table 1 presents correlations between anxiety, preparedness, perceived knowledge, protocol actions, and methods. Preparedness was negatively correlated with anxiety ($r = -.50$, $p < .001$). The more prepared students felt, the less anxious they were. Perceived knowledge ($r = -.17$, $p = .001$; $r = -.34$, $p < .001$) and evacuation protocols ($r = -.15$, $p = .004$; $r = -.16$, $p = .002$) at the high school and university level, respectively, were also negatively correlated with anxiety, which supports the first hypothesis. Other high school level factors related to anxiety include real-time training methods ($r = -.12$, $p = .04$). The more intense training students experienced in high school, the more anxious they felt. Other university-level factors that correlated significantly with anxiety include uninvolved training methods ($r = -.12$, $p = .02$) and lockdown ($r = -.15$, $p = .01$), fight ($r = -.15$, $p = .01$), and evacuation ($r = -.16$, $p = .002$) protocol actions.

Perceived Preparedness

Similar to anxiety, levels of preparedness and evacuation protocol actions ($r = .21$, $p < .001$; $r = .24$, $p < .001$) were positively correlated with levels

TABLE 1
Correlations Among Anxiety, Preparedness, Perceived Knowledge, Protocol Actions, and Training Methods

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Anxiety	—																	
2. Preparedness	−.50**	—																
3. PK HS	−.17**	.16**	—															
4. PK UNI	−.34**	.52**	.15**	—														
5. Lockdown HS	−.01	.07	.28**	.03	—													
6. Lockdown UNI	−.15**	.27**	−.06	.39**	.24**	—												
7. Fight HS	−.05	.07	.17**	.00	.15**	.14**	—											
8. Fight UNI	−.15**	.28**	.04	.39**	−.00	.30**	.30**	—										
9. Evacuate HS	−.15**	.21**	.16**	.08	.26**	.19**	.25**	.08	—									
10. Evacuate UNI	−.16**	.24**	.04	.47**	.04	.42**	.02	.45**	.28**	—								
11. Other HS	−.10	.18**	.10	.10	.20*	.15**	.23**	.03	.38**	.10	—							
12. Other UNI	−.06	.22**	−.06	.33**	.09	.39**	.15**	.52**	.15**	.53**	.30**	—						
13. Uninvolved HS	−.00	.01	.21**	.05	.59**	.20**	.10	.00	.10	.07	.04	.10	—					
14. Uninvolved UNI	−.12**	.22**	−.05	.43**	.13*	.80**	.05	.38**	.14**	.45**	.09	.35**	.16**	—				
15. Involved HS	−.07	.10	.05	.08	.20**	.10	.07	−.08	.21**	.01	.70**	.14**	.06	.03	—			
16. Involved UNI	−.03	.14**	−.00	.23**	.05	.29**	.06	.39**	.03	.38**	.19**	.74**	.05	.25**	.21**	—		
17. Realtime HS	−.12*	.15**	.18**	.06	.18**	.14**	.56**	.16**	.32**	.08	.61**	.23**	.06	.08	.16**	.06	—	
18. Realtime UNI	−.08	.28**	−.03	.38**	.06	.37**	.20	.62**	.18**	.52**	.22**	.70**	.07	.39**	.05	.35**	.27**	—
19. *M*	2.77	4.57	2.81	2.36	27.60	154.20	27.33	53.00	124.00	114.33	39.25	49.75	42.50	90.75	149.50	82.50	97.50	9.50
20. *SD*	0.67	2.39	1.17	1.06	1.31	1.91	0.57	0.80	1.01	1.01	0.71	0.86	0.28	0.49	0.38	0.39	0.45	0.47

Note. PK = Perceived Knowledge. HS = high school. UNI = university. Other = Other Protocol. Uninvolved, Involved, and Real Time refers to training methods. Means refers to the averages of specific protocol actions or training methods used in high school or university.
*$p < .05$. **$p < .10$.

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of perceived knowledge ($r = .16$, $p = .002$; $r = .52$, $p < .001$) at the high school and university levels, again supporting the first hypothesis. The more knowledgeable students felt, the more prepared they felt. Other high school level factors related to preparedness include misconception protocol actions ($r = .18$, $p = .001$). Other university level factors include lockdown ($r = .23$, $p < .001$), fight ($r = .28$, $p < .001$), and misconception ($r = .22$, $p < .001$) protocol actions. Students seemed to feel more prepared if they had received training specifically within the protocol actions mentioned.

Predicting Anxiety and Preparedness with High School and University Variables

Perceived knowledge of high school and university protocols correlated with anxiety and preparedness. They also correlated significantly with each other ($r = .15$, $p = .01$). There were several correlations with many factors. Due to the abundance of correlations, an additional analysis was used to determine which factors actually contributed to anxiety and preparedness and which factors had produced spurious correlations. To examine the unique contributions of the variables to anxiety and preparedness, two hierarchical regression analyses were conducted to predict anxiety and preparedness (see Table 2). Both regression analyses consisted of two steps. Step 1 included all of the high school variables: perceived knowledge, four protocol actions, and three methods of training. Step 2 added the same variables at the university level.

