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Athletic Trainer's Self-Confidence and Experience Level in Managing Exertional Heat Related Illnesses

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ATHLETIC TRAINER'S SELF-CONFIDENCE AND EXPERIENCE LEVEL IN MANAGING EXERTIONAL HEAT RELATED ILLNESSES

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Abstract

Objective: Explore the athletic trainer's level of self-confidence and experience in managing and treating exertional heat illness. **Design:** Non-experimental, exploratory and descriptive research design. **Participants:** 110 respondents, 46% male, 54% female, representing all 10 National Athletic Trainers' Association districts, highest representation from district four (N=50). Sixty-eight percent (68%) from high school outreach setting, 22% College or University settings, and 10% from clinic/hospital setting. Twety-one percent of respondents reported earning ≥55K annual salary. Sixty-seven percent hold Masters degrees while 43% have practiced ≥11 years. **Intervention:** The Athletic Trainer's Self-Confidence Scale (ATSCS), (scale range, 1=strongly agree to 7=strongly disagree) was distributed to certified athletic trainers via Qualtrics survey. **Main Outcome Measures:** One-way ANOVA followed by Tukey post-hoc analysis and independent-sample *t*-tests were used to measure differences between respondents and ATSCS items. Validity and reliability of the ATSCS were evaluated using Pearson *r* correlations and Cronbach coefficient alphas. **Results:** ATSCS yielded satisfactory internal consistency and convergent validity (Pearson *r* correlations between scale items ranged from r=.19(p=.05) to r=.79 (p=.01); Cronbach coefficient alphas α=.82. Athletic trainers were *confident* (overall mean between all scale items was M=2.05±.95) in treating exertional heat illnesses. Athletic trainers were most confident (strongly agree to somewhat agree, M=1.50±.57) in their ability to "think of an emergency plan of action" if an athlete is experiencing an exertional heat illness. Athletic trainers were least confident (somewhat confident to somewhat not confident, M=3.39±1.94) in their ability to know the correct reading of the rectal thermometer to distinguish a heat illness emergency and the proper temperature for cold water immersion. Males were somewhat confident about knowing the correct reading of a rectal thermometer and proper temperature for cold water immersion compared to females who were undecided, M=2.86±1.85 to M=3.83±1.91, t(109) p=.009. Males were also somewhat confident in knowing the proper way to administer a rectal thermometer and cold water immersion compared to females who were undecided, M=2.76±1.67 to M=3.75±2.00, t(109) p=.007**.** ANOVA analysis (Tukey Post Hoc) indicated that athletic trainers earning more salary (≥55K) were more confident than athletic trainers at lower salaries (>25K) in solving difficult problems with heat illness athletes, M=1.52±0.73 to M=2.43±0.94, F(4,108)=2.87, p=.004. **Conclusion:** Athletic trainers are *somewhat confident* in their ability to handle exertional heat illness emergencies. The lowest levels of self-confidence are in their abilities to insert a rectal thermometer and execute cold water immersion and to know the correct readings of the rectal thermometer to distinguish different heat illnesses and the proper temperature for cold water immersion. Athletic training should engage in continuing education opportunities where they are instructed the proper way administer a rectal thermometer and cold water immersion, and know the correct readings. Entry-level educational programs should consider formal instruction and evaluation for care of exertional heat illnesses, and related clinical competencies.

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Introduction

Emergent heat related illness situations can and do occur in the athletic environment, and athletic trainers must be prepared with the proper equipment and confidence to administer effective interventions. Heat illnesses are more likely to occur in hot, humid weather, but can also occur in other conditions. Binkley, Beckett, Casa, Kleiner, and Plumber (2002) note that traditional classification of heat illness defines 3 categories: heat cramps, heat exhaustion, heat stroke, heat syncope and exertional hyponatremia. Exercise-associated muscle (heat) cramps presents during or after intense exercise sessions as an acute, painful, involuntary muscle contraction; exercise (heat) exhaustion is the failure to continue exercise combined with heavy sweating, dehydration, sodium loss, and energy depletion with a rectal temperature between 97°F and 104°F; exertional heat stroke is an elevated core temperature (>104°F) associated with signs of organ system failure due to the temperature regulation system being overwhelmed or inhibited heat loss; heat syncope, or orthostatic dizziness is connected to peripheral vasodilation, postural pooling of blood, diminished venous return, and dehydration. (Binkley et al., 2002).

Environmental factors are what influence the risk of heat illnesses the most. When the environmental temperature is above skin temperature, athletes begin to absorb heat from the environment and depend entirely on evaporation for heat loss (Kenney, 1996). High relative humidity inhibits heat loss from the body through evaporation. Heat is gained or lost from the body by one or more of the following mechanisms: radiation, which is when energy is transferred to or from an object or body via electromagnetic radiation from higher to lower energy surfaces, conduction, which is where heat transfers from warmer to cooler objects through direct physical contact, examples being ice packs and coldwater baths, convection, which is when heat transfers to or from the body to surrounding moving fluid, examples including moving air from a fan, cycling, or windy day, and evaporation, which is when heat transfers via the vaporization of sweat and is the most efficient means of heat loss (Binkley et al, 2002).

Kerr, Marshall, Comstock, and Casa (2013) note that it is estimated that more than 6500 high school football athletes and more than 9000 high school athletes are treated annually for exertional heat illnesses. Currently only 42% of U.S. high schools have access to an athletic trainer (Prentice, 2013). Between 1995 and 2010, a total of 35 football players died from exertional heat stroke, an average of two annually (Kerr, Casa, Marshall, Comstock, 2013), In Summer 2011, six high school football players died due to high temperatures and lack of rehydration and in the 5 year block from 2005 to 2009, more exertional heath stroke deaths occurred in organized sports than in any other 5-year period over the past 35 years (Kerr, Casa, Marshall, Comstock, 2013).

The Board of Certification (2011) and Anderson, Courson, Kleiner, and McLoda (2002) show that the athletic trainer is responsible for developing, administering, and executing a plan of care during an emergent situation, such as an exertional heat illness. Every athletic trainer should have an emergency action plan in place in the event an athlete suffers extreme heat stress. The National Athletic Trainers' Association (2011) reports that failure to provide appropriate care because of a lack of equipment or training may result in additional injury, affecting one's chances for optimal recovery and may even be negligent. Being prepared for exertional heat illnesses requires having a properly equipped emergency trauma/medical kit that is accessible, as well as the proper training and confidence for using the equipment.

Mulholland and Green (2010) report that self-confidence is an important component needed by an athletic trainer to fulfill their duty of being able to identify, evaluate and manage injuries or harmful situations. The athletic trainer should be ready and able to handle all emergencies including those involving exertional heat illnesses. For athletes suffering from exertional heat illness, the athletic trainer may be the first to recognize and respond to their symptoms. The athletic trainer needs to be confident with their skills and education to manage a life threatening heat illness situation. If an athletic trainer is unable to identify an exertional heat illness situation, such as heat exhaustion or heat stroke, an athlete's life could be at risk. If confidence is lacking, Mulholland and Green (2010) say that it is likely from lack of experience and a missing component in their education. With repetitive practice and experience working with athletes suffering from exertional heat illness, an athletic trainers' self-confidence should improve. Athletic training is a profession where practical skill is the essential distinguishing feature, and a large proportion of learning occurs in the clinical environment (Mulholland & Green, 2010).

With repetitive practice and experience, an athletic trainers' self-confidence should improve. Wainwright and colleagues (2010) defined a novice athletic trainer as having less than one year of experience in their field. Therefore, for this study, a novice athletic trainer is defined as having no more than one year of experience. Having one or two years of experience as a certified athletic trainer qualifies one as an advanced beginner because these individuals are now formulating their experiences as a part of their actions as athletic trainers'. A competent athletic trainer will be measured as 2-3 years of experience. A proficient athletic trainer will be defined as having between three to seven years of experience. An expert athletic trainer will be defined as an individual who has a minimum of eight years of experience as a certified athletic trainer.

The motivation for this topic stems from the researchers undergraduate research in looking at equipment preparedness in emergency situations. Morin et al. (2014) did a study to determine the confidence levels of athletic training graduates in performing professional skills and providing care to patients in emergent settings. The researchers in this study want to specifically look at the equipment preparedness and confidence of high school athletic trainers dealing with exertional heat illnesses.

Theoretical Literature

Many studies have been done looking at heat illness emergencies, but none specifically looking at how prepared or confident the athletic trainer or medical professionals on site are for treatment or prevention of a heat illness event. There have also been no published studies that examine athletic trainers' experience or confidence level with evaluating and managing exertional heat illness symptoms in athletes.

Recommendations

The National Athletic Trainers' Association published a position statement on exertional heat illnesses in 2002. Binkley et al, (2002) note several recommendations for the athletic trainer when trying to prevent exertional heat illnesses. The first recommendation is to provide appropriate medical care and that personnel are familiar with exertional heat illness prevention, recognition, and treatment (Binkley et al., 2002). The next recommendation is to adapt athletes to exercise in the heat or acclimate them gradually over 10 to 14 days. Athletes should train for 1 to 2 hours under the same heat conditions that will be present for their event (Binkley et al., 2002). The National Athletic Trainers' Association (NATA) led an effort with more than 10 organizations known as the Inter-Association Task Force (NATA-IATF) to create a comprehensive preseason heat acclimatization process for high school athletes and to reduce the risk of exertional heat illnesses (Kerr et al, 2013).

