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Youth Sport Coaches' Knowledge of Exercise Physiology and Related Concepts

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ABSTRACT

Purpose: The purpose of this study was to evaluate the basic knowledge of youth coaches within the United States on various areas of exercise physiology, as well as coaching procedures and techniques for youth sports. **Methods:** 200 individuals from across the United States were recruited to complete this survey. Descriptive data for each participant were collected: 1) age, 2) education level, 3) major field of study, 4) age level coached, 5) whether or not the coach was paid, and 6) the highest level of sports participation by the coach. A 50-item questionnaire, written in the form of a multiple choice and true/false, was developed and used to evaluate the knowledge of the youth sport coach on topics related to both general and exercise physiology as well as practice design, hydration, nutrition, basic first aid and acute injury management, concussion care, proper resistance training knowledge, sex differences in physiology, and diversity, equity, and inclusion (DEI). **Results:** 76% of respondents were 18-29 years old and 48% had achieved an education level of BA/BS. 62% of respondents coached at the high school level. The overall percent of correct responses to all questions combined was 73.6%. For slightly more than half the questions in the survey, there was a correct response rate greater than 80%. However, 10 of the 50 questions related to recovery and hydration had a correct response rate of less than 60%. **Conclusions:** Overall, survey responses indicate the youth sport coaches sampled had an encouraging amount of knowledge related to exercise physiology, emergency response, and general exercise protocols. However, there appears to be knowledge deficiencies in the categories of recovery and hydration. This lack of knowledge could lead to a myriad of concerns, including medical complications and decreased performance. In conclusion, there is a need for more evaluation of the overall exercise physiology knowledge of youth sport coaches. Youth sport coaches have considerable influence in the lives of young athletes when it comes to instilling good healthy habits.

KEYWORDS: Acute Injury Management, Concussion Care, Hydration, Nutrition, Resistance Training.

Introduction

Throughout the years, the concept of coaching[1-2] has evolved from the object (i.e., technology used for transportation) and eventually into the character used in sport with early clear connection associated with rowing in the mid-1800s[3]. Since then, coaching has become an integral component to sport at all levels from novice to professional and for all age levels. However, per the National Council of Youth Sports, over 60 million children (~54% of children aged 6-17) participate in youth sports in the United States[4]. The increased participations also impact the demand for more youth coaches which has seen a 10-fold increase throughout the last 30 years[5].

Coaches play a critical role in facilitating experiences and helping to develop young participants engaged in the sport activity. Coaches are seen as a key factor in promoting positive effects of sport participation including how to develop healthy lifestyles [1-2]. In a recent survey of coaches[6], the most common training/education coaches participated in were 1) CPR, 2) basic first aid, 3) concussion management, 4) general safety and injury prevention, and 5) physical health and safety. Interestingly, in the same report it was found that coaches ranked 'Sport Skills and Techniques' as the second most interested topic with 74% of coaches surveyed reporting they were interested in gaining more knowledge on the topic. However, information related to exercise science or exercise physiology did not appear to be explored within this group of coaches. Concepts from exercise physiology often underpin approaches to injury mitigation and design of safe and effective training protocols. While some of these individuals may be able to coach effectively, many of these adults may not have the knowledge to be able to provide their players with the proper techniques and procedures about important aspects of exercise physiology. Some of the important topics that coaches should have knowledge in include proper warm-up and cool-down techniques, hydration, nutrition, resistance training techniques, practice design, communication, injury management and prevention, and concussion management. There has been an increased drive to improve coaching practices within the United States, especially through the National Standards for Sport Coaches (NSSC). The NSSC identifies seven core responsibilities for coaches, which includes developing a safe sport environment, conduct practices and prepare for competition, and strive for continued improvement. Within these three core responsibilities, there is a need for knowledge related to exercise and performance physiology, nutrition, hydration, and injury prevention in order to be a responsible coach[7].

There has been limited research on each of these topics individually and even less on all of these skills combined. To our knowledge, there has only been one other survey evaluating youth sport coaches knowledge

of exercise physiology related concepts[8]. Identifying whether this knowledge is present within the youth sport coach population is critical since these exercise physiology related topics are linked to healthy habits in youth, as well as prevention of dangerous and harmful situations. The purpose of this study was to evaluate the basic knowledge of youth coaches around the United States on various areas of exercise physiology, as well as coaching procedures and techniques for youth sports.

Methods

Participants

200 individuals from across the United States were recruited to complete this survey. Descriptive data for each participant was collected and included the following: 1) age, 2) education level, 3) major field of study, 4) age level coached, 5) whether the coach was paid or not, and 6) the highest level of sports participation by the coach.

Experimental design

A questionnaire, written in the form of a multiple choice and true/false using Microsoft Forms, was developed and used to evaluate the youth sport coach's knowledge on important topics related to exercise physiology, including general physiology, training protocols and practice design, hydration, nutrition, basic first aid and acute injury management, concussion care, proper resistance training knowledge, sex differences in performance and adaptations, and diversity, equity, and inclusion (DEI). The questionnaire consisted of 50 multiple choice and true/false questions, shown in Appendix A. Anyone who coached youth sports, defined as children and teenagers between 8-18 years of age, was eligible to take the survey. The principal investigator used personal contacts and social media to promote and spread the word about the study. This research was approved by the Western Colorado University IRB [HRC-2024-02-04-R20].

Statistical Analysis

Standard descriptive statistics were used to characterize the participant population. Microsoft Excel was used to generate graphs to display findings.

Results

Descriptive data for each of the demographic sections are shown in Figures 1-6 including age, education level, major field of study, age-level coached, whether the coach was paid in their role, and the highest level of sports participation by the coach, respectively.

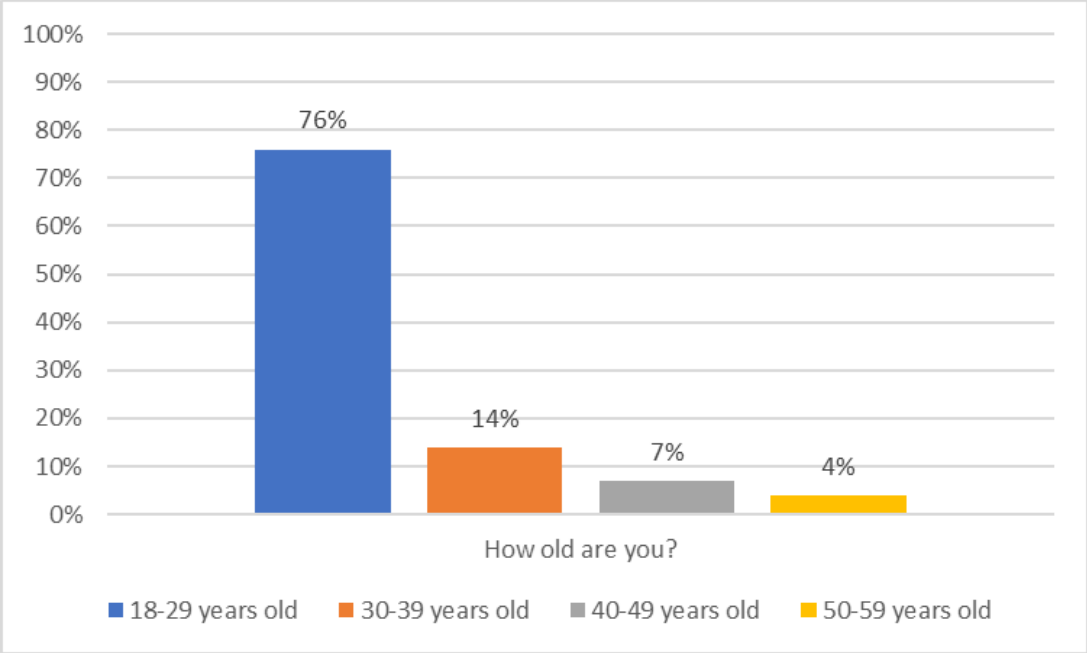

Figure 1. How old are you?

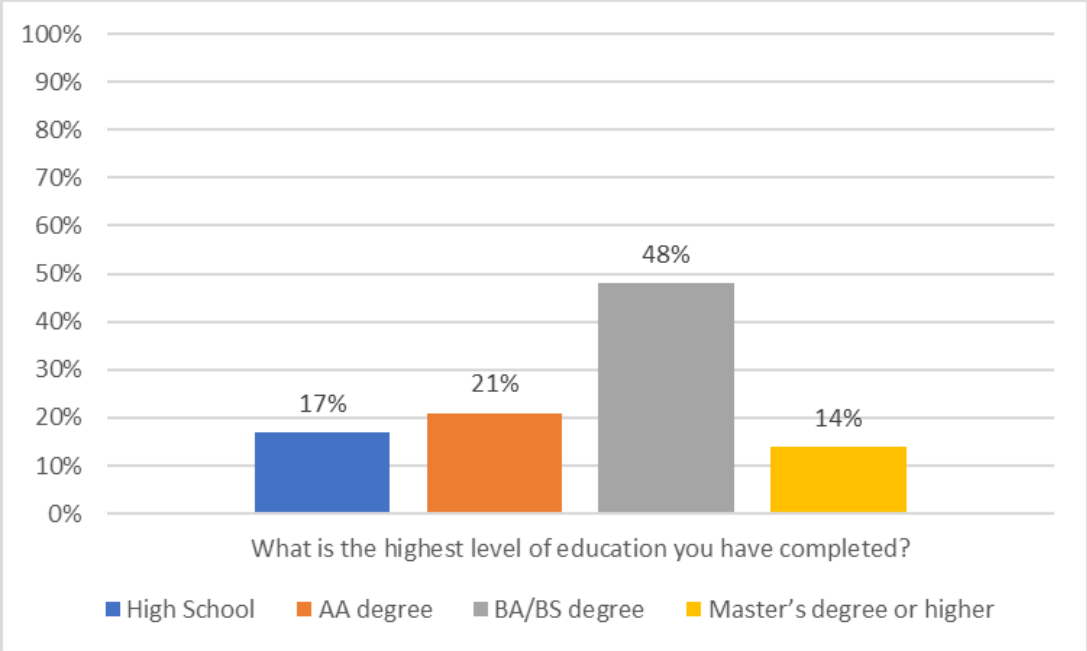

Figure 2. What is the highest level of education that you have completed?

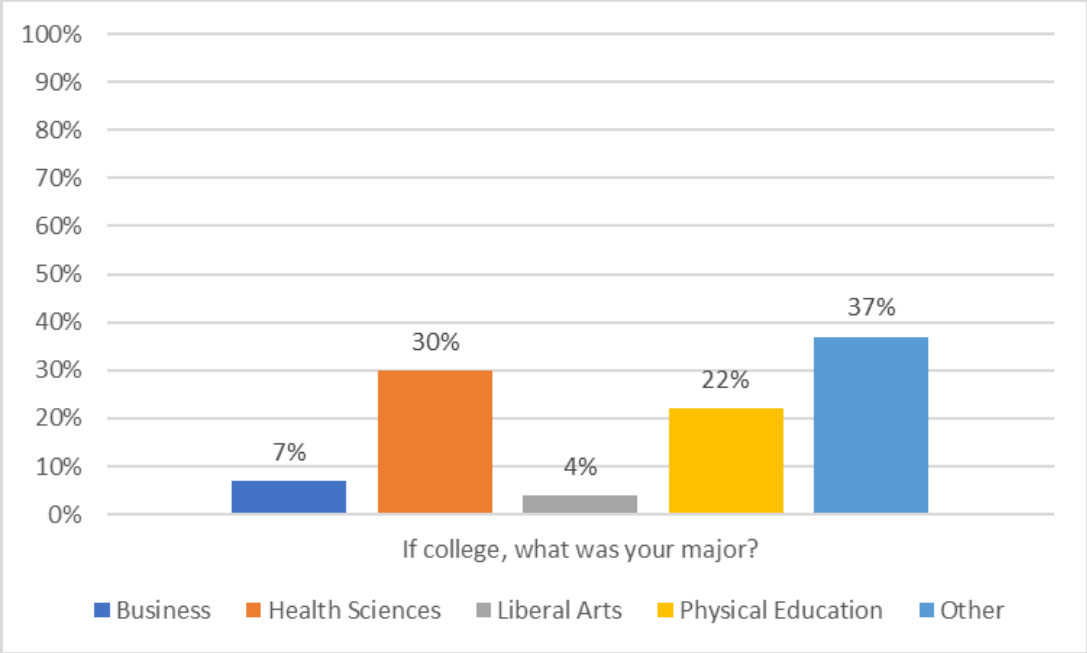

Figure 3. If college, what was your major?