Anxiety

At Step 1, the high school variables (perceived knowledge, training actions, and training type) accounted for 5% of the variance in anxiety, $R^2 = .05$, $F(8, 355) = 2.39$, $p = .02$, which was a significant effect. The variables that uniquely contributed to feelings of anxiety were perceived knowledge in high school and evacuation protocol actions, as shown in Table 2. The more that students perceived they knew about training in high school and the more evacuation protocols they reported, the less anxious they were.

In Step 2, the university variables significantly accounted for an additional 11% of the variance in anxiety, $\Delta R^2 = .11$, $F(8, 347) = 5.88$, $p < .001$. As shown in Table 2, perceived knowledge from high school dropped yet still predicted anxiety, whereas perceived knowledge of university protocols was the only significant university level predictor of anxiety, further supporting the first hypothesis and

providing evidence of long-term effects on anxiety from high school. Evacuation protocol actions from high school were no longer significant and perceived knowledge was still the main variable lessening feelings of anxiety. The more knowledgeable someone felt the less anxious they were, even if there were no specific training methods or protocols that also contributed to less anxiety.

TABLE 2

Hierarchal Multiple Regression Analyses Predicting Anxiety and Preparedness From Perceived Knowledge, Training Methods, and Action Protocols

	Anxiety		Preparedness	
	ΔR^2	β	ΔR^2	β
Step 1	.05*		.08**	
PK HS		−.16**		.14*
Uninvolved HS		.00		−.03
Involved HS		−.05		−.02
Realtime HS		−.07		.02
Lockdown HS		.08		−.01
Fight HS		.03		−.03
Evacuate HS		−.13*		.16**
Other HS		.01		.12
Step 2	.11**		.26**	
PK HS		−.12*		.09
Uninvolved HS		.00		−.04
Involved HS		−.05		−.01
Realtime HS		−.08		.02
Lockdown HS		.08		−.01
Fight HS		.05		−.08
Evacuate HS		−.12		.15**
Other HS		.02		.07
PK UNI		−.32***		.47***
Uninvolved UNI		.11		−.18*
Involved UNI		.08		−.53
Realtime UNI		.12		.05
Lockdown UNI		−.14		.21**
Fight UNI		−.12		.14*
Evacuate UNI		−.01		−.12
Other UNI		.02		−.01
Total R^2	.16**		.34**	

Note. PK = Perceived Knowledge. Other = Other Protocol. HS = high school. UNI = university. Uninvolved, Involved, and Real Time refer to training methods.
*$p < .05$. **$p < .01$. ***$p < .001$.

Perceived Preparedness

At Step 1, the high school variables accounted for 8% of the variance in preparedness, $R^2 = .08$, $F(8, 355) = 3.59$, $p = .001$. Similar to the effects on anxiety, perceived knowledge in high school and evacuation protocols in high school predicted preparedness, shown in Table 2. The more students perceived they knew about training in high school the more prepared they felt.

In Step 2, the university variables accounted for an additional 26% of the variance, $\Delta R^2 = .26$, $F(8, 347) = 17.32$, $p < .001$, driven by several factors. The variable most strongly related to preparedness was perceived knowledge at the university level, which overshadowed high school perceived knowledge, again supporting the first hypothesis, as shown in Table 2. More reported lockdown and fighting protocols increased feelings of preparedness but uninvolved training decreased preparedness. The uninvolved training may bring awareness to the issue of school shootings but fails to provide direct instructions lessening students' preparedness. Although the high school variables, specifically perceived knowledge and evacuation protocols, have effects on current feelings of anxiety and preparedness, once the university variables are introduced, perceived knowledge is what effects anxiety and preparedness the most.

Knowledge in High School and University

The second hypothesis, that students have lower levels of knowledge about their current campus active shooter protocols than high school active shooter protocols, was evaluated using a dependent-samples t test. The hypothesis was supported. Students' perceived knowledge of current campus/university active shooter protocols ($M = 2.36$, $SD = 1.06$) was significantly lower than students' perceived knowledge of high school active shooter protocols ($M = 2.81$, $SD = 1.17$), $t(363) = 5.83$, $p < .001$, $d = .40$.

Discussion

In the present study, the types of protocols and training methods differed between high school and university, and both high school and university protocols and training methods had consequences on current anxiety and preparedness among undergraduates. The hypothesis that active shooter protocols and drills that were completed in high school impact current levels of anxiety and preparedness was supported. The present study expanded Zhe and Nickerson's (2007) findings, showing that lockdown training received in high school did not have any long-term negative effects on anxiety. However, the protocols reported at the high school level followed best practice guidelines for the most part, in that study participants did not report highly sensorial lockdown training experiences. This may indicate that following best practice guidelines when implementing active shooter training does not have long-term effects. Overall, perceived knowledge of high school training contributes to lower levels of current anxiety, but perceived knowledge of university training contributes to lower levels of anxiety the most. Thus, levels of perceived knowledge, especially at the university level, is the main factor that lessens anxiety; the more people feel they know, the less anxious they feel.