Other important recommendations by Binkley et al, (2002) include; educating athletes to keep hydrated by matching fluid intake with sweat and urine output and drink before they feel thirsty, developing a plan of action in the event that a sling psychrometer reading provides unsafe weather conditions for events and how to alter training, provide proper break periods and rest with beverages for rehydration, avoid the hottest part of the day for training, and limit weight loss to no more than 2% to 3% of body weight.

Equipment

Supplies to treat exertional heat related emergencies should be available at practice and games. Binkley et al, (2002) also recommend having on hand, cool water or sports drinks, ice for active cooling (ice bags, tub cooling), rectal thermometer to assess body-core temperature, tub, wading pool, kiddy pool, or whirlpool to cool the trunk and extremities for immersion cooling therapy, and sling psychrometers to asses heat and humidity conditions.

Casa, McDermott, Lee, Yeargin, Armstrong and Maresh (2007) state "it is quite difficult, if not impossible, to kill an otherwise healthy athlete experiencing exertional heat stroke if rapid cooling via cold/ice water immersion is implemented within a few minutes after collapse." Water has a higher thermal conductivity than air, leading to a much greater potential for heat transfer (Casa et al., 2007). Evidence indicates that the amount of time that rectal temperature exceeds at critical level temperature for cell damage dictates the severity of exertional heat stroke injury (Casa et al., 2007). Lowering core body temperature to less than 40-C (104-C) within 30 min should be the primary goal of exertional heat illness treatment (Casa et al., 2007). The literature indicates that the care provider should use cold water immersion unless a reason exists to use another cooling technique. "The best cooling rates reported in the literature are with cold water immersion, which consistently provides outstanding cooling rates in controlled studies and clinical interventions of exertional heat illness patients" (Casa et al., 2007).

Presentation of Illness

Recognition and treatment of exertional heat illnesses are very important. Exercise-associated muscle (heat) cramps are the easiest to recognize, presenting with thirst, sweating, transient muscle cramps and fatigue and can be treated by stopping activity, replacing lost fluids with sodium-containing fluids, and begin mild stretching with massage of the muscle spasm (Binkley et al., 2002). An athlete with heat syncope will be presented with fainting associated with dizziness, tunnel vision, pale or sweaty skin and should then be moved to a shaded area, vital signs being monitored and rehydrated (Binkley et al., 2002). Heat exhaustion and heat stroke will prevent similarly with hallucinations, altered mental status, confusion, disorientation, or coma but should be differentiated by measuring core temperature rectally; a core temperature reading higher than 104°F denote heat stroke (Binkley et al., 2002). Binkley et al, (2002) suggest that the best way to treat an athlete suffering from heat exhaustion or heat stroke is to remove equipment and clothing and begin rapid cooling.

The primary goal of exertional heat illness management is to implement a heat acclimatization guideline. Casa and Csillan (2009) speak highly of the heat acclimatization protocol saying that it is essential in secondary school athletic programs to minimize the risk of exertional heat illness during the preseason practice period. Progressive acclimatization is especially important during the initial 3 to 5 days of practices. Casa and Csillan (2009) note when an athlete undergoes a proper heat-acclimatization program, physiologic function, exercise heat tolerance, and exercise performance are all enhanced, while athletes who are not exposed to a proper heat-acclimatization program face measurable increased risks for exertional heat illness. The recommendations outlined by Casa and Csillan (2009) are minimum standards. The heat-acclimatization period is defined as the initial 14 consecutive days of preseason practice for all student athletes with the goal of the acclimatization period to enhance exercise heat tolerance and the ability to exercise safely and effectively in warm to hot conditions (Casa and Csillan 2009).

Preseason heat acclimatization guidelines from Casa and Csillan (2009) are in table 1.

Table 1.

Days 1-5	First 5 days of formal practice, athletes may not participate in more than 1 practice per day. Practice time should not exceed 3 hours in any 1 day. A 1 hour maximum walk-through is permitted, a 3 hour recovery period should be present between practice and walk-through
Days 1 & 2	Sports requiring helmets or shoulder pads, helmets are the only protective equipment permitted
Days 3-5	Helmets and shoulder pads permitted

Table 1.

Days 6-14	All protective equipment may be worn and full contact may begin. Double practices days may begin and be followed by a single-practice day. When a double practice day is followed by a rest day, another double practice is permitted after the rest day
All days	Double practice days, no practice is to exceed 3 hours in duration, and not athlete is to participate in more than5 hours of total practice (including warm-p, stretching, cool-down, walkthrough, conditioning, weight-room activities). Because the risk of exertional heat illnesses during the preseason acclimatization period is high, it is strongly recommended that an athletic trainer be on site before during and after all practices

Exercise heat exposure produces progressive changes in thermoregulation that involve sweating, skin circulation, thermoregulatory set point, cardiovascular alterations, and endocrine adjustments (Binkley et al, 2002). After exercise heat acclimatization, physiological responses are impacted in ways such as heart rate, core body and skin temperature, and fatigue all decrease while stroke volume, sweat output and evaporation of sweat increase and onset of sweating begins earlier in training, allowing the body thermoregulation to work properly in keeping the body cool (Binkley et al., 2002.) All of the physiologic response changes lead to better physical activity during heat and decrease the risk of exertional heat illness occurring.

An athletic trainer is the key health care provider in the emergency management team. They are likely to have more contact with an athlete than the athlete's physician. Therefore, athletic trainers' can help the athletes learn how to appropriately acclimatize the weather and stay hydrated, allowing physical activity and athletics to become an enjoyable part of their life, which may significantly reduce the risk of many serious heat illnesses. With this in mind it's important to understand relevant competencies that athletic trainers should utilize while working with an exertional heat illness athlete.

Athletic Training Competencies

The BOC Role Delineation Study/ Practice Analysis, 6th edition (2011) identifies essential knowledge and skills for the athletic training profession and serves as a blueprint for exam development and the NATA Athletic Training Education Competencies, 5th edition (2011) provides the knowledge, skills, and clinical abilities to be mastered by students enrolled in professional athletic training education programs.

Presented are the BOC role delineations and athletic training education competencies related to exertional heat illness:

> Explain the principles of the body's thermoregulatory mechanisms as they relate to heat gain and heat loss. Explain the principles of environmental illness prevention programs to include acclimation and conditioning, fluid and electrolyte replacement requirements, proper practice and competition attire, hydration status, and environmental assessment (eg, sling psychrometer, wet bulb globe temperatures [WBGT], heat index guidelines).Summarize current practice guidelines related to physical activity during extreme weather conditions (eg, heat, cold, lightning, wind). Obtain and interpret environmental data (web bulb globe temperature [WBGT], sling psychrometer, lightning detection devices) to make clinical decisions regarding the scheduling, type, and duration of physical activity. Assess weight loss and hydration status using weight charts, urine color

charts, or specific gravity measurements to determine an individual's ability to participate in physical activity in a hot, humid environment. Explain the role of core body temperature in differentiating between exertional heat stroke, and head injury. Differentiate the different methods for assessing core body temperature. Assess core body temperature using a rectal probe. Explain the role of rapid full body cooling in the emergency management of exertional heat stroke. Develop, implement, and monitor prevention strategies for at-risk individuals (eg, persons with a previous history of heat illness, persons with sickle cell trait) and large groups to allow safe physical activity in a variety of conditions. This includes obtaining and interpreting data related to potentially hazardous environmental conditions, monitoring body functions (eg, hydration status), and making the appropriate recommendations for individual safety and activity status.

Self-efficacy

Self-efficacy is an individual's beliefs that they are able to perform certain tasks (Bandura, 1977). Self-efficacy is a measure of confidence, which is directly tied to motivation. Bandura (1977) based his theory of self-efficacy on the principal assumption that psychological procedures provide as means of constructing and enhancing expectations of personal efficacy. Expectations of efficacy can be distinguished from outcome expectancies. Outcome expectancy is defined as an individual's estimate that a certain behavior will point to certain outcomes (Bandura, 1977). Efficacy expectations are the belief that one can successfully accomplish the behavior required to produce the outcomes. Out-come and efficacy expectations are differentiated by Bandura (1977), because individuals can believe that a particular course of action will produce certain outcomes. If these ex-pectations bring about serious doubts on whether the task can be successfully performed, then information does not influence their behavior (Bandura, 1977). Expectations in per-sonal mastery affect both initiation and persistence of coping behavior. The strength of an individual's belief in their effectiveness is likely to affect the idea that they will be able to cope with given situations.

Bandura (1977) explains expectations of personal efficacy are based on four ma-jor sources of information that include performance accomplishments, vicarious experi-ence, verbal persuasion, and physiological states.

Performance accomplishment is based on personal mastery experiences. Suc-cesses raise ones expectations; repeated failures will lower them, especially if the mis-takes occur early in the course of events. Following the development of strong efficacy expectations through repeated success, the negative impact of infrequent failures will be diminished. The failures that are overcome by determined effort, will strengthen self-mo-tivated persistence (Bandura, 1977). Through this type of experience an individual will determine ways the most challenging situation can be mastered through continued effort. Therefore the effects of failure on personal efficacy somewhat depend on the timing and the total pattern of experiences in which failures occur (Bandura, 1977).