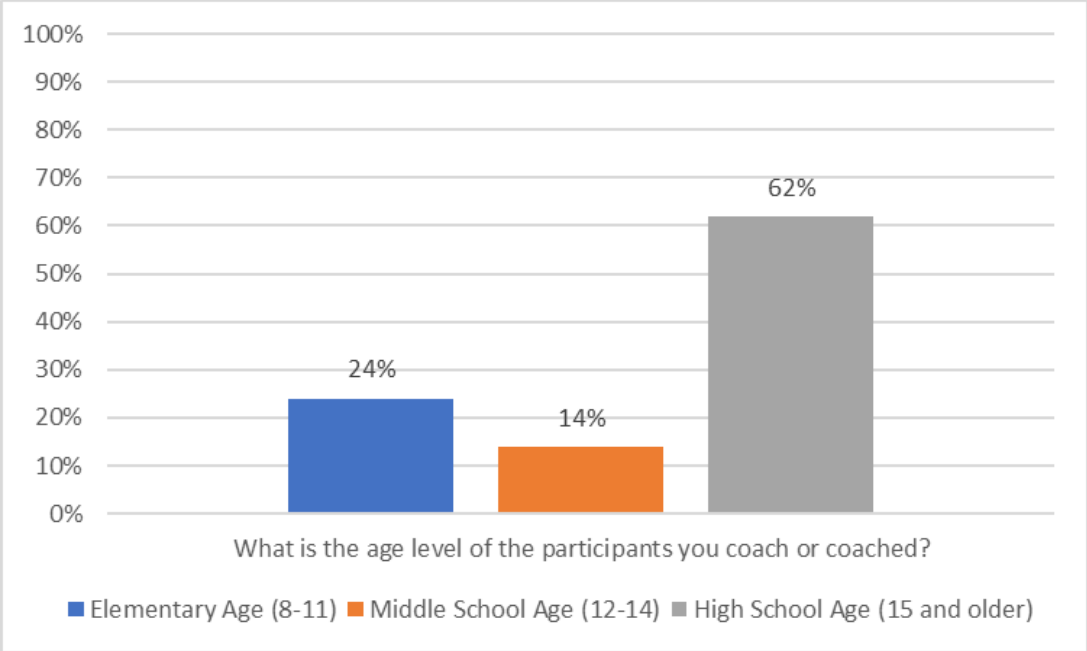

Figure 4. What is the age level of the participants you coach or coached?

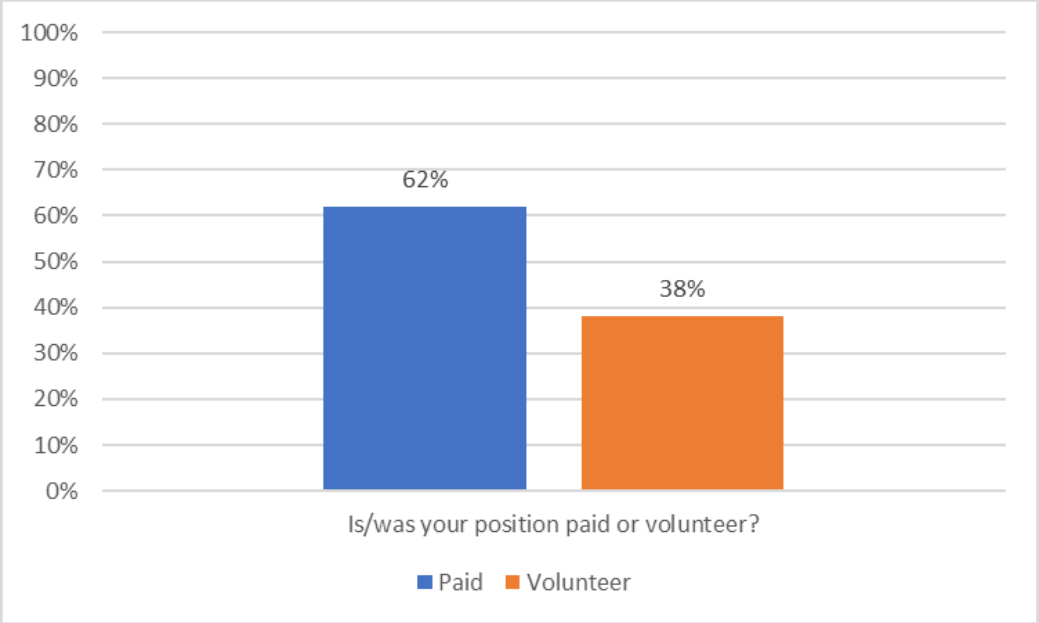

Figure 5. Is/was your position paid or volunteer?

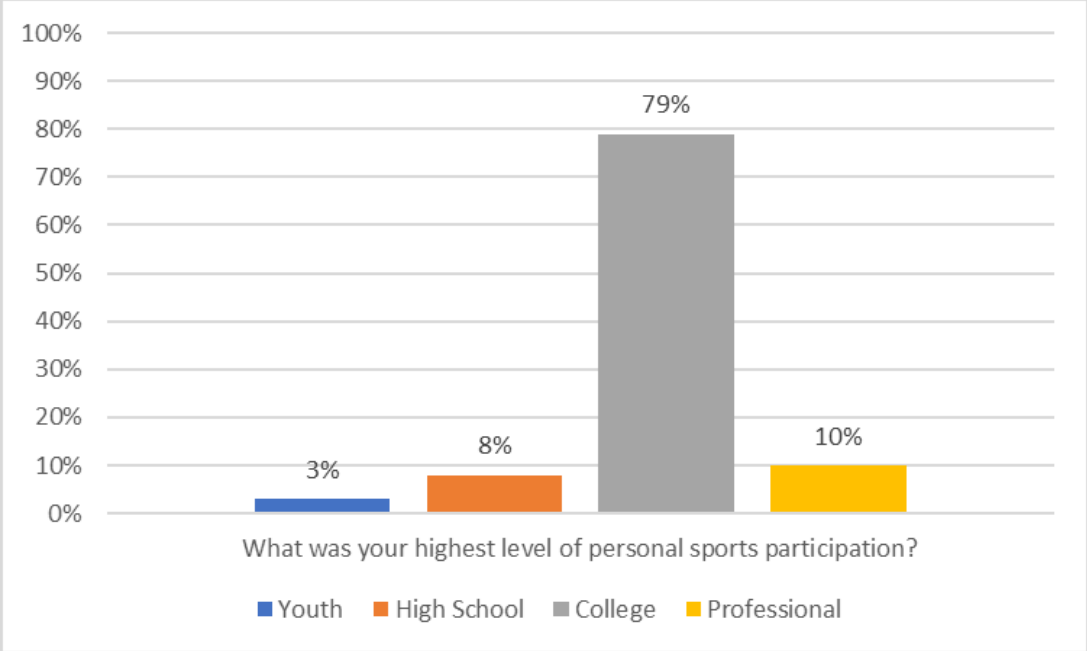

Figure 6. What was your highest level of personal sports participation?

The overall percentage of correct responses to all questions combined was 73.6%. The highest percent correct response rate was 100% for questions #7, #9, and #33. The lowest percent correct response rate was 10.3% for question #5. The percent correct responses to each question are presented in Table 1. Individual responses for each question are presented in Appendix B.

Table 1. The % correct and % incorrect responses to each question.

Question	Correct (%)	Incorrect (%)
1. Which of the following athletes is at the LOWEST risk of developing a heat-related illness?	65.5	34.5
2. A player is experiencing shortness of breath, coughing, wheezing, and tightness in his chest. What condition is he MOST likely experiencing?	93.1	6.9
3. The preferred way to stay safe and prevent hypothermia when exercising outdoors is to _____	96.6	3.4
4. Current recommendations state that children and adolescents should perform 60 minutes of __on a daily basis.	79.3	20.7
5. Fluid intake should be dictated by taste preference, since volume of intake, rather than fluid content, is the most critical issue in child athletes.	10.3	89.7
6. Before exercise, it is recommended that athletes consume ___.	58.6	41.4
7. What does the acronym RICE stand for in injury prevention and care?	100	0
8. Rapid swelling of the brain following a second head injury that occurs before the symptoms of a previous head injury have resolved is referred to as __.	69	31
9. A youth sports coach who sees a decrease in performance and sudden lack of enthusiasm about participation in one of his or her athletes is MOST likely seeing the results of _____.	100	0
10. If children are ready to participate in organized sports, they are also ready for some type of strength training.	41.4	58.6
11. Which two micronutrients are MOST likely to be deficient in youth athletes?	65.5	34.5
12. Which of the following statements comparing youth exercisers to adult exercisers is MOST accurate?	82.8	17.2
13. One of the athletes on your team has begun to struggle in practice. He looks pale and complains of dizziness, fatigue, and a throbbing headache. As he describes his symptoms, he begins to vomit. When you try to talk to him, he is somewhat disoriented. He does not fall or hit his head. As his coach, what should you do?	48.3	51.7
14. When should an athlete return to play after a concussion?	96.6	3.4
15. What is the primary purpose of a cool-down?	58.6	41.4
16. A player must experience loss of consciousness in order to be diagnosed with a concussion.	96.6	3.4
17. If the temperature and heat-stress index are expected to be mildly elevated, how should a coach respond?	82.8	17.2
18. The primary goal of acute injury management for strains and sprains is _____.	65.5	34.5
19. A 15-year-old female club soccer player was pushed to the ground by an opposing player. You witness her hit her head. She stands up on her own but looks “foggy.” She complains of a mild headache and answers your questions appropriately but slowly. What is the BEST next step?	72.4	27.6

20. What is a function of protein in the diet?	96.6	3.4
21. The purpose of an AED is to _____.	89.7	10.3
22. An example of a proper pre-competition meal would be ____.	86.2	13.8
23. You are the coach of a middle school basketball team. Two of your players showed up late to practice and you would like to discipline them so that they learn the importance of punctuality. What would be the LEAST appropriate disciplinary method?	75.9	24.1
24. A well-designed warm-up period will accomplish which of the following?	86.2	13.8
25. Drastic loss in weight, mood swings and a preoccupation with food, calories and weight are warning signs of what illness?	82.8	17.2
26. What is a good way to monitor an athlete's hydration levels during exercise?	17.2	82.8
27. During which of the following is it MOST appropriate to consume electrolyte-supplemented beverages such as sports drinks?	20.7	79.3
28. What is the MOST likely cause of an overuse injury in a young athlete?	75.9	24.1
29. Acute musculoskeletal injuries should be treated with heat packs for up to the first 72 hours before ice is applied.	65.5	34.5
30. When an athlete suffers a suspected spinal injury, you should first __.	62.1	37.9
31. For exercise bouts lasting LESS THAN 60 minutes, it is recommended that a player should replace his or her fluids with ___.	89.7	10.3
32. During the preseason, it may be prudent for youth sports coaches to spend a little less time practicing _____and a little more time performing ____.	62.1	37.9
33. The most important consideration when strength training with youth is _____.	100	0
34. Static stretching is MOST appropriate during which segment of a youth sports practice?	93.1	6.9
35. Players should only take water breaks when they are thirsty.	96.6	3.4
36. The performance of strength training by children and adolescents should be _____.	79.3	20.7
37. During the acute phase of injury management, ice should be applied every hour for up to ___until the tendency for swelling has passed.	93.1	6.9
38. Nausea, initially pale and then flushed skin and light headedness are some acute signs and symptoms of what?	55.2	44.8
39. What percentage of a child's caloric intake should be carbohydrates?	65.5	34.5
40. Which of the following would be the LEAST effective way to help minimize heat-related injuries during an outdoor football practice?	86.2	13.8
41. Which of the following is not a component of the female athlete triad?	62.1	37.9
42. Which of the following is not a sign/symptom of Relative Energy Deficiency in Sport (RED-S)?	93.1	6.9

43. True or False, RED-S can happen in both males and females.	93.1	6.9
44. Which of the following is not a consideration when creating an inclusive environment in youth sports?	62.1	37.9
45. Each of the following are reliable/valid methods for monitoring athlete recovery with the exception of:	51.7	48.3
46. Which muscle fiber type recovers faster from a workout?	41.4	58.6
47. True or False, training at altitude will require increased recovery time.	86.2	13.8
48. Each of the following is a sign/symptom of iron deficiency with the exception of:	82.8	17.2
49. How many kids are involved in youth sports?	62.1	37.9
50. Each of the following are ways to encourage youths to participate in sports, with the exception of:	82.8	17.2

Discussion

Exercise physiology knowledge plays an important role in the development of youth athletes. This knowledge base includes information on how coaches should design practices and how they should create healthy habits in youth athletes. Our research is promising in that the overall combined correct question response on our survey was 73.6%. However, it is important to continue to make progress in the base knowledge of coaches due to the direct impact they have on participants in the sport.