Similar to the findings with anxiety, preparedness was related to perceived knowledge and evacuation protocols at the high school level. In contrast, perceived knowledge at the high school level no longer impacts current feelings of preparedness. The perceived knowledge at the university level seems to overshadow the knowledge from high school. Although Lui et al. (2015) found that the more knowledgeable people were, the more knowledgeable and confident they felt, there is no guarantee that higher levels of knowledge will always produce more informed and effective behaviors when reacting to real emergencies (Lui et al., 2015).

Although perceived knowledge had the largest impacts on anxiety and preparedness, the two also had a strong negative relationship with each other. As participants' feeling of preparedness increased, their anxiety decreased. Having lower anxiety and increased preparedness is a positive outcome of training and is beneficial if one is faced with an actual crisis. At this particular university, these findings are concerning due to the high levels of preparedness that are paired with limited training. This raises the question of what concrete training and knowledge students are pulling from to feel prepared for an active shooter situation, especially because knowledge levels from the university level were low.

The second hypothesis was supported; students had lower levels of knowledge about their current campus active shooter protocols. There was a higher level of knowledge regarding high school protocols, and although this knowledge was low, knowledge regarding university protocols was even lower. The present study found that averages of knowledge from high school leaned toward feeling neutral

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about knowing what to do in an active shooter event. Averages of knowledge at the university level leaned toward disagreeing with knowing what to do. Because there was a lack of training at the university level, it was expected that knowledge of active shooter protocols would be lower. This is concerning because although knowledge was very low, people still reported that they felt currently prepared for active shooter events but may not actually possess the skills needed to mitigate loss of life if an actual response is required.

Although the low levels of knowledge and the limited training at this university still contributed to higher levels of preparedness, this could lead to a false sense of preparedness. Because university response protocols require students to be well-versed in more than just lockdown protocols, high school training may be helpful but insufficient for translating into the actual skills needed for a real-life situation on a university campus. Increasing perceived knowledge is seemingly easy, but an increase in perceived knowledge does not mean there is an increase in skills or application of that knowledge. This hypothesis has preliminary support by findings conducted by Safe Havens International (Dorn, 2018), which found that individuals who received options-based training then reacted in ways that would more likely harm other individuals rather than save them in subsequent simulations. Dorn (2018) also found that the uninvolved type of training, the kind used at the university in the present study, was linked with lower levels of preparedness. Although the university in the current study is providing some form of informational training, the uninvolved method may bring awareness to the issue of active shooters, but not provide concrete skills and solutions that can be used in a real crisis.

College students who report greater perceived knowledge of their high school protocols also feel less anxious and more prepared; however, once university knowledge is established the high school knowledge is overshadowed. Due to this overshadowing effect, the knowledge learned at the high school level may not automatically translate into knowledgeable actions and skills at the university level. Therefore, having set training using options-based drills based on best practice guidelines at the university level may help produce actual skills and actions (Zhe & Nickerson, 2007). The relationship between perceived knowledge and anxiety and preparedness implies that perceived knowledge of current university protocols can decrease anxiety and increase preparedness. Because there is no

official training at this university, any effects on preparedness may be stemming from participants implementing protocols from high school, which could potentially have negative or positive consequences. Using protocols from high school may pose a potential danger in an actual active shooter situation because there are other factors to be considered when preparing at a university, such as campus layout and the developmental levels of students. On the contrary, using protocols from high school may be beneficial if the protocols focus on lockdown, which follows best practice guidelines. The relationship between perceived knowledge in high school and university means that college students are replacing or updating their knowledge from high school with new information. This is a potential concern because this study revealed limited training at the current university. To ensure the current knowledge replacing older knowledge is anchored in best practice recommendations, further training may be needed.

Limitations and Future Directions

Although the current study found long-term effects of active shooter protocols, these findings are specific to one university and may not generalize to schools with different training protocols. Therefore, findings from the current study cannot apply to institutions that may have less or more robust training. To combat the institutional homogeneity of this study, future studies may conduct a multi-institutional collaborative study to explore differences in training between institutions and any different effects that may arise. Future studies may also replicate the current study at various institutions to explore similarities or differences in training and the effects of training.

Although feelings of preparedness at the university level positively impacting anxiety and preparedness may indicate that active shooter training can mitigate negative impacts of that training, these findings are also concerning because it is unclear where most students are gaining new knowledge from. It is possible that students carefully read the notices posted in classrooms, but it is also possible that students may have conflated the sources of their knowledge or misinterpreted some of the definitions used in the survey. Another possible confounding variable is that a university shooting took place at another university within 30 miles of this university within a few weeks of this survey being distributed. Thus, the increased media coverage over what to do in an active shooter situation might

have contributed to higher levels of perceived preparedness. This study did not measure anxiety and preparedness while students were in high school and again when they were in college, so future studies may implement a longitudinal design to better measure which training protocols and methods were employed while students were in high school and college. With the increased push for more in-depth and intense drills, the consequences of these drills should further be explored. This study demonstrated that there are long-term consequences that need to be investigated.

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