Many expectations are derived from vicarious experience. By seeing others per-form aggressive activities without negative consequences can generate expectations in observers that they too will improve if they increase and strive in their efforts (Bandura, 1977). These individuals persuade themselves that if others can do a particular task, they should be able to achieve at least some improvement in performance. Because these experiences rely on social comparison they are less dependable on the capabilities of the person trying to accomplish a task. This also makes expectations on efficacy more vulnerable and likely to change as the person develops their skills.

Verbal persuasion is used widely because it is easy to use and easily available. Individuals are led into believing they can cope well with what has overwhelmed them in the past (Bandura, 1977). Like vicarious experiences, expectations that are developed verbally in this manner are likely to be weaker than those arising from one's own accomplishments because they do not add a credible experience to base their performance. Individuals who are persuaded in this fashion will be led to believe they hold the means to master challenging situations and will build greater effort than those who receive on the performance aids. However, if the individual does not hold the competence to facilitate effective performance it will likely lead to failures that discredit the persuader and further undermine the recipients' perceived self-efficacy (Bandura, 1977).

The final source of self-efficacy is emotional arousal. Stressful and taxing situations can elicit emotional arousal, depending on the circumstances, might have informative value concerning personal competency (Bandura, 1977). High arousal usually decreases performance; individuals are more likely to thrive when they are not tense or agitated. By placing these individuals in situations that elicit the emotions in a stressful situation, these emotions could extinguish their anxiety and bring about some level of avoidance behavior.

According to Bandura (1994), individuals who possess a high sense of self-efficacy are likely to view their emotional manner as an energizing promoter of performance, while the individual who has self-doubt will regard their emotional state as a debilitator. Bandura (2004) suggests that “efficacy beliefs influence goals and aspirations; the stronger the perceived self-efficacy, the higher the goals people set for themselves and the firmer the commitment to them” (p. 145).

Self-efficacy in Health Care

Self-efficacy and self-confidence are necessary practice elements for individuals that are in the healthcare profession in terms of education and practice (White, 2009). Healthcare educators should have a decent understanding of the concept of self-efficacy in order to assist in the accomplishments of healthcare students and their learning of technical and nontechnical skills. Skills involving self-efficacy should also be involved in the growth of a healthcare professional through their own personal experiences. The aim of healthcare professionals should be to facilitate a trusted care of patients. Professionals such as athletic trainers, nurses, physical therapists and doctors must display self-efficacy, and as such, simplification and reasoning of its meaning if necessary. Those who are in the care of a healthcare professional must feel safe and reassured. Low self-efficacy makes other uncomfortable (White, 2009). Healthcare providers must therefore exude a level of self-efficacy which promotes patients comfort.

Collegial support is necessary to gain confidence in oneself (White, 2009). Nursing performances are carried out by an individual, but in most cases it is carried out through interactions between colleague nurses in a team, much like other healthcare professionals (Lee & Ko, 2010). Healthcare managers should recognize the characteristics of a group (leadership style, efficacy of a leader, atmosphere of a team, collective efficacy, etc.) and group dynamics (Lee & Ko, 2010). For this reason it's suggested that healthcare providers develop a structured efficacy program to improve the outcomes regarding their care. This will aide not only at the organizational level but also at the individual level of developing self-efficacy. The environment of each athletic training job setting can vary greatly. Athletic trainers working at high schools are usually the sole health care provider at that site, working autonomously and sometimes lacking in various resources that make health care delivery easier. In contrast, athletic trainers working at colleges/universities will typically have a network of colleagues also working in the athletic training facility, which can provide the benefits of peers and mentors. Additionally, college/university athletic trainers will typically have greater resources to care for their patients, such as an on-site team physician, equipment, and resources.

Experience is vital to promote motivation, which promotes the amount of practice being done to master a skill, all of which improves self-efficacy. The amount of exposure that an individual obtains is directly correlated with the amount of self-confidence an individual can obtain (Renner & Renner, 2001). White (2009) suggests that experience, exposure and practice are critical prerequisites for self-confidence. Therefore, if an individual has very little experience with specific clinical competencies then it can be assumed that they will not have a high self-efficacy when performing a particular task.

Success is the most profound attribute to the concept of self-confidence (White, 2009). White (2009) states that "one can have knowledge about a procedure, gain a support system, practice a skill and be appropriately geared up for a situation, but if the successes do not occur, self-confidence will be stalled." If an individual has few successes and many failures they may hesitate at the opportunity or progress slowly, to gain the confidence needed to complete task during a situation they are required to be competent with.

The literature has shown that self-efficacy can be developed in a number of ways for healthcare workers. This development can occur quickly or slowly depending on the individual and their experiences of being able to perform specific competencies. If the provider experiences many successful situations throughout their professional career, then they will develop the tools to become a successful and confident professional. This will instill in them the self-efficacy to experience any situation confidently as they progress through their career.

Empirical Literature

Unfortunately, there is a lack of research on self-efficacy within healthcare professions. The majority of the research involving self-efficacy in the healthcare setting has been identified through the field of nursing and involves students developing positive self-efficacy. There have been no published studies that have involved athletic trainers and the role of self-efficacy. White (2009) identifies that students and professionals have varying levels of self-confidence, and there are several factors that influence confidence in the clinical environment. Success in the clinical environment builds self-efficacy and the more clinical success an individual experiences, the more self-efficacy will be improved and reinforced. However, it should be identified that faculty perception and student perception about experiences may differ widely (White, 2009). White (2009) discusses that there must be a learning of skills and procedures before self-efficacy can be built. The learning and reinforcement of learning are not necessarily achieved by an individual performing the skill on their own.

Confidence

Morin, Misasi, Davis, Hannah, and Rothbard (2014) conducted a study to determine the confidence levels of athletic training graduates in performing professional skills, providing care to patients in emergent settings, and to suggest improvements in clinical education. Morin et al, (2014) surveyed first-time candidates from undergraduate and graduate Commission on Accreditation of Athletic Training Education–accredited programs sitting for the BOC examination during the April 2011 testing window. The survey addressed the participants' self-perceived level of confidence in performing different professional skills associated with athletic training (Morin et al, 2014). Morin et al, (2014) had participants rate their level of confidence on a scale from 1 to 10 (1= no confidence, 10= extremely confident). Morin et al, (2014) found that participant confidence levels were strong in performing athletic training skills on traditional patient populations, although body region was a factor and lower confidence levels were reported for caring for elderly and special needs individuals, with insufficient clinical experiences as the primary cause.

Morin et al, (2014) conducted a study with much strength. First, they focused on entry level athletic trainers who most likely lacked experience, allowing them to really assess athletic trainer's confidence of their athletic training educational programs. Morin et al. (2014) also helped answer the question of how confident athletic trainers are for dealing with different populations, which is something that has not been focused on much in athletic training. One weakness of this study was that the main confidence scale was based on athletic training domains and after looking at the questions it lacks many questions. There is one question “What is your confidence level in providing care to a patient suffering a non-orthopedic illness?” (Morin et al, 2014). This questions is very broad and encompasses a wide range of illnesses.

Shinew (2011) also completed research looking at entry level athletic trainers but focused on their perceived adequacy of clinical education in preparation for confident professional practice. Shinew (2011) used a survey to collect information from employed, entry-level athletic trainers within two years of graduating from their entry-level athletic training programs. The main questionnaire contained two concepts; perceptions of adequacy regarding clinical education preparation and confidence to practice athletic training, and used a Likert scale ranging from ‘strongly agree’ to ‘strongly disagree,’ (Shinew, 2011). Shinew (2011) found that overall 87.1% of the respondents perceived their clinical education to be adequate, 96.7% felt confident to practice AT, and cumulatively by the A-CI, 97% felt their clinical education was adequate in preparing them for confident professional practice. “Eighty two percent or more respondents perceived their clinical education preparation as being adequate for the domains: prevention, clinical evaluation and diagnosis, immediate care, and treatment, rehabilitation and reconditioning. The domain with the most respondents to feel their clinical education preparation was inadequate was, ‘organization and administrative duties’ with 46 (10%) of the respondent” (Shinew, 2011).

Shinew (2011) completes a strong study because it is the only other study since 2003 to look at athletic training educational research on the perceptions of recent athletic training students on either didactic or clinical education and since that time, there have been significant changes in academic preparation, with the elimination of the internship route to certification and many other accreditation revisions. The main instrumentation that Shinew (2011) utilized was created to capture participants perceptions as athletic training students on their clinical educational experiences and confidence to practice athletic training based on the professional practice domains. Again, looking at the questionnaire it does not seems to fulfill all of the professional practice domains as most questions pertain to prevention, diagnosing, treatment, rehabilitation, reconditioning and administrative duties.