There is limited previous research that has examined exactly how much youth sport coaches know and understand about each of these specific topics. To our knowledge, there has only been one other study[8] exploring specific concepts of exercise physiology within the youth sport population including proper warm-up and cool-down techniques, hydration, resistance training, practice organization, and sex differences. The researchers found a score for all respondents of 28.7 correct out of 40 questions (71.8%). Additionally, it was found there was an overall lack of knowledge in each of the categories and there was not a difference between demographic data and total questionnaire score for biological sex, education level, different degrees, level of coaching, or if they were paid or not. We believe coaches within our study scored slightly higher than this previous work simply due to greater educational training and easier access to coaching materials since the original survey was conducted over 10 years prior to the current survey. However, from the responses to the current survey, nine specific questions stood out as the most often missed, with (in all but one instance) 50 percent or more of respondents answering those questions incorrectly (see Table 2). Four of those questions related to hydration, while the others touched on resistance training, nutrition and concussions. Besides major problems with the hydration questions, the researchers noted that half of respondents were unfamiliar with Second Impact Syndrome, a dangerous and often fatal concussion-related complication.

For slightly more than half the questions (see Table 1) there was a % correct response rate greater than 80%. This is encouraging and suggests that youth sport coaches do have considerable knowledge across various exercise physiology-related categories. The first 40 questions in the present study were exactly the same as those presented previously[8]. Overall, our findings are comparable to the previous findings. Previously, the researchers found the correct scores for all respondents in the 2013 study equated to 71.8% relative to 74.1% in the present study. Similarly, for the 9 questions most participants got incorrect in the previous study, participants in the current study also tended to struggle with these same questions, as shown in Table 3. However, it should be noted that many of the same knowledge gaps exist even though the previous study took place over 10 years

ago, which is concerning. For instance, it is evident that there is a need for more hydration education within youth sport coaches, especially since dehydration can lead to a variety of serious heat-related problems and illnesses[9]. Education pertaining to when, what type of fluid should be consumed, and how to assess hydration status should be included in standard coaching education courses.

The most concentrated research has involved concussions and injury prevention, and more recently nutrition. One survey of 250 youth soccer coaches found that 75% felt aware of concussions and 80% stated their institutions had established a set of guidelines regarding player concussions[10]. One study[11] found that demographics play a role in the knowledge and management of concussions. Level of education, age of the coach, and level of competition were all found to influence the decision-making process of coaches. However, one question on the survey specifically asks for a definition of second impact syndrome (i.e., experiencing a second head injury before recovering from an initial head injury) and there was an improvement from 50 to 69% of the participants answering correctly from a previous study[8] and our study, respectively. While this does show progress, it remains concerning that almost one-third of the participants in the present study did not know what this syndrome was defined as. If the proper precautions are not taken, returning an athlete to competition too soon can have catastrophic consequences.

Another topic that has been researched is the level of education of youth coaches regarding CPR, first-aid, and acute injury management. One study[12] of 752 coaches found that 40% of them had received no form of safety training. This same study[11] found that of all safety training techniques, first-aid and CPR were the most commonly taught, but only 13% and 20% of all youth sport coaches, respectively, were actually certified in each. Another area of interest involves proper nutritional practices for athletes. Most of the research on this topic has been conducted at the collegiate level, where two studies[13-14] found that more information and education needs to be required of coaches so that they are better able to relay nutrition information and provide advice to their athletes. There are 10 questions (see Table 1) that participants achieved a percent correct response rate of less than 60%. This highlights a need for broad further education for youth sport coaches. In particular, there appears to be extreme knowledge deficiencies in the categories of recovery (questions #45 and #46) and hydration (#5, #13, #27). Lack of knowledge pertaining to these topical areas can lead to a myriad of problems, including medical complications and decreased performance.

Table 2. The 9 questions most participants got incorrect in the Porcari 2013 study[8].

Researchers[8] found nine questions that a majority (approximately 50% or greater) of the respondents answered incorrectly (correct answer is shown in **bold text**).

Question #5: Fluid intake should be dictated by taste preference, since volume of intake, rather than fluid content is the most critical issue in child athletes.
A. True: 15.7%
B. False: 84.3%

Question #8: Rapid swelling of the brain following a second head injury that occurs before the symptoms of a previous head injury have resolved is referred to as _____.
A. Second Cerebral Injury: 17.1%
B. Second Impact Syndrome: 52.9%
C. Second Relative Abrasion: 0%
D. Post Concussive Syndrome: 30%

Question #10: If children are ready to participate in organized sports, they are also ready for some type of strength training.
A. True: 28.6%
B. False: 71.4%

Question #11: Which two micronutrients are MOST likely to be deficient in youth athletes?
A. Calcium and vitamin D: 31.4%
B. Iron and vitamin C: 18.6%
C. Vitamin D and vitamin C: 10%
D. Calcium and iron: 40%

Question #26: What is a good way to monitor an athlete's hydration levels during exercise?
A. Asking the athlete how thirsty he or she is after practice: 5.7%
B. Observing the athlete's rate of sweating: 45.7%
C. Weighing an athlete before and after practice: 32.9%
D. Monitoring reaction time and coordination: 15.7%

Question #27: During which of the following is it MOST appropriate to consume electrolyte-supplemented beverages such as sports drinks?
A. When activity lasts longer than 30 minutes: 47.1%
B. During high-intensity strength-training workouts: 15.7%
C. Whenever participants are visibly sweating: 15.7%
D. When the schedule calls for repeated same-day sessions: 21.4%

Question #36: The performance of strength training by children and adolescents should be _____.
A. Discouraged due to the potential for damage to their growth plates: 32.9%
B. Avoided due to the increased risk of musculoskeletal injury: 11.4%
C. Allowed only if the youth are mature enough to exercise on their own: 21.4%
D. Encouraged to reduce the risk of sports-related injuries: 34.3%

Question #38: Nausea, initially pale and then flushed skin and light headedness are some acute signs and symptoms of what? A. Heat cramps: 2.9% **B. Dehydration: 47.1%** C. Hypothermia: 0% D. Heat stroke: 50% Question #39: What percentage of a child's caloric intake should be carbohydrates? **A. 55-70%: 48.6%** B. 25-35%: 44.3% C. 12-15%: 4.3% D. 70-85%: 2.9%

Table 3. Comparison of % correct responses across 9 questions between the Porcari 2013 study[8] and current study.

Question	Porcari 2013 % correct	Current study % correct
Question #5: Fluid intake should be dictated by taste preference, since volume of intake, rather than fluid content is the most critical issue in child athletes.	15.7%	10.3%
Question #8: Rapid swelling of the brain following a second head injury that occurs before the symptoms of a previous head injury have resolved is referred to as _____.	52.9%	69%
Question #10: If children are ready to participate in organized sports, they are also ready for some type of strength training.	28.6%	41.4%
Question #11: Which two micronutrients are MOST likely to be deficient in youth athletes?	40%	65.5%
Question #26: What is a good way to monitor an athlete's hydration levels during exercise?	32.9%	17.2%
Question # 27: During which of the following is it MOST appropriate to consume electrolyte-supplemented beverages such as sports drinks?	21.4%	20.7%
Question # 36: The performance of strength training by children and adolescents should be _____.	34.3%	79.3%
Question # 38: Nausea, initially pale and then flushed skin and light headedness are some acute signs and symptoms of what?	47.1%	55.2%
Question # 39: What percentage of a child's caloric intake should be carbohydrates?	48.6%	65.5%
Mean	**35.7%**	**47.1%**

Limitations

There are a few limitations to the study. First, when looking at the questions that were answered incorrectly, it is possible that some of the incorrect response rate could be attributable to poorly worded questions,

which could have caused confusion on the part of the participants. Second, while 200 responses are great, it is an only small fraction of the over 6.5 million adults serving as youth sport coaches. As such, this convenience sample may not reflect the exercise physiology knowledge of the entire population of youth sport coaches.

Conclusion

In conclusion, there is a need for more in-depth evaluation of the exercise physiology knowledge of youth sport coaches to better pinpoint the areas lacking and to identify better approaches to help educate coaches. Our findings closely mimic previous research[8] that more education is warranted across various categories of exercise physiology. Youth sport coaches have considerable influence in the lives of young children when it comes to instilling good healthy habits. It is important coaches understand the basics of different aspects of exercise physiology and are able to take this knowledge and carry it over to their practices and help teach youth the proper techniques in a safe environment.

Competing interests

This investigation was supported financially by the American Council on Exercise (ACE). The American Council on Exercise (ACE) was not involved in development of the study design, data collection and analysis, or preparation of the manuscript. There are no other potential conflicts of interest related to this article.

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References

1. Bailey R. (2006). Physical education and sport in schools: A review of benefits and outcomes. *J Sch Health*, 76, 397–401.
2. Bailey R, Armour K, Kirk D, Jess M, Pickup I, Sandford R, & BERA Physical Education and Sport Pedagogy Special Interest Group. (2009). The educational benefits claimed for physical education and school sport: An academic review. *Res Pap Educ*, 24 (1), 1–27.
3. Stec D (2012). The personification of an object and the emergence of coaching. *J Manag Hist*, *18*(3), 331–358.
4. https://ncys.org/ (Accessed: September 29, 2024).
5. https://projectplay.org/ (Accessed: June 28, 2024).
6. https://www.aspeninstitute.org/wp-content/uploads/2023/09/11.14.22-Anderson-Butcher-Bates.-2022.-National-Coach-Survey-Final-Report .pdf (Accessed: January 9, 2025).
7. Gano-Overway L., et al. (2020). Revising the National Standards for Sport Coaches Within the USA. *Int Sport Coach J*, 7(1), 89–94.
8. https://www.acefitness.org/continuing-education/prosource/december-2013/3601/exclusive-ace-research-do-youth-coaches-need-coaching-too/
9. Nichols AW. (2014). Heat-related illness in sports and exercise. *Curr Rev Musculoskelet Med*, *7*, 355–365.
10. https://goalwa.wordpress.com/2012/02/15/korrio-survey-knowledge-gap-between-concussion-awareness-and-safety/ (Accessed: August 12, 2024).
11. Bramley H, Kroft C, Polk D, Newberry T, Silvis M. (2012). Do youth hockey coaches allow players with a known concussion to participate in a game? *Clin Pediatr (Phila)*, 51(3), 283-287.
12. https://www.safekids.org/sites/default/files/documents/ResearchReports/Coaching Our Kids to Fewer Injuries A Report on Youth Sports Safety - April 2012.pdf (Accessed: February 5, 2025).
13. Zinn C, Schofield G, Wall C. (2006). Evaluation of sports nutrition knowledge of New Zealand premier club rugby coaches. *Int J Sport Nutr Exerc Metab*, 16(2), 214–225.
14. Corley G, Demarest-Litchford M, Bazzarre TL. (1990). Nutrition knowledge and dietary practices of college coaches. *J Am Diet Assoc* , 90(5), 705–709.

APPENDIX A

YOUTH COACHING QUESTIONNAIRE

1. Which of the following athletes is at the LOWEST risk of developing a heat-related illness?

A. An overweight high school football player who recently recovered from a diarrheal illness Engaging in two-a-day practices in 80 degree Fahrenheit heat
B. A physically fit, well-rested 12-year-old soccer player participating in a tournament in 95 degree Fahrenheit heat
C. A physically fit, mildly dehydrated 15-year-old cross-country runner completing a five-mile run in 90 degree Fahrenheit heat
D. A previously inactive 8-year-old boy with a mildly elevated temperature playing tag with his friends in 95 degree Fahrenheit weather

2. A player is experiencing shortness of breath, coughing, wheezing, and tightness in his chest. What condition is he MOST likely experiencing?

A. An asthma attack
B. A heart attack
C. A concussion
D. A fractured rib

3. The preferred way to stay safe and prevent hypothermia when exercising outdoors is to _____.

A. Dress as warmly as possible
B. Drink warm fluids prior to exercising
C. Eat warm foods before exercise so the core body temperature increases
D. Dress in layers and adjust them according to body temperature

4. Current recommendations state that children and adolescents should perform 60 minutes of _____ on a daily basis.

A. High-intensity cardiorespiratory exercise
B. Body-weight exercises and calisthenics
C. Moderate to vigorous physical activity
D. Strength training with light to moderate loads

5. Fluid intake should be dictated by taste preference, since volume of intake, rather than fluid content, is the most critical issue in child athletes.

A. True
B. False

6. Before exercise, it is recommended that athletes consume _____.

A. 8-12 ounces of fluid, 10-15 minutes before exercise
B. 5-10 ounces of fluid, 15-20 minutes before exercise
C. 16-20 ounces of fluid, 10-15 minutes before exercise
D. Players do not need any fluids before exercise

7. What does the acronym RICE stand for in injury prevention and care?

A. Rest, ice, console, elevation
B. Rest, inform, console, evaluation
C. Rest, ice, compression, elevation
D. Rest, inform, compression, evaluation

8. Rapid swelling of the brain following a second head injury that occurs before the symptoms of a previous head injury have resolved is referred to as _____.

A. Second Cerebral Injury
B. Second Impact Syndrome
C. Second Relative Abrasion
D. Post Concussive Syndrome

9. A youth sports coach who sees a decrease in performance and sudden lack of enthusiasm about participation in one of his or her athletes is MOST likely seeing the results of _____.

A. Overtraining
B. Overuse injury
C. Under-training
D. Puberty

10. If children are ready to participate in organized sports, they are also ready for some type of strength training.

A. True
B. False

11. Which two micronutrients are MOST likely to be deficient in youth athletes?

A. Calcium and vitamin D
B. Iron and vitamin C
C. Vitamin D and vitamin C
D. Calcium and iron

12. Which of the following statements comparing youth exercisers to adult exercisers is MOST accurate?

A. Children tend to recover more quickly from high-intensity bouts of physical exertion.
B. Children have higher levels of anaerobic power than adults.
C. Children eliminate lactic acid more slowly after exercise than adults.
D. Children typically perform better on high-energy activities lasting 30–120 seconds.

13. One of the athletes on your team has begun to struggle in practice. He looks pale and complains of dizziness, fatigue, and a throbbing headache. As he describes his symptoms, he begins to vomit. When you try to talk to him, he is somewhat disoriented. He does not fall or hit his head. As his coach, what should you do?

A. Have the child lie down on the ground where he is, identify a person to call 9-1-1 while you offer the child ice cold water, give the child a fever-reducer such as Tylenol or ibuprofen, and await EMS arrival
B. Move the child to shade, identify a person to call 9-1-1 while you remove protective equipment and clothing, give the child a fever-reducer such as Tylenol or ibuprofen, force the child to drink ice cold water, and await EMS arrival
C. Remove the child from practice and move him to the shade, instruct an assistant coach to attend to the athlete and call the child's mother while you call 9-1-1, continue practice while you await arrival of the child's parents and EMS
D. Move the child to shade, identify a person to call 9-1-1 while you remove protective equipment and clothing, spray cold water on the child, and await EMS arrival

14. When should an athlete return to play after a concussion?

A. When the athlete says he or she feels ready to return to play
B. After receiving written consent from the athlete's parents
C. After receiving written clearance from a licensed healthcare provider
D. When the coach feels he or she is able to return

15. What is the primary purpose of a cool-down?

A. To reduce heart rate and prevent blood pooling in the extremities
B. To raise the body's core temperature
C. To prepare the body for the next bout of exercise
D. To decrease the amount of post-workout muscle soreness

16. A player must experience loss of consciousness in order to be diagnosed with a concussion.

A. True
B. False

17. If the temperature and heat-stress index are expected to be mildly elevated, how should a coach respond?

A. Remind parents to make sure the kids wear sunscreen
B. Postpone or cancel practice
C. Include one scheduled five-minute break per one hour of activity
D. Lower the intensity and/or duration of activity

18. The primary goal of acute injury management for strains and sprains is _____.

A. To limit swelling and control the pain
B. To improve the range of motion of the injured area
C. To ensure that the injured athlete remains relatively calm
D. To determine the general severity of the injury

19. A 15-year-old female club soccer player was pushed to the ground by an opposing player. You witness her hit her head. She stands up on her own but looks "foggy." She complains of a mild headache and answers your questions appropriately but slowly. What is the BEST next step?

A. Monitor the athlete for several hours to assess clinical condition
B. Prompt referral to the ER or a physician for evaluation
C. Return to play since she did not have loss of consciousness
D. Send her home with a teammate to rest and recover

20. What is a function of protein in the diet?

A. Protein helps regulate metabolism
B. Protein helps the body recover and repair itself after exercise
C. Protein is used as a source of energy for short burst activities
D. Protein helps with nerve conduction

21. The purpose of an AED is to _____.

A. Help with delivering compressions during CPR
B. Analyze heart rhythm and deliver a shock if necessary
C. Help to clear a possible airway obstruction
D. Prevent the loss of consciousness

22. An example of a proper pre-competition meal would be _____.

A. A piece of fruit
B. Pasta with chicken
C. A hamburger with fries
D. A candy bar

23. You are the coach of a middle school basketball team. Two of your players showed up late to practice and you would like to discipline them so that they learn the importance of punctuality. What would be the LEAST appropriate disciplinary method?

A. Require the players to apologize to their teammates for being late
B. Require that the players stay after practice for several minutes to help clean up the gym
C. Have a discussion with the players after practice about the importance of timeliness for the team
D. Have the players run several extra laps at the onset of practice

24. A well-designed warm-up period will accomplish which of the following?

A. Prevent early-onset muscle soreness and fatigue
B. Enhance the flexibility of all participants
C. Prepare the body for the upcoming exercise events
D. Allow an athlete to reach a steady-state heart rate that can be maintained

25. Drastic loss in weight, mood swings and a preoccupation with food, calories and weight are warning signs of what illness?

A. Bulimia
B. Compulsive overeating
C. Anorexia
D. Night eating syndrome

26. What is a good way to monitor an athlete's hydration levels during exercise?

A. Asking the athlete how thirsty he or she is after practice
B. Observing the athlete's rate of sweating
C. Weighing the athlete before and after practice
D. Monitoring reaction time and coordination

27. During which of the following is it MOST appropriate to consume electrolyte-supplemented beverages such as sports drinks?

A. When activity lasts longer than 30 minutes
B. During high-intensity strength-training workouts
C. Whenever participants are visibly sweating
D. When the schedule calls for repeated same-day sessions

28. What is the MOST likely cause of an overuse injury in a young athlete?

A. High body mass index
B. Training errors
C. Previous injury
D. Improper footwear

29. Acute musculoskeletal injuries should be treated with heat packs for up to the first 72 hours before ice is applied.

A. True
B. False

30. When an athlete suffers a suspected spinal injury, you should first _____.

A. Provide stabilization to the suspected injured area
B. Determine if the athlete can move his or her extremities
C. Check for vital signs
D. Ask the athlete to touch his or her toes

31. For exercise bouts lasting LESS THAN 60 minutes, it is recommended that a player should replace his or her fluids with _____.

A. Chocolate milk
B. Sports drinks
C. Energy drinks
D. Water

32. During the preseason, it may be prudent for youth sports coaches to spend a little less time practicing _____and a little more time performing _____.

A. Sport-specific skills; conditioning exercises
B. Aerobic exercise; sport-specific skills
C. Conditioning exercises; balance training
D. Plyometric exercise; aerobic exercise

33. The most important consideration when strength training with youth is _____.

A. Lifting the most weight possible
B. Increasing muscle mass
C. Teaching proper technique and safety
D. Increasing muscular endurance

34. Static stretching is MOST appropriate during which segment of a youth sports practice?

A. Warm-up
B. Resistance training phase
C. Aerobic conditioning phase
D. Cool-down

35. Players should only take water breaks when they are thirsty.

A. True
B. False

36. The performance of strength training by children and adolescents should be _____.

A. Discouraged due to the potential for damage to their growth plates
B. Avoided due to the increased risk of musculoskeletal injury
C. Allowed only if the youth are mature enough to exercise on their own
D. Encouraged to reduce the risk of sports-related injuries

37. During the acute phase of injury management, ice should be applied every hour for up to _____until the tendency for swelling has passed.

A. 5 minutes
B. 20 minutes
C. 45 minutes
D. 60 minutes

38. Nausea, initially pale and then flushed skin and light headedness are some acute signs and symptoms of what?

A. Heat Cramps
B. Dehydration
C. Hypothermia
D. Heat Stroke

39. What percentage of a child's caloric intake should be carbohydrates?

A. 55-70%
B. 25-35%
C. 12-15%
D. 70-85%

40. Which of the following would be the LEAST effective way to help minimize heat-related injuries during an outdoor football practice?

A. Practice with no pads or helmets
B. Conduct a walk-through of plays instead of running them at full speed
C. Take frequent water breaks
D. Hold practice between 1:00 – 4:00 p.m.

41. Which of the following is not a component of the female athlete triad?

A. Menstrual dysfunction
B. Elevated blood pressure
C. Low energy availability
D. Decreased bone mineral density

42. Which of the following is not a sign/symptom of Relative Energy Deficiency in Sport (RED-S)?

A. Excessive fatigue
B. Frequent illness
C. Increased sport performance
D. Rapid weight loss

43. True or False, RED-S can happen in both males and females.

A. True
B. False

44. Which of the following is not a consideration when creating an inclusive environment in youth sports?

A. Pronouns
B. Socioeconomic status
C. Religion
D. Name

45. Each of the following are reliable/valid methods for monitoring athlete recovery with the exception of:

A. Measure resting heart rate
B. Assess muscle soreness
C. Assess readiness for change
D. Rate mood

46. Which muscle fiber type recovers faster from a workout?

A. Fast twitch
B. Slow Twitch

47. True or False, training at altitude will require increased recovery time.

A. True
B. False

48. Each of the following is a sign/symptom of iron deficiency with the exception of:

A. Poor circulation
B. Dizziness/lightheadedness
C. Extreme fatigue
D. Improved digestion

49. How many kids are involved in youth sports?

A. 54%
B. 12%
C. 78%
D. 87%

50. Each of the following are ways to encourage youths to participate in sports, with the exception of:

A. Substitute sports for free time/be competitive with them
B. Allow them to pick which sport to play
C. Experience a professional game
D. Participate in a sport with their friends and peers

APPENDIX B

INDIVIDUAL RESPONSES TO EACH QUESTION

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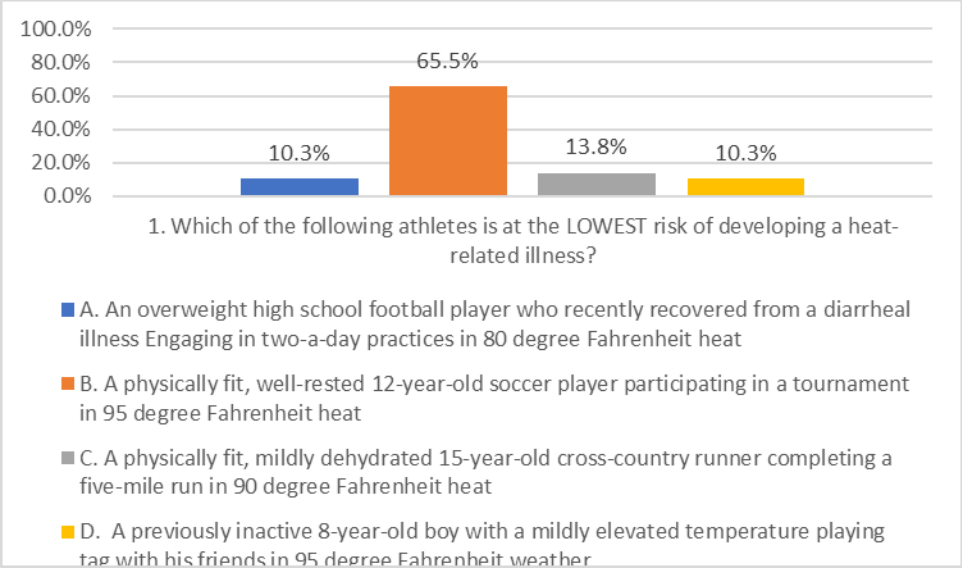