Self-efficacy

There have been several studies that have used Bandura's self-efficacy model and specifically the Generalized Self-Efficacy Scale to identify a health care providers' self-confidence when working with their patients. One study used the Generalized Self-Efficacy Scale to investigate how healthcare providers improving perceptions of self-efficacy can develop their well-being and job satisfaction (Duggleby, Cooper, & Penz, 2009). Duggleby et al. (2009) took sixty-four continuing care assistants (personal care aides) who registered for a 'Living with Hope' Conference and they completed a demographic form, Herth Hope Index, Global Job Satisfaction Questionnaire, Spiritual Well-Being Scale, General Self-Efficacy Scale, and a hope questionnaire. Duggleby et al. (2009) found that a statistically significant positive correlation was found between hope and self-efficacy, indicating that perceptions of self-efficacy increase with hope as well as participants having greater perceptions of self-efficacy and lower levels of spiritual well-being may have more hope.

The main strength of the study conducted by Dubbleby et al (2009) was that they were able to gather enough information to get results and examine relationships between hope and spiritual well-being, global job satisfaction, and general self-efficacy. The weakness of the study by Duggleby et al (2009) is that they had participants complete 5 separate questionnaires with a total of 52 items along with 4 open ended questions. The multiple scales would take a bit of time to complete.

Another study used the Generalized Self-Efficacy Scale to determine and measure competence and self-efficacy in entry level nursing students (Lauder, Holland, Roxburgh, Topping, Watson, Porter, & Behr, 2008). The participants in this survey were nursing students and midwives and Self-efficacy was measured by the ten-item General Perceived Self-Efficacy Scale (GPSE) (Schwarzer and Jerusalem, 1995). It has a four-point response format (not at all true; hardly true; moderately true; exactly true) and scores ranged from 10-40 with higher scores representing greater self-efficacy. Lauder et al. (2008) found that 'All source support' was moderately associated with self-efficacy. Therefore, higher levels of support are linked to high levels of self-efficacy.

Education and Implementation

The purpose of Mazerolle et al. (2011) was to gain an understanding of educational techniques used to deliver content regarding exertional heat stroke and were guided by the following 3 questions: How are athletic training educators and programs preparing their students to diagnose and treat a potential case of exertional heat stroke? What types of realistic learning opportunities are afforded to the athletic training student regarding the skills of thermometry and cold-water immersion? What role does educational preparation play in the implementation of thermometry and cold water immersion into clinical practice?

The participants included 13 athletic training educators (11men, 2 women) from programs accredited by the Commission on Accreditation of Athletic Training Education. Instrumentation included 3 in-person focus group interviews at the 2009 National Athletic Trainers' Association annual meeting in San Antonia, TX. The researchers developed a set of open-ended questions based on existing literature, knowledge of the topic, and the research questions established before data collection. Two follow-up telephone interviews were conducted after the 3 focus group sessions. Data were analyzed using inductive content analysis. In 2011, Mazerolle et al. found 4 themes emerged from the analysis:

> Educational techniques, educational competencies, previous educational training, and privacy/public opinion. **Educational techniques** highlighted the lack of hands-on training for thermometry and CWI. **Educational competencies** referred to the omission of thermometry, and CWI as psychomotor skills. **Previous educational training** addressed educators not having the skills or comfort with the skills necessary to properly educate students. **Privacy/public opinion** comprised external inputs from various groups (parents and coaches), legal considerations, and social bias. (Mazerolle et al., 2011, pp. 525-526)

The study by Mazerolle et al (2011) was a great qualitative study that gathered information that is great for looking at how educators and educational programs are lacking in competencies dealing with exertional heat illnesses. Mazerolle et al (2011) then went on to discuss how each theme that emerged in the results directly influenced each other. The understanding is that qualitative research involves small sample sizes, which this study did a good job at gathering athletic training educators from 6 of the 10 NATA districts, but I think this study could have found more if all 10 districts were represented with more than 1 educator from each district as well as varying the division level they taught at to note any differences between school sizes.

Mazerolle, Pinkus, Casa, McDermott, Pagnotta, Ruiz, Armstrong and Maresh (2011) were concerned with the fact that certified athletic trainers demonstrate strong knowledge of recommended practices with exertional heat stroke but are apprehensive in implementing rectal temperature assessment and cold water immersion, which might lead to deaths from EHS that could have been prevented. This concerned led Mazerolle et al., (2011) to investigate why collegiate and high school athletic trainers do not implement best practices for the recognition and treatment of exertional heat stroke. This study was conducted via in-person focus groups with a sample size of 19 athletic trainers of collegiate of high school level. Mazerolle et al, (2011) found five emergent themes that explained the lack of evidence-based practice regarding recognition and treatment of exertional heat stroke. Three themes (lack of knowledge, comfort level, lack of initiative) were common in both the collegiate and high school settings, and 2 separate themes (liability concerns, lack of resources) were present in the high school setting (Mazerolle et al., 2011). For high school athletic trainers, a lack of equipment and resources created apprehension about implementation of appropriate measures and in several instances, high school athletic trainers discussed not having the budget for the expenses associated with rectal thermometers or cold water immersion (Mazerolle et al., 2011).

The main strength of this study is that it is a follow up of the previous study by Mazerolle et al (2011) but involved a perspective from the clinical athletic trainer rather than the educator. For a qualitative study, Mazerolle et al, (2011) was able to gather a good sample size and question both collegiate and high school athletic trainers so note differences between the two. A pilot was conducted before data collection which strengthened the study allowing grammatical changes for readability and ordering of questions for more effective flow (Mazerolle et al. 2011).

Epidemiology and Environment

Cooper, Ferrara, and Broglio (2006) looked at exertional heat illness and environmental conditions during a single football season in the Southeast United States. Cooper et al. (2006) had a purpose to evaluate the wet bulb globe temperature and the incidence of exertional heat illness during American football practice sessions at 5 National Collegiate Athletic Association Division I Southeastern universities from August through October in 2003. The participants were the collegiate football players at the 5 universities. Cooper et al. (2006) recorded wet bulb globe temperatures from August through October 2003, at the beginning, middle, and end of each practice session. The EHIs were identified and recorded, and athlete-exposures were calculated. Copper et al. (2006) found athletic trainers at participating institutions reported a total of 139 EHIs during the 3-month period and the overall illness rate was greatest in August, with a sharp decline in the following months. The EHIs accounted for 88% of all illnesses in August and 12% in September, with no EHIs reported in October (Cooper et al., 2006).

Cooper et al (2006) had a couple of weaknesses in their study, one being that they only looked at college universities where the athletic training staff would be more prepared than high schools. The study noted that each exertional heat illness was not confirmed by a physician and they assumed that each athlete suffering from an exertional heat illness was able to identify it as such and report it to the medical staff on hand (Cooper et al. 2006). The last weakness of this study was that the design did not require the athletic trainer to measure core body temperature at the time of illness (Cooper et al. 2006), allowing exertional heat stroke to occur and not be recorded.

Kerr, Casa, Marshall, and Comstock (2013) were interested in describing the epidemiology of exertional heat illness in high school athletes. Analyzing the National High School Sports–Related Injury Surveillance System data from 2005-2011 allowed Kerr, Casa, Marshall, and Comstock (2013) to find that exertional heat illnesses were widely distributed geographically, and most occur in August (60.3%). Of the exertional heat illnesses reported during practice, Kerr, Casa, Marshall, and Comstock (2013) found that almost one third (32.0%) occurred more than 2 hours into the practice session and the exertional heat illness rate in football (4.42 per 100,000 athlete exposures) was 11.4 times that in all other sports combined (95%). In addition, approximately one third (33.6%) of exertional heat illnesses occurred when a medical professional was not onsite at the time of onset (Kerr, Casa, Marshall, and Comstock, 2013).

The major strength of this study was that they were able to gather data on all high school athletes rather than focusing on one sport such as football. The major limitation with the study by Kerr, Casa, Marshall, and Comstock (2013) was that their methods called for them to analyze the National High School Sports–Related Injury Surveillance

System data, which only allowed them to calculate rates and describe circumstances of exertional heat illness that were recorded.

Compliance of Guidelines

Kerr, Marshall, Comstock, and Casa (2013) then examined compliance with NATA-IATF guidelines and related exertional heat illness prevention strategies. Kerr, Marshall, Comstock, and Casa (2013) sent an online questionnaire to 1142 certified athletic trainers, which captured compliance with 17 NATA-IATF guidelines and exertional heat illness prevention strategies in high school football during the 2011 preseason. Kerr, Marshall, Comstock, and Casa (2013) found that on average, athletic trainers reported football programs complying with 10.4 NATA-IATF guidelines; 29 AT (2.5%) reported compliance with all 17. Guidelines with the lowest compliance were as follows: ‘‘Single-practice days consisted of practice no more than three hours in length’’ (39.7%); and ‘‘During days 3–5 of acclimatization, only helmets and shoulder pads should be worn’’ (39.0%) (Kerr, Marshall, Comstock, and Casa 2013). An average of 7.6 exertional heat illness prevention strategies were used and the common exertional heat illness prevention strategies were as follows: having ice bags/cooler available (98.5%) and having a policy with written instructions for initiating emergency medical service response (87.8%) (Kerr, Marshall, Comstock, and Casa 2013). Kerr, Marshall, Comstock, and Casa (2013) revealed that programs in states with mandated guidelines had higher levels of compliance with guidelines and greater prevalence of EHI prevention strategies.