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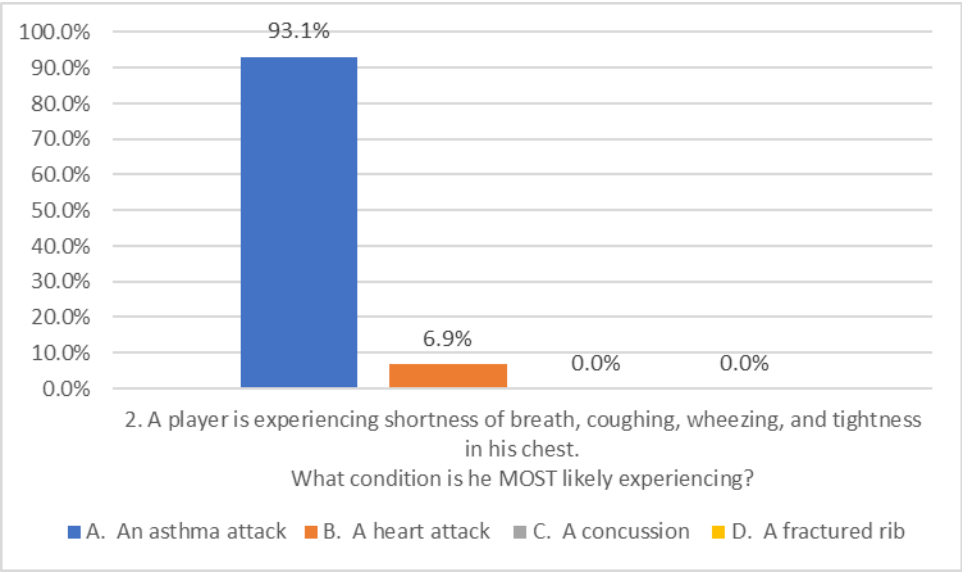

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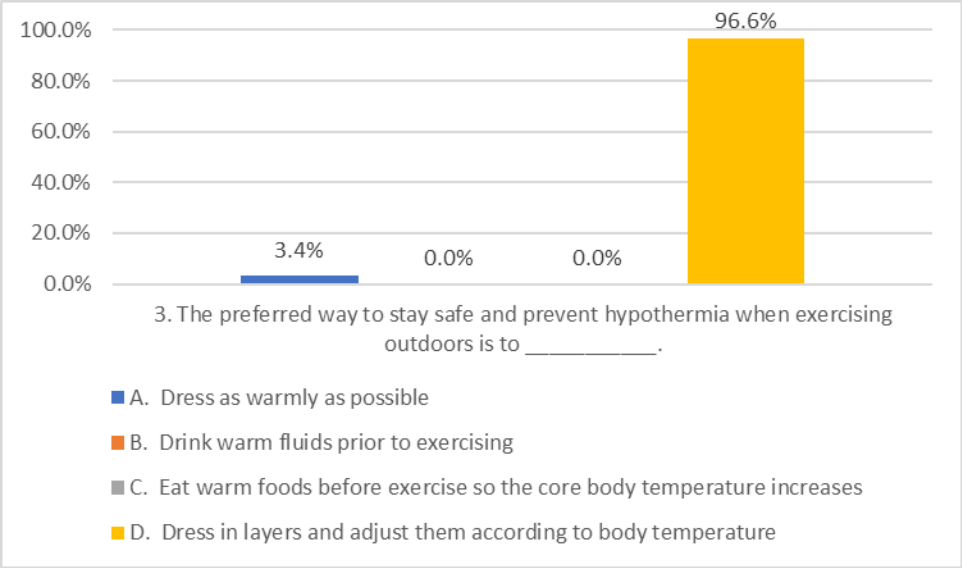

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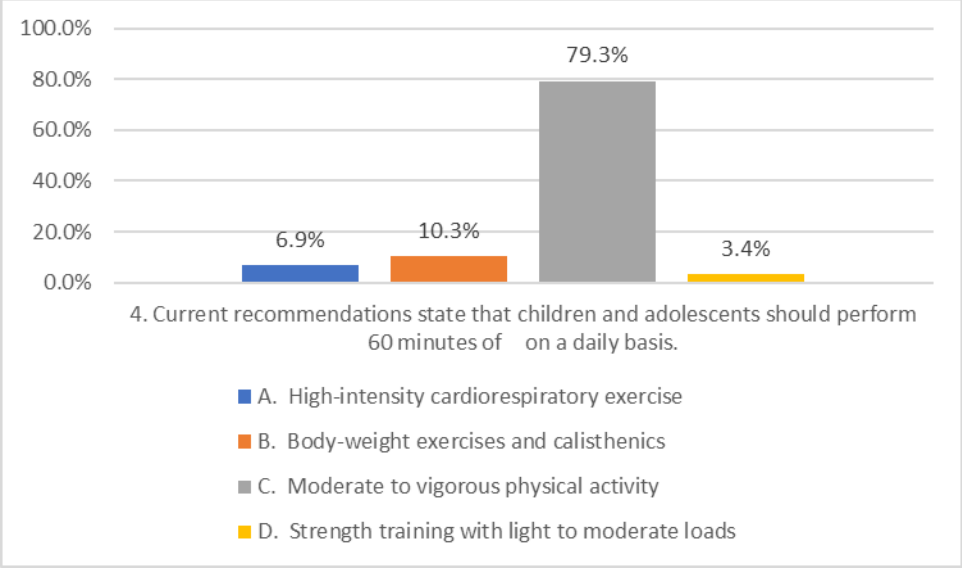

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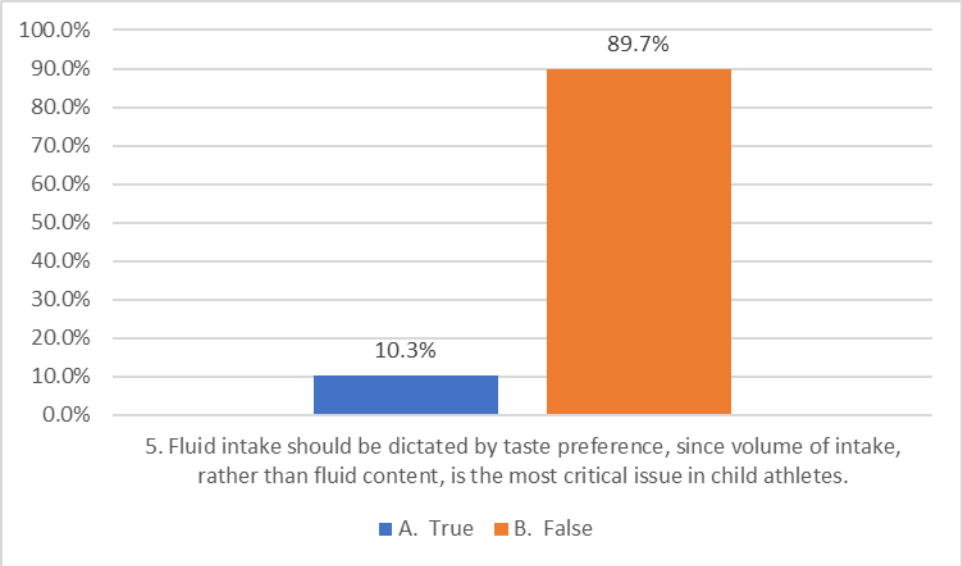

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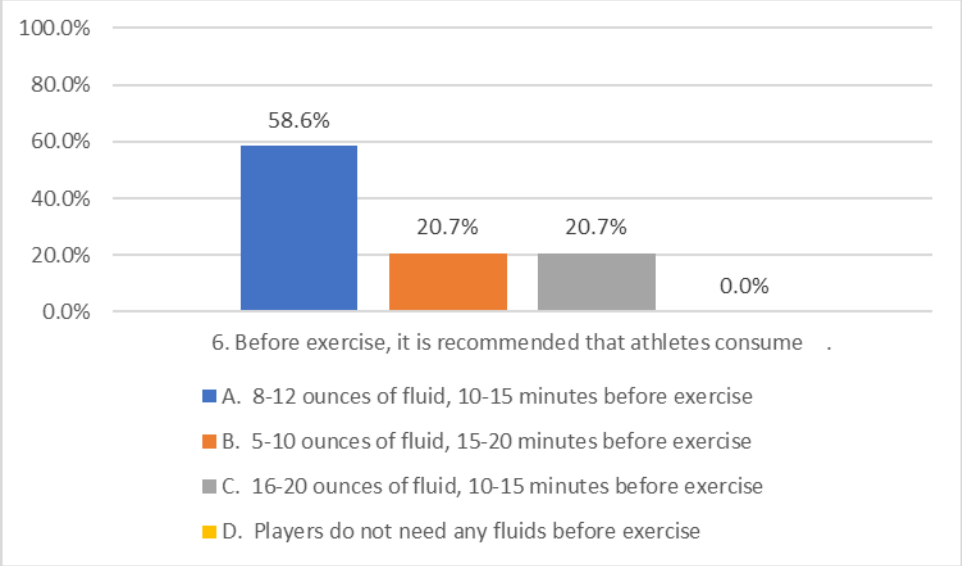

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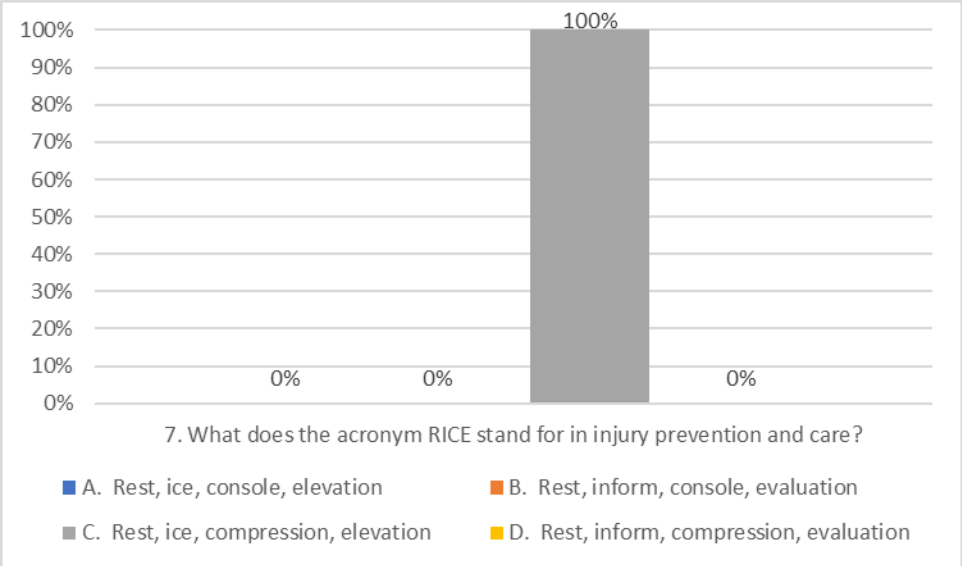

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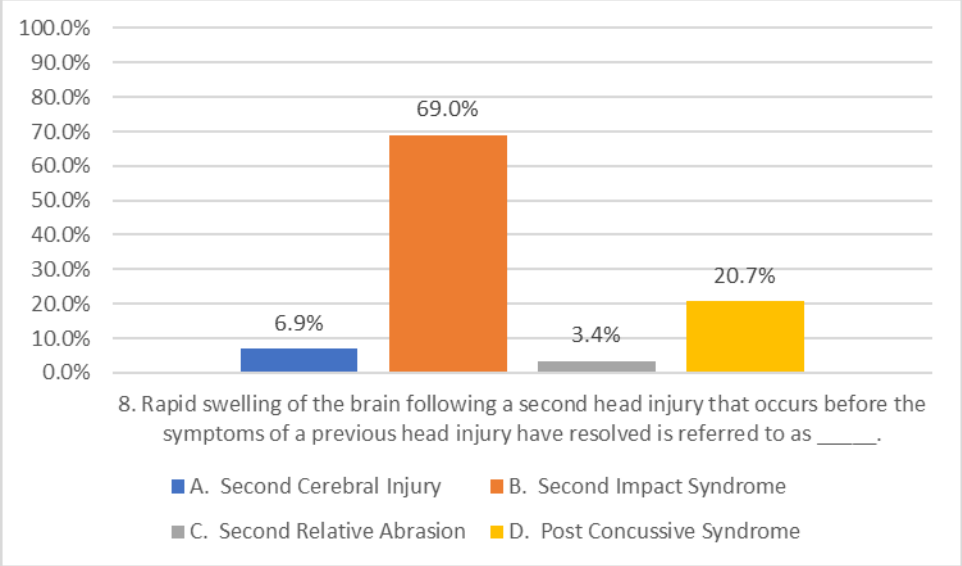

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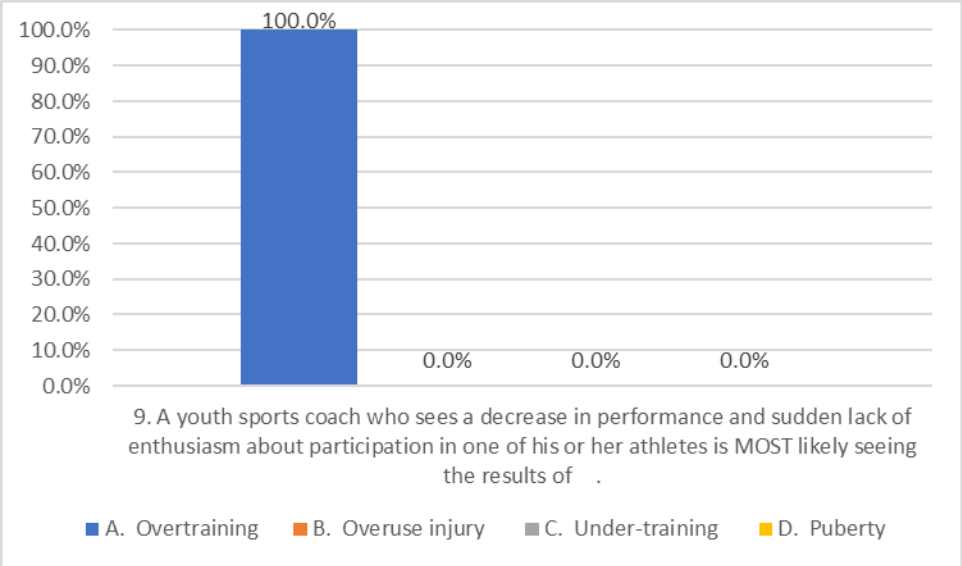

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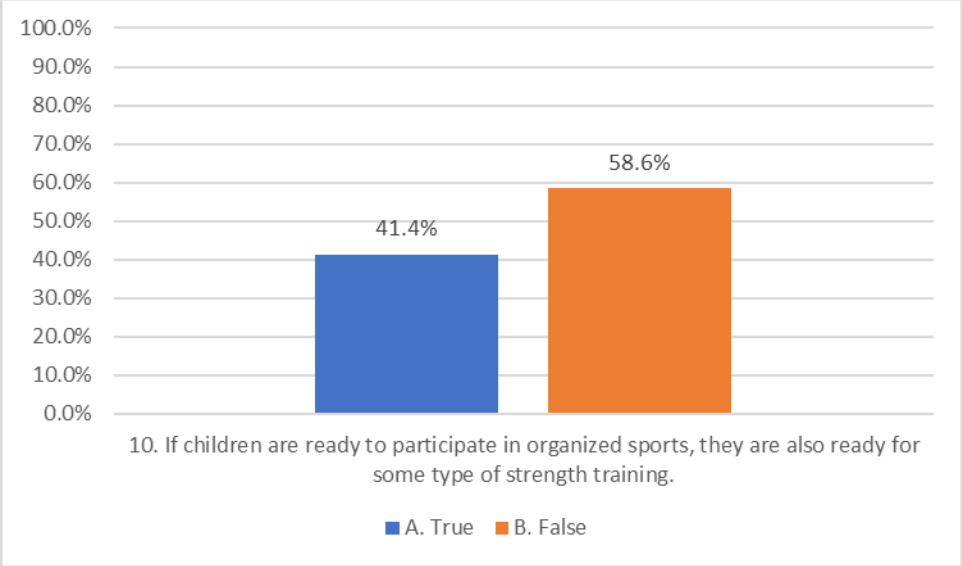

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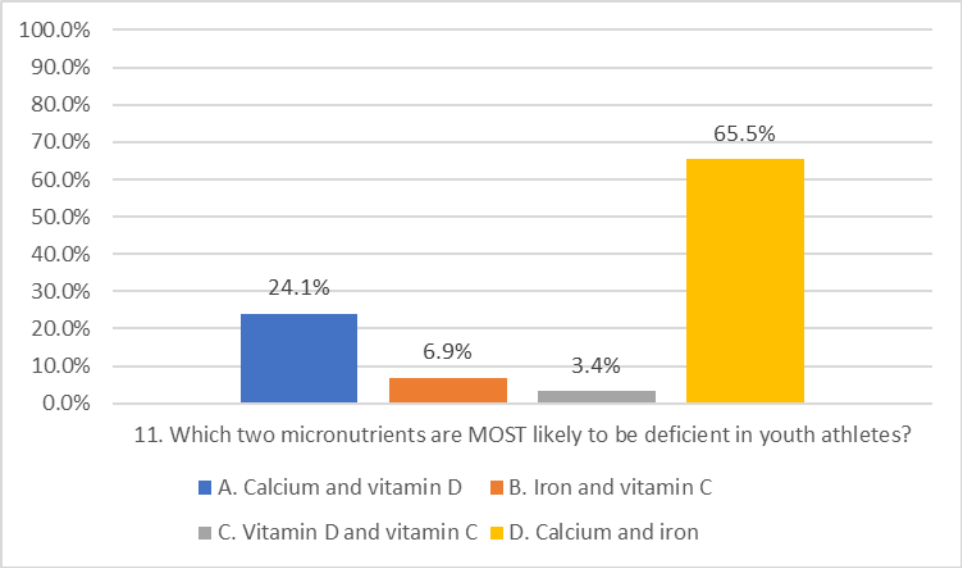

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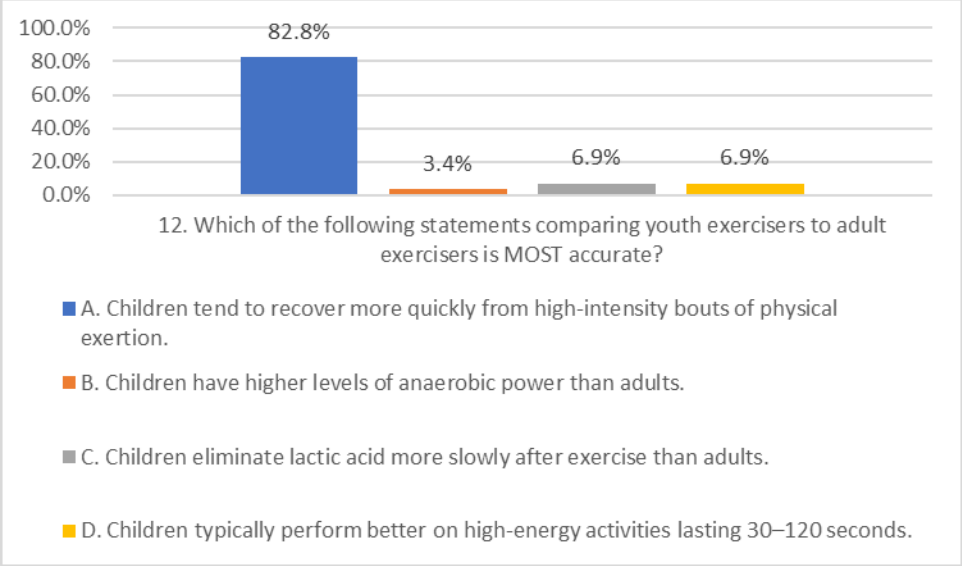

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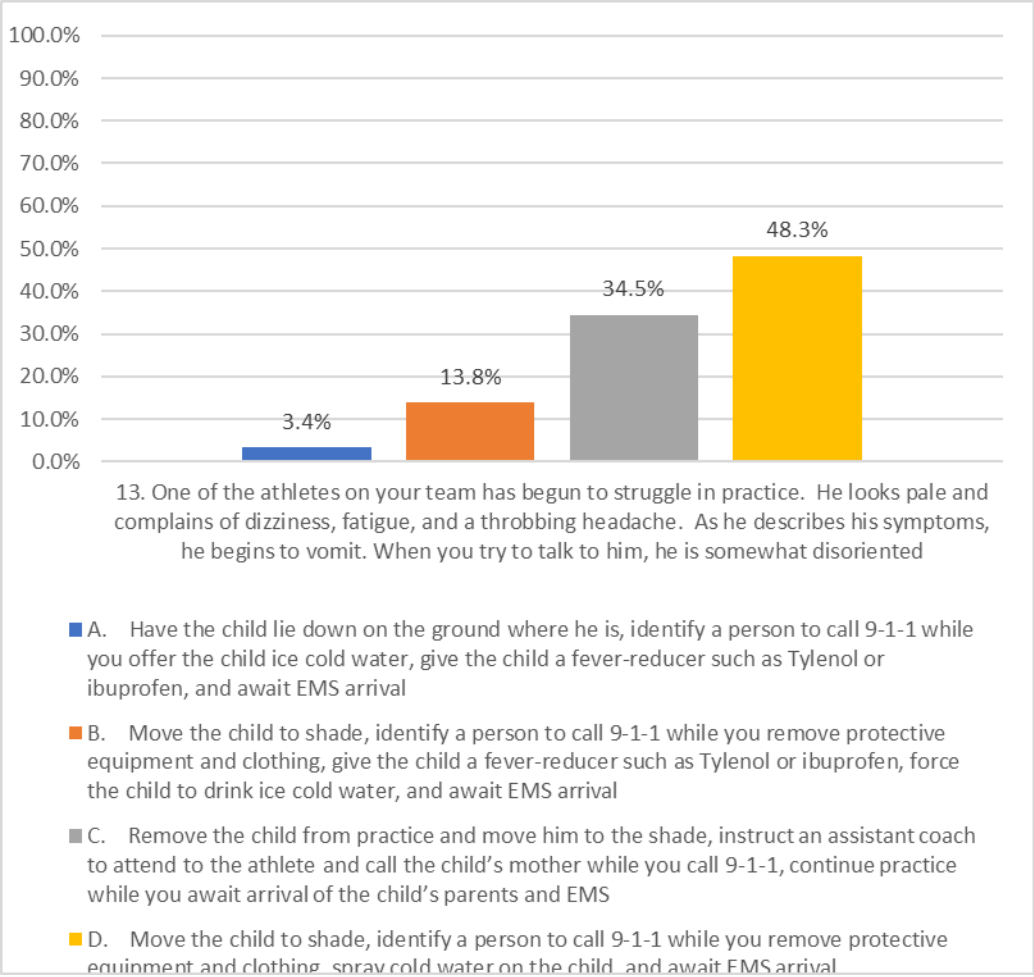