The major strength of this study was its design. Kerr, Marshall, Comstock, and Casa (2013) included 17 recommendations from the NATA-IATF preseason heat acclimatization guidelines and several related exertional heat illness prevention strategies on the basis of existing recommendations for their questionnaire. The major weaknesses of their study included they only have an 18% response rate possibly biasing the sample and not allowing generalizability to all high school football programs, such as those without athletic trainer coverage. Also, they were unable to obtain data from high schools without athletic trainers; data collection from high schools without athletic trainers is recommended.

Equipment

DeMartini et al. (2015) investigated the effectiveness (speed of cooling and survival rates) of cold water immersion in the treatment of exertional heat stroke and the researchers also looked to compare the cooling rates on the basis of sex, age, and initial rectal temperature. Participants included runners in the Falmouth Road Race for 18 years, a longitudinal study. DeMartini et al. obtained finish line medical tent patient records for the years it was available: 1984, 1989, 1992-1994, 1996-1998, 2001, and 2003-2011. The patient information was included “if the patient had a recorded initial rectal temperature or maximum greater than or equal to 40 degree Celsius and a recorded diagnosis of exertional heat stroke” (DeMartini et al., 2015).

Upon entrance into the medical tent, all participants’ blood pressure, heart rate and rectal temperature were recorded. Common signs of EHI were also noted (ashen skin, collapse, and alterations in pulse). Once diagnosed, participants were put in 50gal CWI tubs with temperature of 10 degrees Celsius (50 degree Fahrenheit). DeMartini et al. (2015) found there were 274 cases of EHS over the 18 years of collected data and the survival rate for the 18 years was 100% with no significant interactions observed between cooling rate and initial rectal temperature, sex, or age.

The strength of DeMartini et al. (2015) comes from the study design also. Their criteria for inclusion were based on proper diagnosis of exertional heat illness and all participants were treated at the same location. Using rectal thermometry, heart rate, blood pressure, signs of exertional heat illness such as collapse and ashen skin, as well as presentation with central nervous system dysfunction were all considered for diagnosis in every participant. The major weaknesses were that some of the information went back 18 years so some treatment files were incomplete with missing data points, making it difficult to thoroughly analyze the treatment period itself.

Conceptual framework

The topic of equipment preparedness and confidence levels for diagnosing, treating, and managing exertional heat illness is extremely important. The motivation for this topic stems from the researchers undergraduate research in looking at equipment preparedness in emergency situations. With it being estimated that more than 6500 high school football athletes and more than 9000 high school athletes are treated annually for exertional heat illnesses (Kerr, Marshall, Comstock, and Casa, 2013) and only 42% of U.S. high schools have access to an athletic trainer (Prentice, 2013), these issues raise great concern. There are numerous amounts of literature on exertional heat illness recommendations and protocols to follow for prevention and treatment but somehow heat stroke is among the top 3 causes of death in athletes and may rise to the primary cause in the summer months (Casa et al, 2012). Something that is so preventable and treatable with the proper equipment and training should not rank so high as a cause of death.

There still needs to be research done to address equipment preparedness for exertional heat illnesses. No study has specifically looked at what required equipment athletic trainers or other medical professionals should have or do have on site for events. With all of the literature on recommended guidelines and protocol and even what equipment athletic trainers should have in the event of an exertional heat illness, there should be some study looking into this. There are studies that have begun to speculate as to why athletic trainers might not have things such as rectal thermometers and cold whirl pools for cold water immersion such as the study by Mazerolle et al (2011). What Mazerolle et al (2011) noted was that high school athletic trainers discussed not having the budget for the expenses associated with rectal thermometry or cold water immersion. “When asked whether they had a rectal thermometer available as one of their temperature assessments, 4 high school athletic trainers responded, "No," and the rest said they had thermometers that could be used rectally, but they would not assess body temperature that way” (Mazerolle et al., 2011). In Mazerolle et al (2011) study they noted that if they used a method to cool athletes, most high school athletic trainers relied on whirlpools that were in the athletic training room but not necessarily close to the fields.

The study by DeMartini et al. (2015) really shows how critical certain equipment is for diagnosing and treating exertional heat illnesses, especially heat stroke. Having access to a sling psychrometer for gauging weather and humidity, rectal thermometer for getting a valid core temperature and having cold water immersion for athletes suffering from heat stroke saved 100% of athletes in an 18 year span. It is crucial to be prepared for an exertional heat stroke because it could mean saving an athlete’s life.

Also noted from the previous studies were issues in design. Morin et al (2014) and Shinew (2011) both designed their studies so that the confidence scales were based on athletic training domains or the professional practice domains. From looking at the questionnaires, they do not fully incorporate all of the athletic training domains, especially those pertaining to exertional heat illnesses. Morin et al, (2014) only had one question pertaining to non orthopedic illness which assuming that is where exertional heat illnesses would fall under. This one question is very broad and encompasses so many illnesses athletic trainers encounter that it doesn't seem just to place them all under one question. Looking at the questionnaire by Shinew (2011) it does not fulfill all of the professional practice domains as most questions pertain to prevention, diagnosing, treatment, rehabilitation, reconditioning and administrative duties.

Purpose

This study was constructed to determine certified athletic trainers equipment preparedness and self-confidence in diagnosing and treating exertional heat illnesses. The primary purpose was to observe if certified athletic trainers possessed the recommended equipment for treating heat illnesses and if experience level working within the field of athletic training would play a role in their level of self-confidence when working with an exertional heat illness athlete. The final purpose was to observe if how many heat illness athletes the certified athletic trainer has worked with during their time as a certified athletic trainer would play a role in their self-confidence working with heat illness athletes.

The hypothesis that if athletic trainers have the proper equipment and a significant amount of experience as a certified athletic trainer, then they will have a high confidence level when managing exertional heat illness events, while athletic trainers who lack proper equipment and have little experience as a certified athletic trainer will have lower self-confidence when managing and caring for an athlete suffering from exertional heat illness. It is also hypothesized that athletic trainers who have more education and higher salary levels will be more confident in treating exertional heat illnesses.

Methods

Participants

A double-blind sampling technique was used to recruit participants from the National Athletic Trainers' Association (NATA). All participants were certified athletic trainers and members of the NATA. Recruitment was conducted through an e-mail that was sent out to 1,000 randomly selected certified athletic trainers by the NATA. The survey instrument was distributed to certified athletic trainers via e- mail link to a Qualtrics generated survey. The study was approved through the university Human Subjects Review Board.

There were 110 respondents to the e-mail invitation. Certified athletic trainers that were not members of the NATA were not eligible to participate in the study. Respondents were 46% male, 54% female, representing all 10 National Athletic Trainers' Association districts, highest representation from district four (N=50). Sixty-eight percent (68%) from high school outreach setting, 22% College or University settings, and 10% from clinic/hospital setting. Twety-one percent of respondents reported earning ≥55K annual salary. Sixty-seven percent hold Masters degrees while 43% have practiced ≥11 years.

Assumptions can be made about the development of the study and that because the questionnaires are being sent to athletic trainers' it can be assumed that these individuals will respond truthfully, and that the participants understood the directions.

Measures

The Athletic Trainer's Self-Confidence Scale (ATSCS) was developed, based on Bandura's self-efficacy model, and the Generalized Self-Efficacy Scale (GSES), to assess athletic trainer's self-confidence. According to Schwarzer and Jerusalem (1995) the GSES was originally developed by Matthias, Jerusalem, and Ralf- Schwarzer in 1979. This instrument contained 20 items. In 1981, it was reduced to 10 items (Schwarzer& Jerusalem, 1995). The GSES aims at a broad and stable sense of personal competence to deal effectively with a variety of stressful situations (Scholz, Dona, Sud, &Schwarzer, 2002). The GSES reliability standards range from 0.5 to 0.9 depending on the intended use and context for the instrument. Internal consistency is 0.76 to 0.90, with the majority in the high .80s (Schwarzer& Jerusalem, 1995).

Schwarzer and Jerusalem (1995) note that the criterion-related validity shows positive coefficients with favorable emotions, dispositional optimism, and work satisfaction, while negative coefficients were found with depression, anxiety, stress, burnout, and health complaints. The ATSCS contains 9 separate questions regarding an athletic trainers' self-confidence when evaluating and managing an athlete suffering exertional heat illness. The participants are instructed to select the statement that accurately describes them. For each section on the survey, the scale range is, 1=strongly agree to 7=strongly disagree.

For the ATSCS, determining *a priori* the mean range for each question, the participant's self-confidence working with an exertional heat illness athlete can be identified. Mean ranges are from strongly confident M= 1-1.49, confident M= 1.5-2.49, somewhat confident M=2.5-3.49, undecided M=3.5-4.49, somewhat not confident M=4.5-5.49, not confident M= 5.5-6.49, strongly not confident M= 6.5-7.

Data Collection Procedures

Utilizing the NATA membership database, 1000 U.S. high school athletic trainers were sent an informational email explaining the importance and purpose of the study. The subjects were assured that the study will only be used for research purposes and that their results will be confidential. The email included a link to the ATSCS where participants were be informed that by filling out the survey, they are consenting to participate in the study. The subjects were also be informed that they can withdraw from the study at any point. If they chose not to participate, the subjects could leave the survey website. Once the survey is completed, the subject was asked to submit his/her completed survey for data analysis. For those participants who do not respond, a follow up email was sent out twice for over 2 weeks to recruit as many participants as possible.