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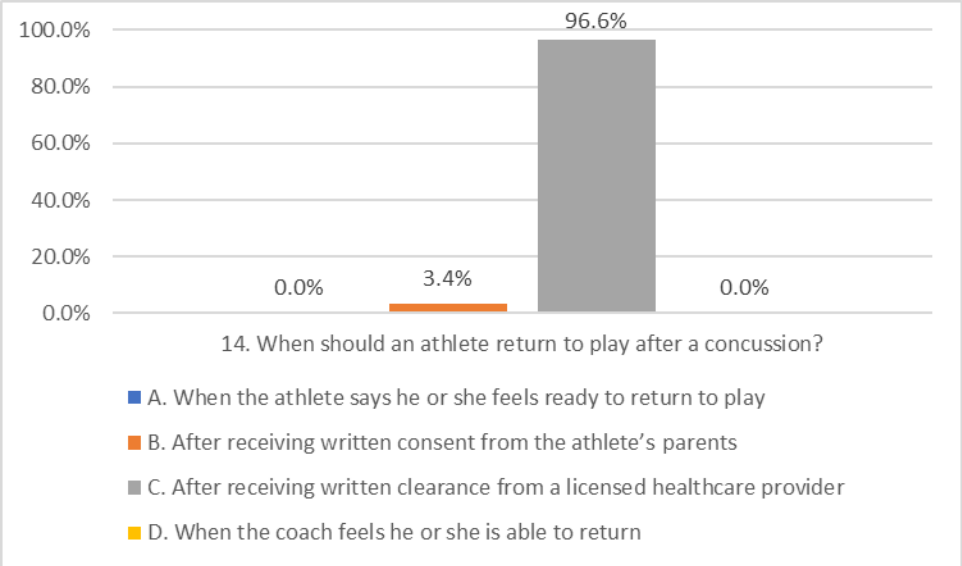

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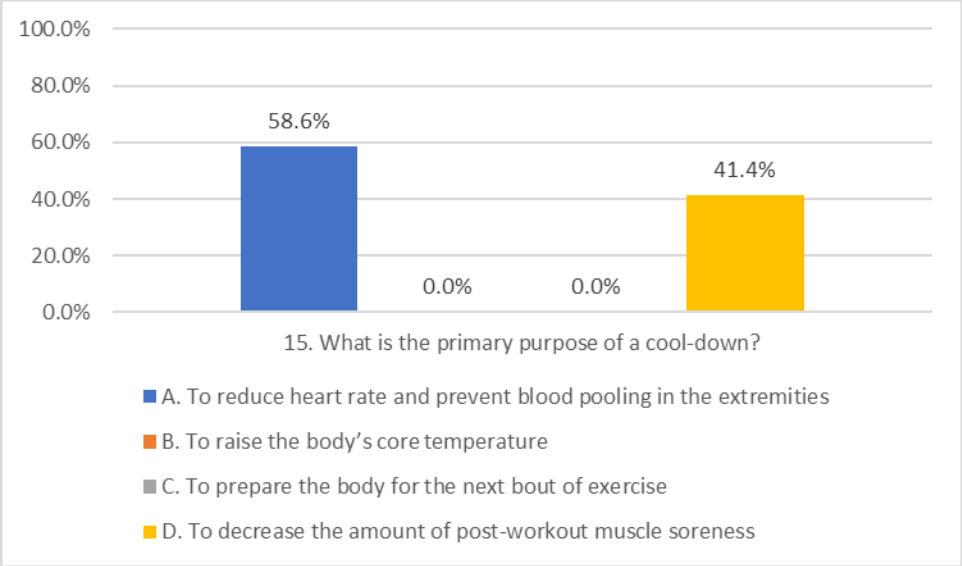

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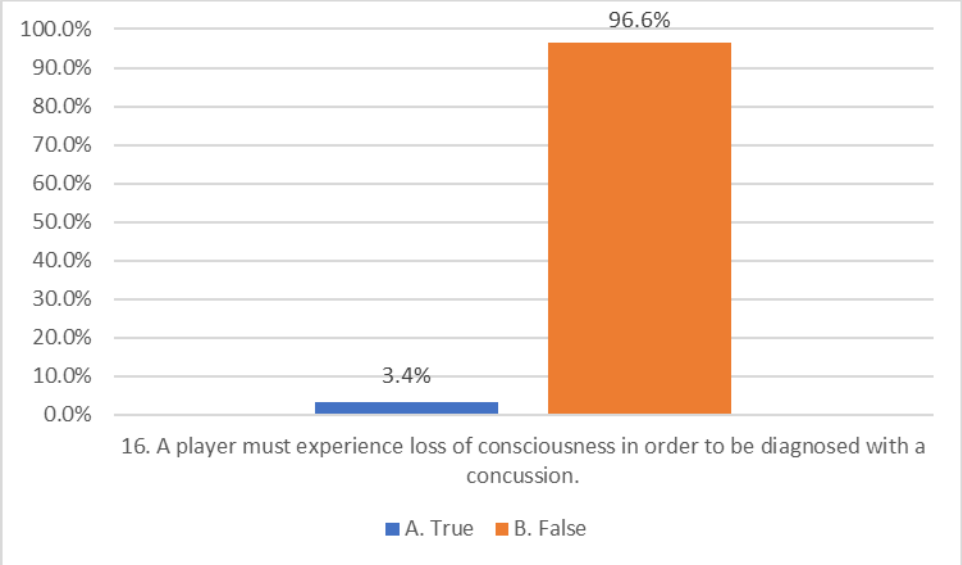

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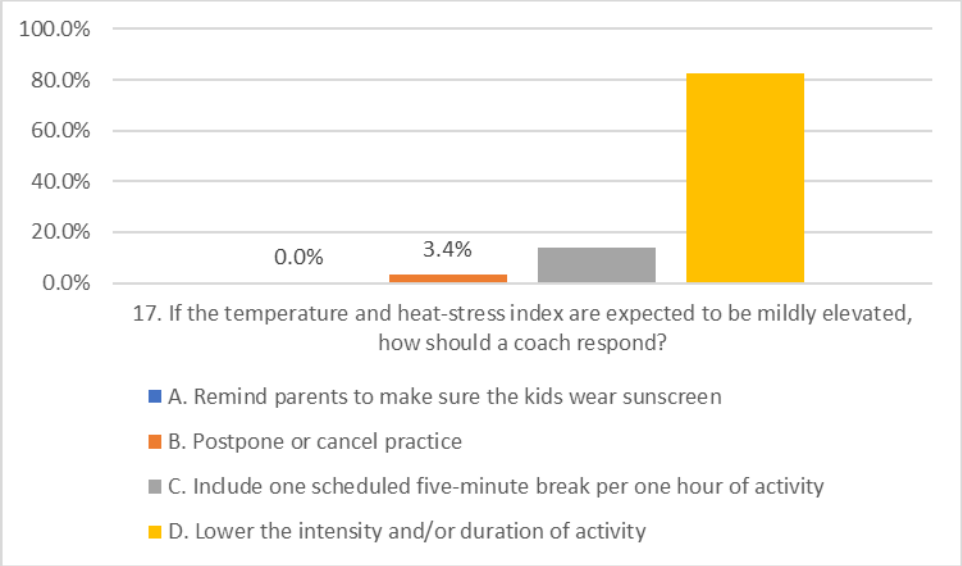

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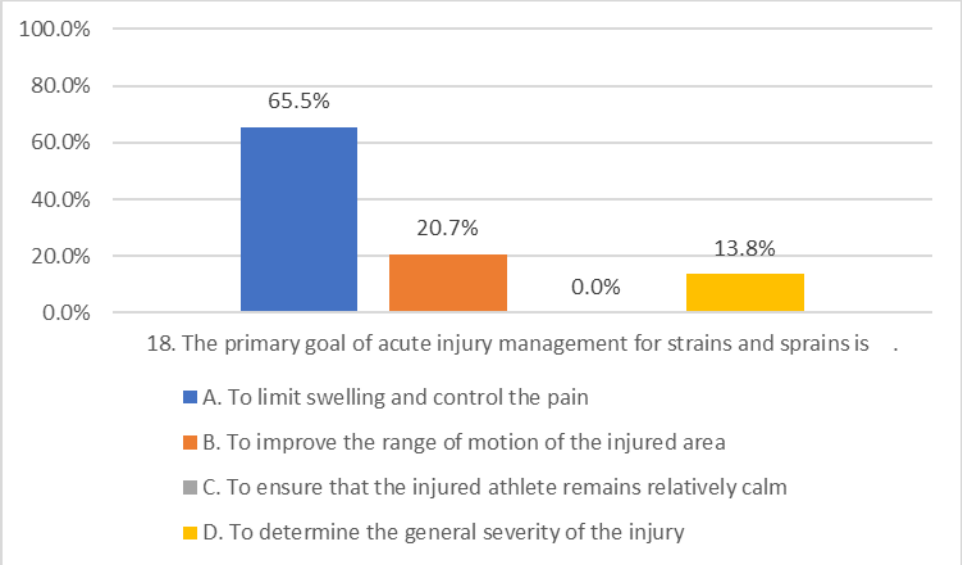

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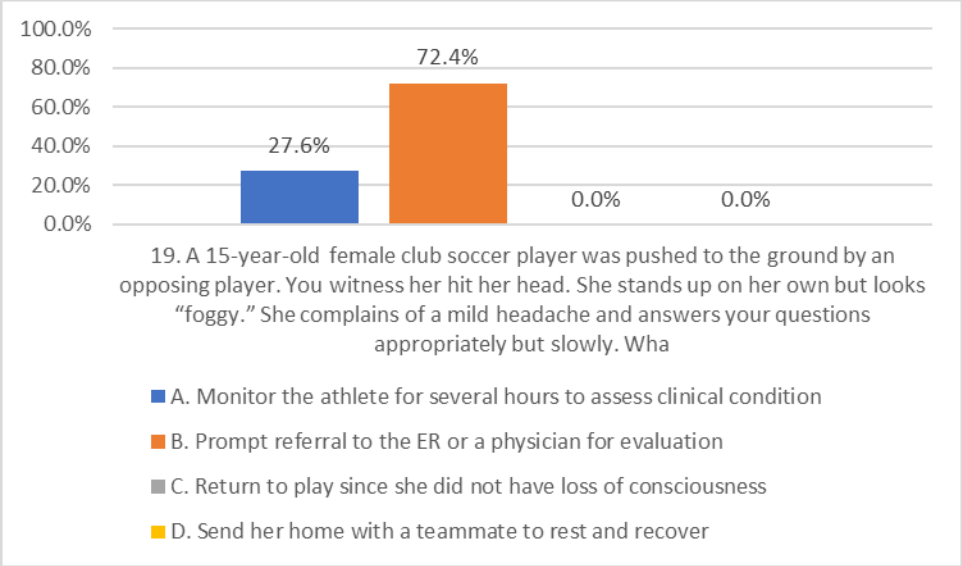

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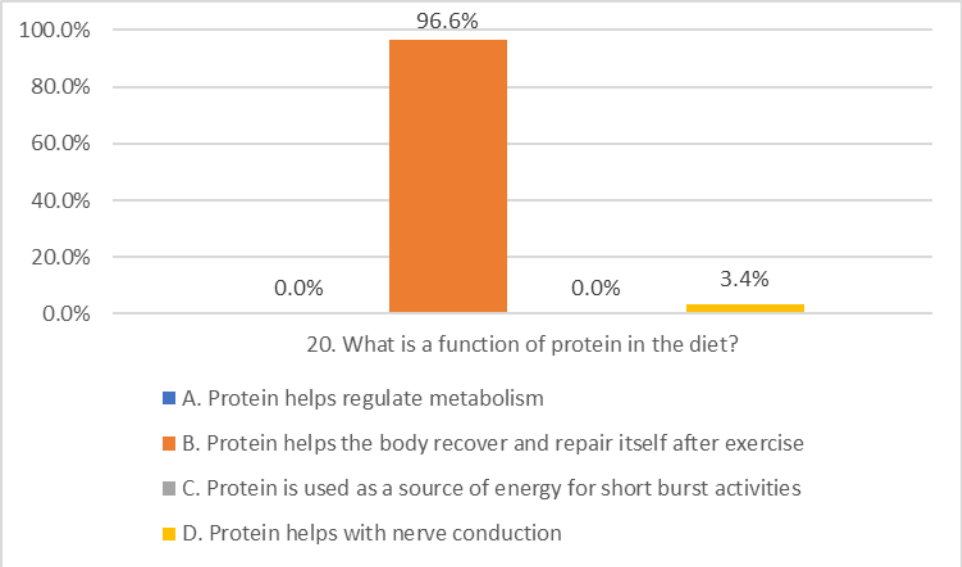