Data Analysis

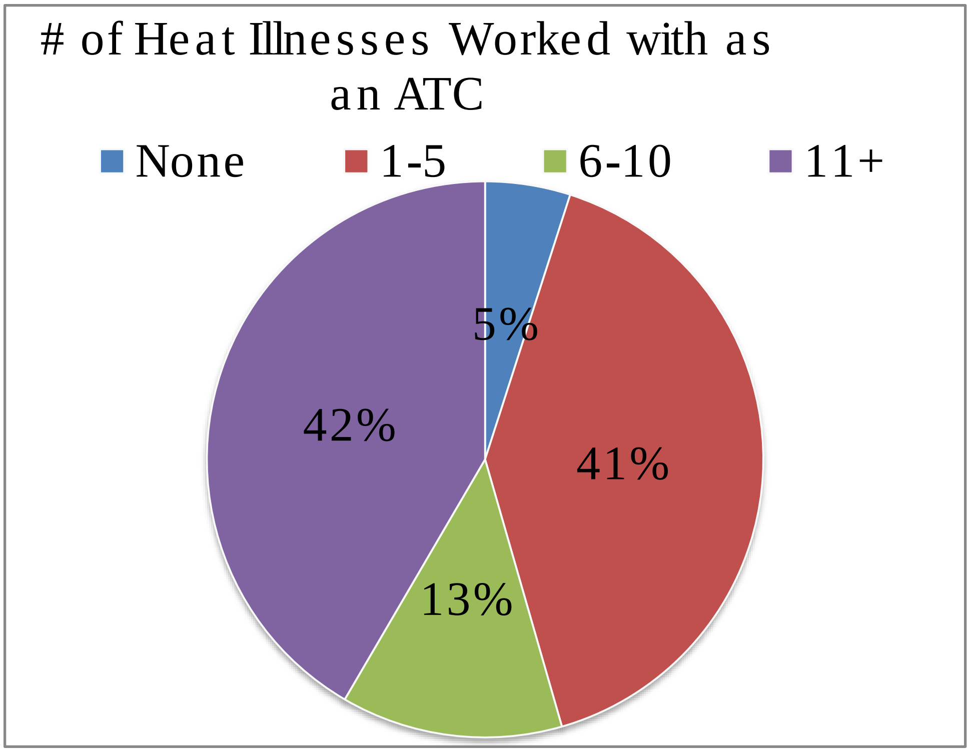
The quantitative data was analyzed using Statistical Package for the Social Science (SPSS 19). Descriptive statistics and frequency distributions were used to report certified athletic trainers' demographic and self-efficacy profiles. To determine if the relationship between self-efficacy and experience between different demographic characteristics, independent samples t-tests and ANOVA with Tukey Post Hoc were used. Furthermore, to establish reliability and validity of the survey instrument Pearson *r* correlations were used and a Cronbach alpha score was determined.

Results

Demographics

A total of 110 certified athletic trainers participated in the study. Males accounted for 46% (n=51) of the certified athletic trainer responses, females accounted for 54% (n=59), representing all 10 National Athletic Trainers' Association districts, highest representation from district four (N=50). Participation was highest for 26-34 year olds with 39% (n=43). Eighty perfect (n-88) reported having become a certified athletic trainer through curriculum route verses 20% (n=20) taking the internship route. Sixty-eight percent (68%) from high school outreach setting, 22% College or University settings, and 10% from clinic/hospital setting. Forty-two (n=46) percent reported having worked with more than 11 heat illness patients in their career while 41% (n=45) reported having worked with 1-5 heat illness patients. Twenty-one percent (n=23) of respondents reported earning ≥55K annual salary, while 30% (n=33) of athletic trainers reported a salary of 35k-45k. Forty-three percent (n=47) reported having more that 11 years experience as a certified athletic trainer. Sixty-seven percent (n=74) hold Masters degrees while 43% (n=47) have practiced ≥11 years.

Figure 1.



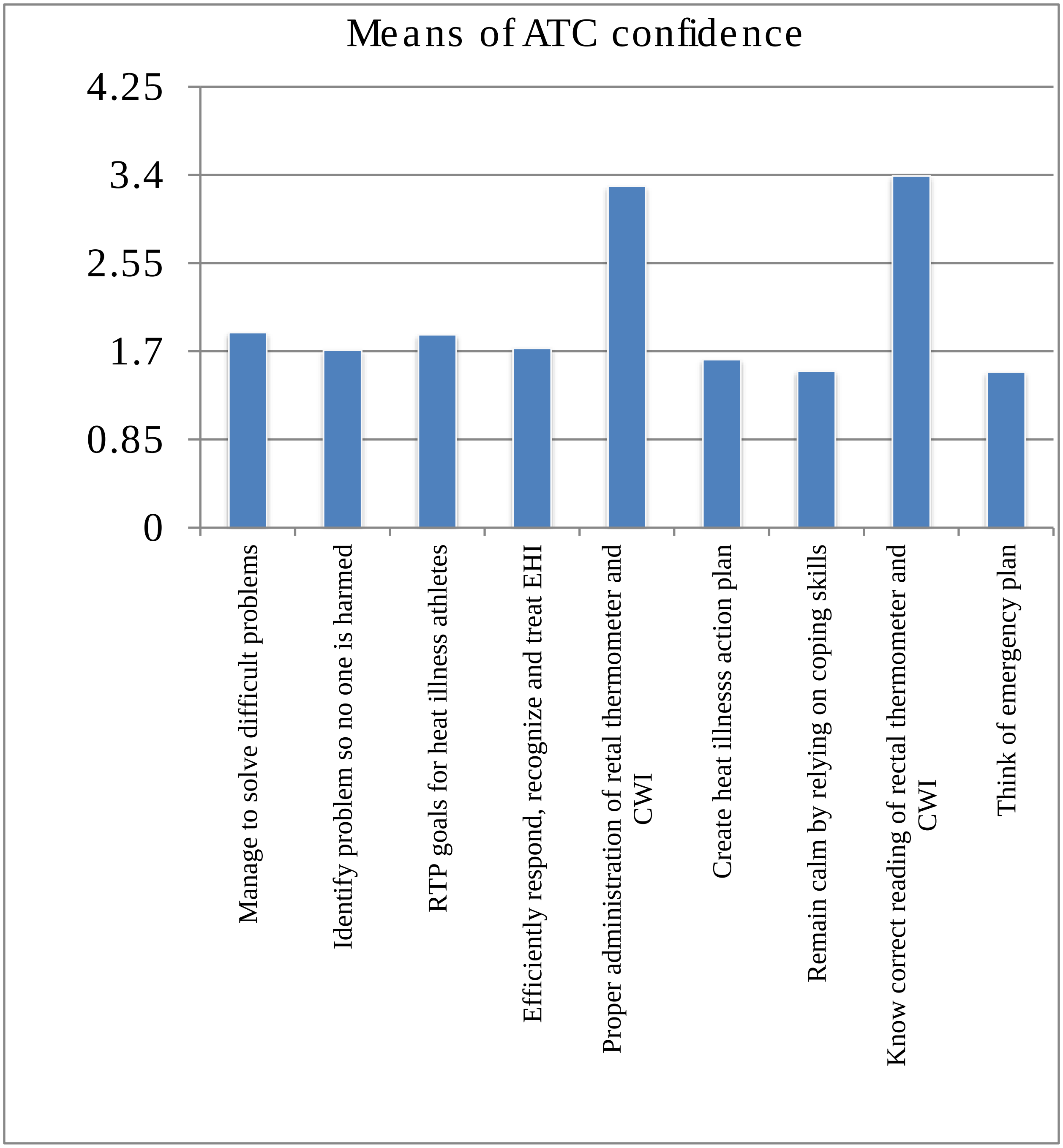
Instrument Validity

The Athletic Trainer's Self-Confidence Scale yielded satisfactory internal consistency and convergent validity (Pearson *r* correlations between scale items ranged from r=.19(p=.05) to r=.79 (p=.01); The instrument had a Cronbach coefficient alphas score of α=.82, which represents a closely related set of items as a group for the instrument.

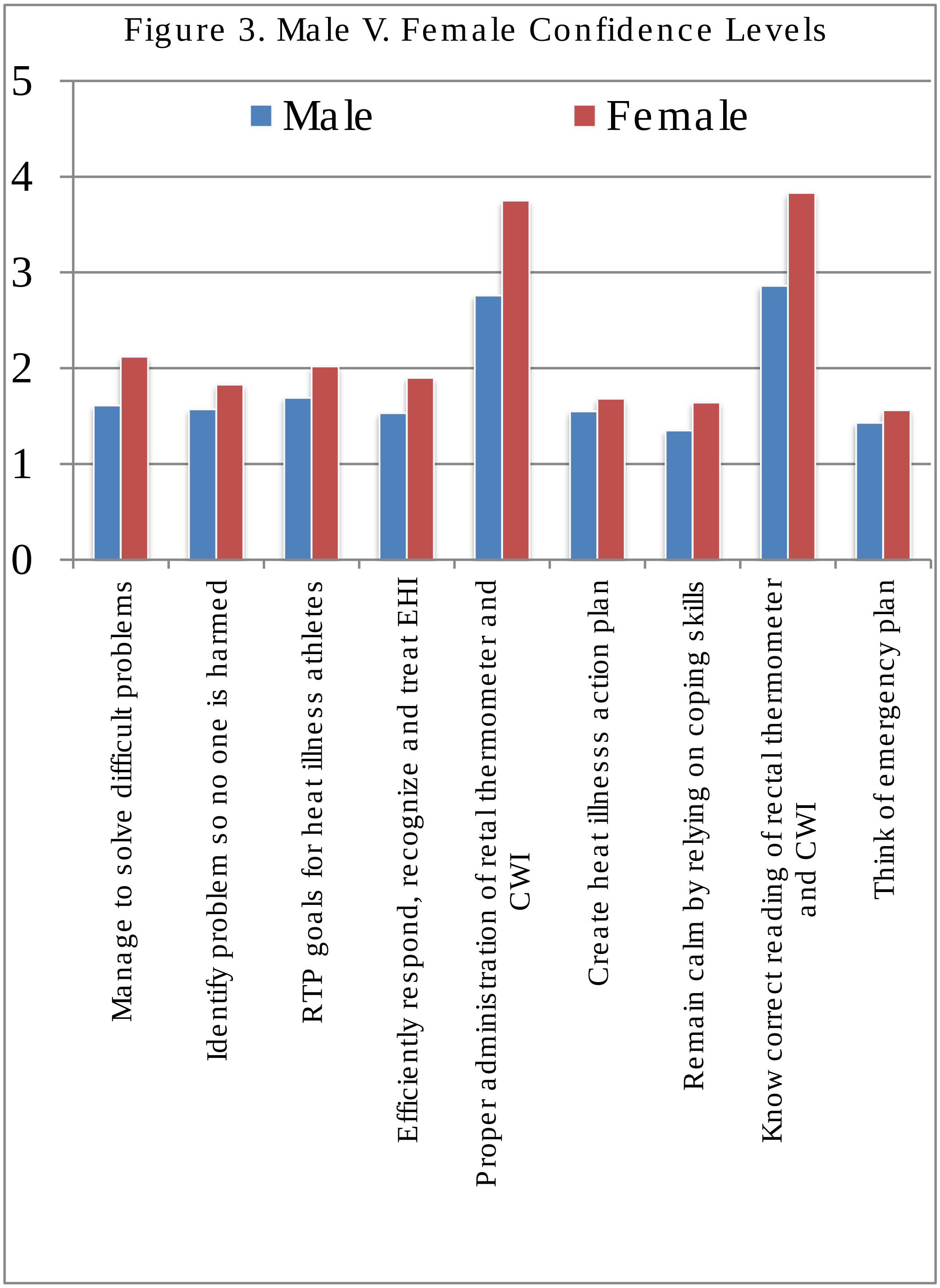
Statistical Analysis

Athletic trainers were *confident* (overall mean between all scale items was M=2.05±.95) in treating exertional heat illnesses. Athletic trainers were most confident (strongly agree to somewhat agree, M=1.50±.57) in their ability to "think of an emergency plan of action" if an athlete is experiencing an exertional heat illness. Athletic trainers were least confident (somewhat confident to somewhat not confident, M=3.39±1.94) in their ability to know the correct reading of the rectal thermometer to distinguish a heat illness emergency and the proper temperature for cold water immersion.

Figure 2.

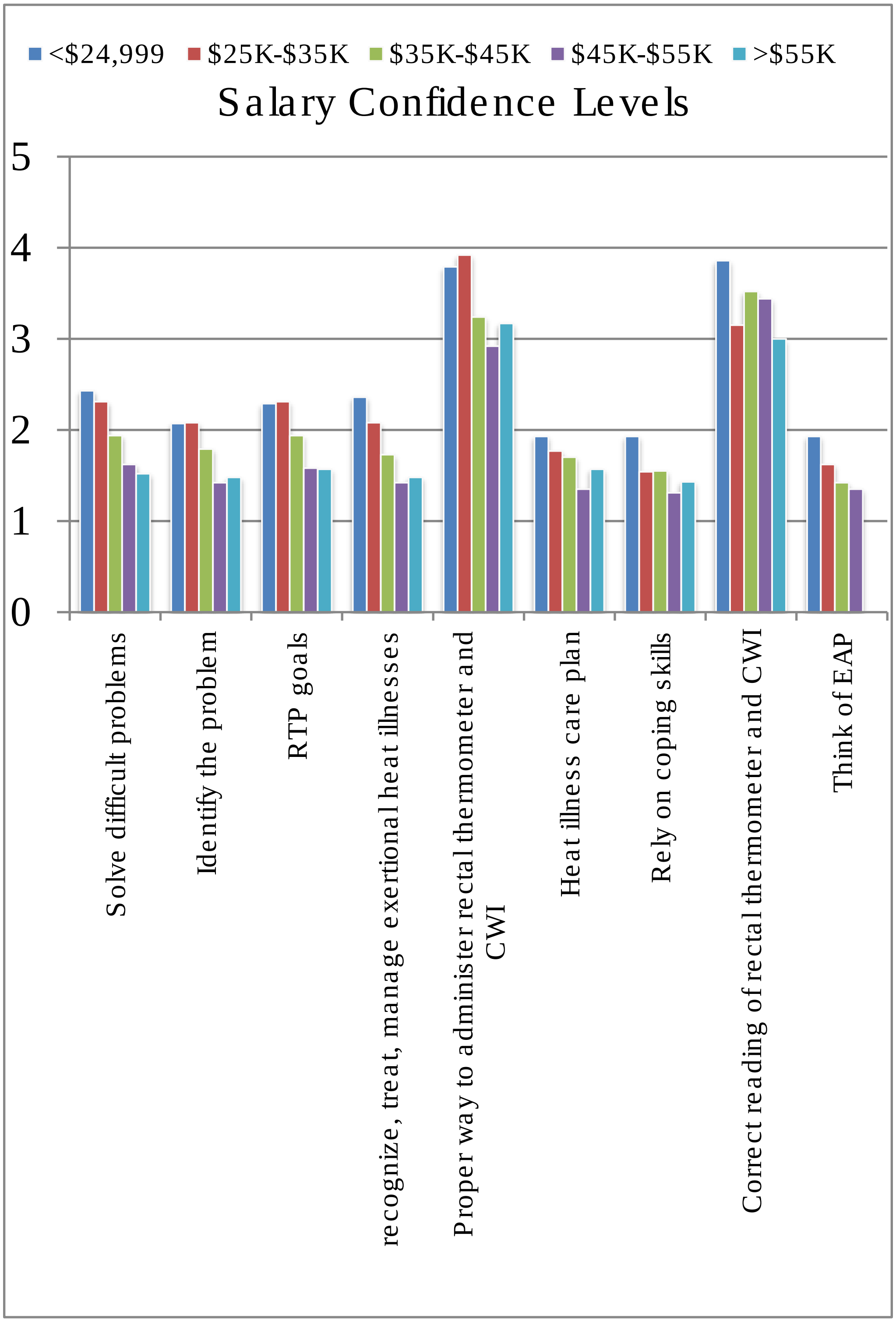


An independent samples t-test was conducted to show the differences in confidence levels for gender among certified athletic trainers. Males were somewhat confident about knowing the correct reading of a rectal thermometer and proper temperature for cold water immersion compared to females who were undecided, M=2.86±1.85 to M=3.83±1.91, t(109) p=.009. Males were also somewhat confident in knowing the proper way to administer a rectal thermometer and cold water immersion compared to females who were undecided, M=2.76±1.67 to M=3.75±2.00, t(109) p=.007. There



were no other significant differences between the other scale items based on gender.

One-way ANOVA's followed by Tukey post-hoc analysis between respondents and ATSCS items was used to determine confidence levels of certified athletic trainers in several areas. Comparison between certified athletic trainers confidence and salary was used as an indicator of experience. The understanding that more experienced athletic trainers will have a higher overall salary than inexperienced athletic trainers was assumed. Significant finding were found with athletic trainers earning a salary (>$55K). These athletic trainers were more confident than athletic trainers at lower salaries <$24,999 in always managing to solve difficult problems when working with an exertional heat illness athlete, $F(4, 108)=5.33$; $p=.001$; $M=1.52\pm0.73$ to $M=2.42\pm0.94$. Athletic trainers earning a salary of $45K to >$55K were also more confident than athletic trainers at $25K to $35K in regard to if a heat illness injury arises, identifying the problem in a timely manner so that no one is harmed, $F(4, 108)=5.25$; $p=.010$; $M=1.42\pm.504$ to $M=2.08\pm.494$. Athletic trainers whose salary is greater than $45K were strongly confident in their ability to efficiently respond to unexpected exertional heat illness events and be able to recognize, treat and prevent them in a proper amount of time, while athletic trainers making <$25K-$35K were somewhat confident, $F(4, 108)=7.36$; $p=0.000$; $M=1.42\pm.504$ to $M=2.46\pm.745$. Athletic trainers earning more salary (≥55K) were more confident than athletic trainers at lower salaries (>25K) in solving difficult problems with heat illness athletes, $M=1.52\pm0.73$ to $M=2.43\pm0.94$, $F(4,108)=2.87$, $p=.004$. **Figure 4.**



The number of heat illness athletes a certified athletic trainer has treated was used to determine how confident an athletic trainer is compared to other experience levels of other athletic trainers working with heat illnesses since becoming certified for one comparison. Statistical differences were shown for athletic trainers who have worked with more than 11 exertional heat illness athletes, compared to those working with one to five exertional heat illness athletes. Athletic trainers working with >11 exertional heat illnesses are more confident that they always manage to solve difficult problems when working with an exertional heat illness athlete, compared to athletic trainers with 1-5 encounters, $F(3, 109)= 3.558$; $p=.017$; $M=1.65\pm.674$. Athletic trainers who have worked with more than 11 exertional heat illnesses athletes, $F(3, 109)=6.467$; $p=. 000$; $M=1.49\pm.587$, and 6-10 heat illness athletes, $F(109)=6.467$; $p=.000$; $M=1.49\pm.519$ were strongly confident that they can efficiently respond to unexpected exertional heat illness events and be able to recognize, treat and prevent them in a proper amount of time, compared to athletic trainers with no experience working with an exertional heat illness athlete. Athletic trainers who have worked with more than 11 exertional heat illness patients were somewhat confident they could establish return to activity goals for individuals who had encountered an issue, while athletic trainers who had worked with six to ten were also somewhat confident, $F(3, 109)=5.872$; $p=.001$; $M=1.61\pm.649$ to $M=1.71\pm.726$.

ANOVA analyses indicated differences between athletic trainer's that were either beginners/competent, proficient, and experts. Expert athletic trainers were more confident than beginner athletic trainers in being able to remain calm if an athlete were facing a life threatening exertional heat illness condition, $F(2, 110)=3.17$; $p=.041$; $M=.86\pm.91$ to $M=1.45\pm1.15$. Expert athletic trainers were more confident than beginner/competent athletic trainers in being able to handle any problem that may occur with a heat illness individual $F(2, 110)=6.47$; $p=.046$; $M=1.44\pm.90$ to $M=2.00\pm1.21$.

Expert athletic trainers were more confident than proficient athletic trainers in being able to handle any problem that may occur with a heat illness individual $F(2, 110)=6.47$; $p=.005$; $M=1.44\pm.90$ to $M=2.03\pm.88$.

Discussion

This study was constructed to determine certified athletic trainers self-confidence in diagnosing and treating exertional heat related illnesses. The primary purpose was to observe if certified athletic trainers experience level working within the field of athletic training would play a role in their level of self- confidence when working with a heat illness athlete. The final purpose was to observe if how many heat illnesses the certified athletic trainer has worked with during their time as a certified athletic trainer would play a role in their self-confidence working with a heat illness athlete. Our findings indicated that Athletic trainers were *confident* or *somewhat confident* in regard to diagnosing and treating exertional heat related illnesses. However, the lowest level of self-confidence is in their ability to know the correct reading of the rectal thermometer to distinguish a heat illness emergency and the proper temperature for cold water immersion. Athletic trainers that were categorized as being experts had the most self-confidence when working with heat illnesses. Athletic trainers that have worked with more than 11 heat illness patients were significantly the most confident in areas dealing with managing to solve difficult problems when working with an exertional heat illness athlete, being able to efficiently respond to unexpected exertional heat illness events and be able to recognize, treat and prevent them in a proper amount of time, and that they could establish return to activity goals for individuals who had encountered an issue. Males were somewhat confident about knowing the correct reading of a rectal thermometer and proper temperature for cold water immersion compared to females who were undecided.

The salary an athletic trainer receives does show significance in certain areas of their confidence of handling exertional heat illneses. As the results have shown, typically the more money an athletic trainer makes the higher their self-confidence is, which for the most part can be tied to experience, assuming an athletic trainer that has practiced longer and has more experience makes more money annually than athletic trainers with less experience and years worked. There were no significant differences in in confidence based on the setting or district that the athletic trainer worked in.

The strength of an individual's belief in their effectiveness is likely to affect the idea that they will be able to cope with given situations. Athletic Trainers in this study who rate their self-confidence high, typically have better outcomes when dealing with exertional heat illnesses. When managing exertional heat illnesses the only methods proven valid for recording accurate temperature is rectal or gastrointestinal methods, 18% reported having a rectal thermometer. The gold standard for decreasing core body temperature is cold water immersion, 74% reported having a cold water tub. When asked if they had ever faced not having the proper equipment to manage a heat illness situation, cold water immersion was the #1 response for equipment lacking.

The study has several intrinsic limitations. First, a comprehensive literature review identified no instrumentation specific to athletic training to measure confidence levels in athletic trainers' that work with exertional heat illnesses. Therefore, a modification was made to the Generalized Self-Efficacy Scale to establish a validated instrument to measure self-confidence. The sample represented athletic trainers that were only a part of the National Athletic Trainers' Association.

There were no significant differences in the setting or district that the athletic trainer worked in. These findings can be identified as very positive results from the study. This could be attributed to the similar techniques in which athletic training programs are educating their athletic training students on exertional heat illnesses. With that being said the highest level of confidence athletic trainers have is thinking of an emergency action plan. Athletic trainers are knowledgeable in developing protocols to protect their athletes when an emergency arises. Therefore, being able to contact emergency assistance is a fundamental expectation within this profession, even if the emergency is not a heat illness one. The lowest level of confidence athletic trainers identified with was in their ability to know the correct reading of the rectal thermometer to distinguish a heat illness emergency and the proper temperature for cold water immersion. It's also important to note that the second lowest confidence response of athletic trainers pertained to the proper way to administer a rectal thermometer and cold water immersion, which are the gold standards of care for heat illness emergencies. This suggests that athletic trainers need more education on how to administer rectal thermometers and cold water immersion and how to properly gage readings and temperatures for different situations.

Future Research should look to develop the understanding of what makes an athletic trainer confident when working with heat illness athletes. Self-confidence from other aspects of athletic training should be studied as well in areas such as sickle cell, and general injury evaluation and management. This will allow entry-level educational programs to develop further areas of increased attention for this particular subject matter.

Conclusion

The majority of Athletic Trainers lacked many recommended pieces of emergency equipment for managing and treating EHI's (cold water immersion tubs, rectal thermometers and access to ice at all venues). Athletic trainers are *somewhat confident* in their ability to handle exertional heat illness emergencies. The lowest levels of self-confidence are in their abilities to insert a rectal thermometer and execute cold water immersion and to know the correct readings of the rectal thermometer to distinguish different heat illnesses and the proper temperature for cold water immersion. Athletic training should engage in continuing education opportunities where they are instructed the proper way administer a rectal thermometer and cold water immersion, and know the correct readings. Entry-level educational programs should consider formal instruction and evaluation for care of exertional heat illnesses, and related clinical competencies.

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Appendix A:

The Athletic Trainer's Self-Confidence Scale

Please answer the questions based on your capabilities right now as a certified athletic trainer and how confident you are that you can do the following tasks at the present time.

1. I can always manage to solve difficult problems when working with an exertional heat illness athlete.

oStrongly Agree
oAgree
oSomewhat Agree
oUndecided
oSomewhat Disagree
oDisagree
oStrongly Disagree

2. If a heat illness emergency arises, I can identify the problem in a timely manner so no one is harmed.

oStrongly Agree
oAgree
oSomewhat Agree
oUndecided
oSomewhat Disagree
oDisagree
oStrongly Disagree

3. I can establish return to activity goals for individuals that have recently encountered a heat illness.

oStrongly Agree
oAgree
oSomewhat Agree
oUndecided
oSomewhat Disagree
oDisagree
oStrongly Disagree

4. I am confident that I can efficiently respond to unexpected exertional heat illness events and be able to recognize, treat and prevent them in a proper amount of time.

oStrongly Agree
oAgree
oSomewhat Agree

oUndecided
oSomewhat Disagree
oDisagree
oStrongly Disagree

5. I know the proper way to administer a rectal thermometer and cold water immersion.
oStrongly Agree
oAgree
oSomewhat Agree
oUndecided
oSomewhat Disagree
oDisagree
oStrongly Disagree

6. I can create a heat illness action plan for athletes' practices and games.
oStrongly Agree
oAgree
oSomewhat Agree
oUndecided
oSomewhat Disagree
oDisagree
oStrongly Disagree

7. I remain calm if an athlete were facing a life threatening heat illness condition because I can rely on my coping skills.
oStrongly Agree
oAgree
oSomewhat Agree
oUndecided
oSomewhat Disagree
oDisagree
oStrongly Disagree

8. When confronted with an athlete with abnormal activity in the heat, I know the correct reading of the rectal thermometer to distinguish a heat illness emergency and the proper temperature for cold water immersion to administer to an individual.
oStrongly Agree
oAgree
oSomewhat Agree
oUndecided
oSomewhat Disagree
oDisagree
oStrongly Disagree

9. If an athlete is in trouble, I can think of an emergency plan.
   - oStrongly Agree
   - oAgree
   - oSomewhat Agree
   - oUndecided
   - oSomewhat Disagree
   - oDisagree
   - oStrongly Disagree