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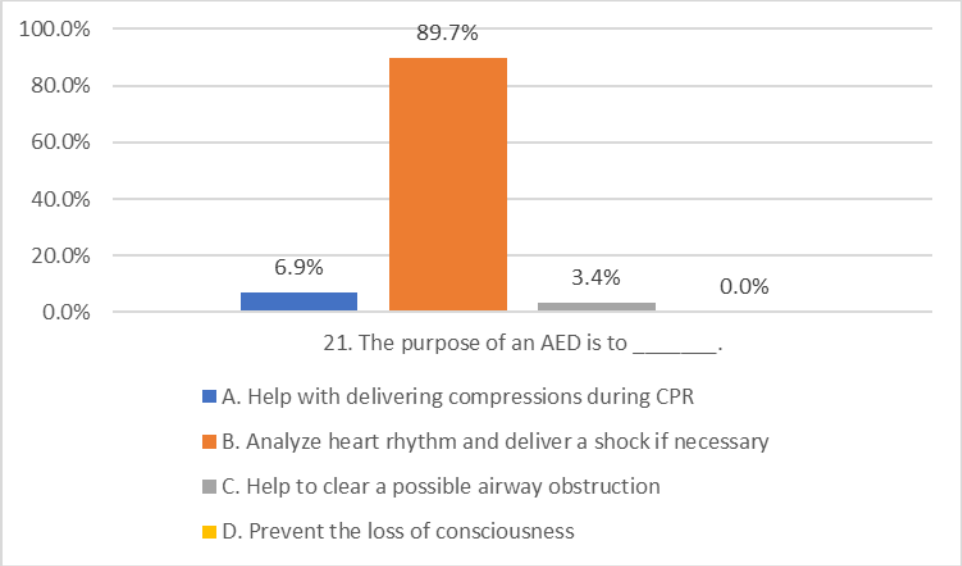

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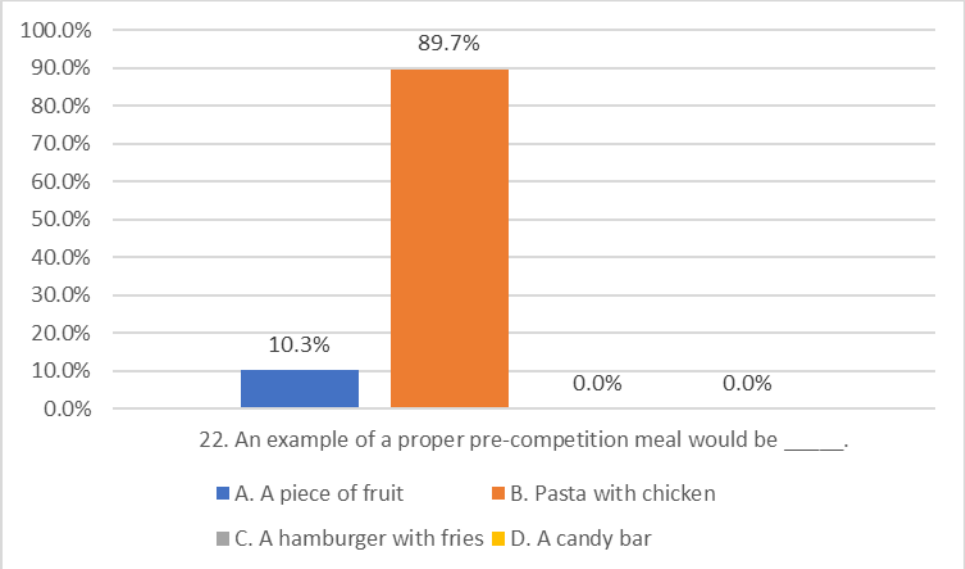

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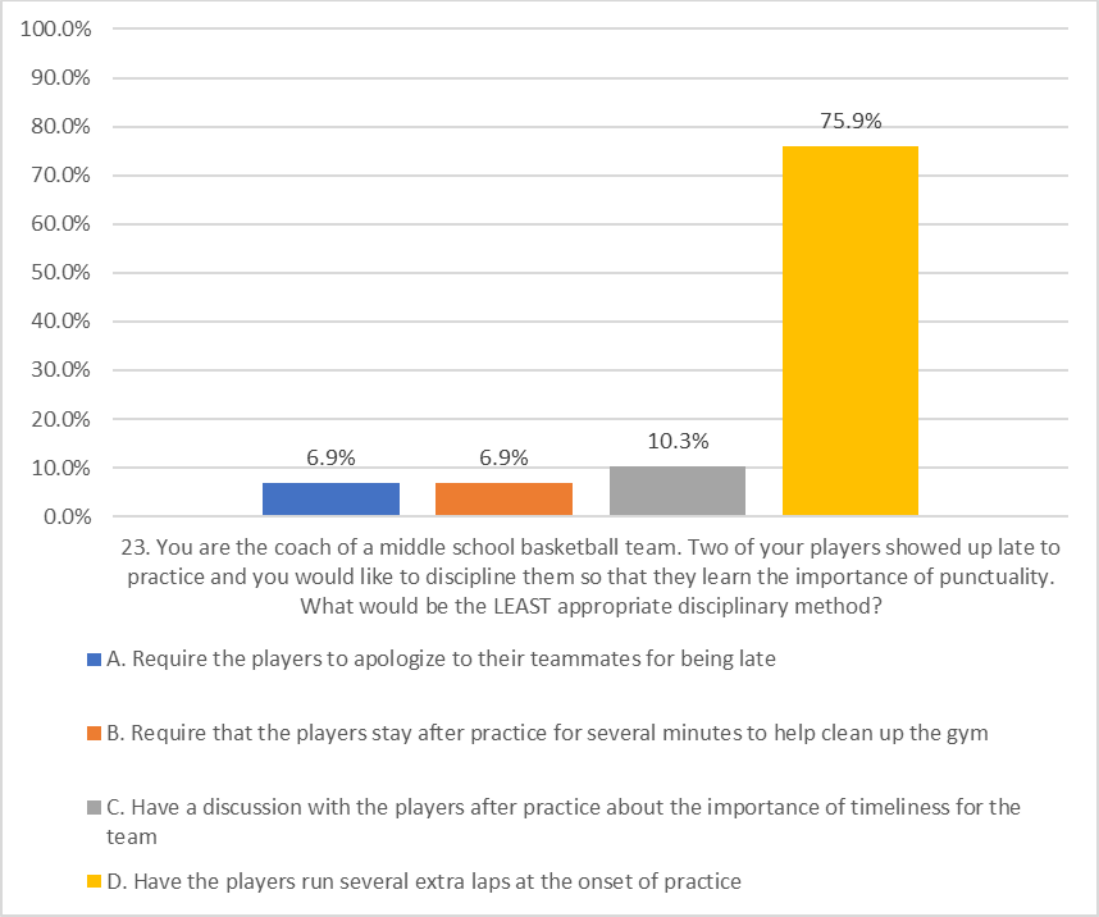

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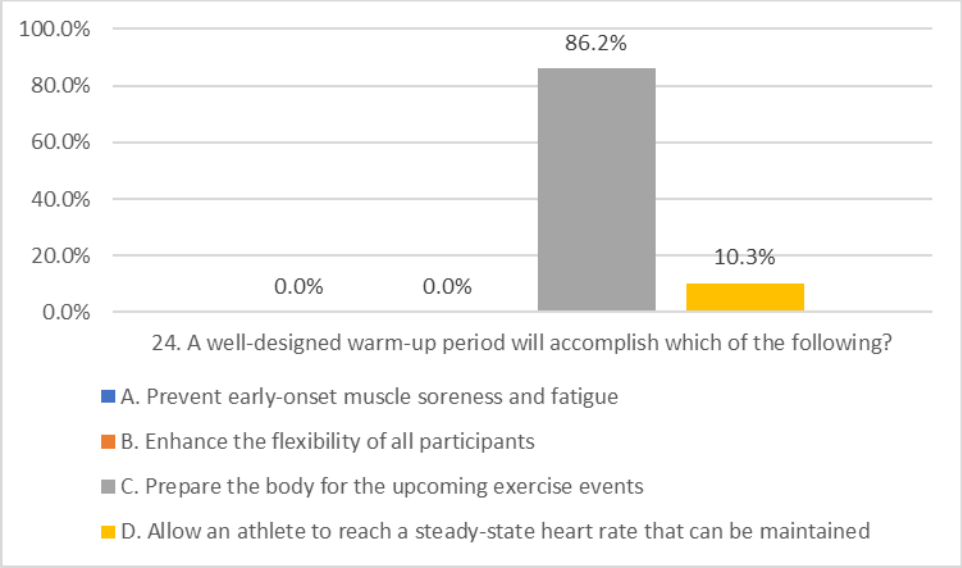

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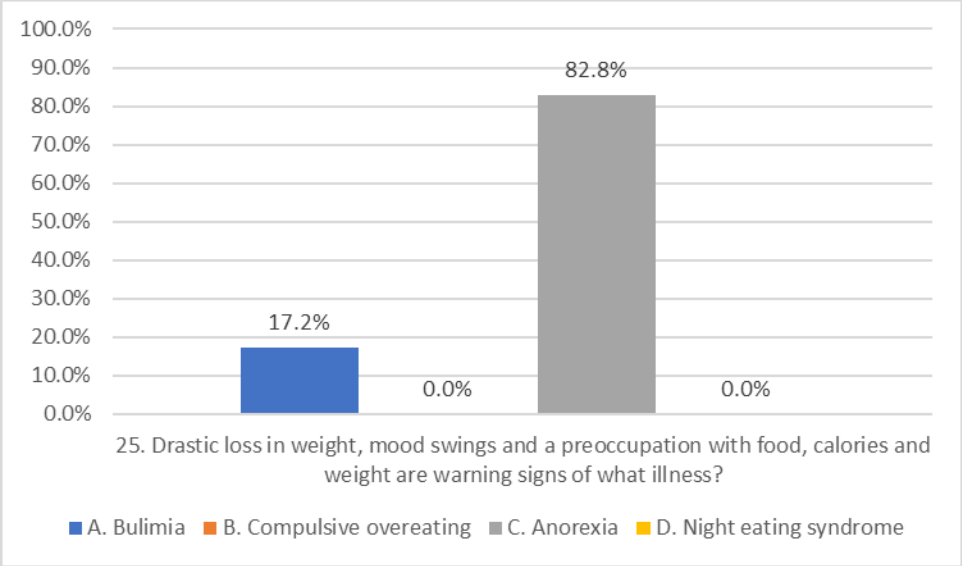

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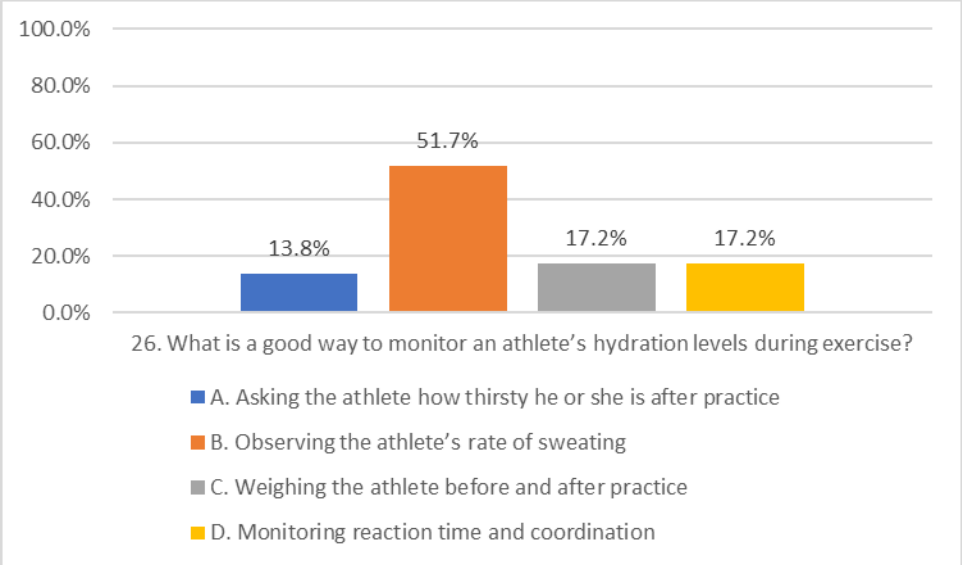

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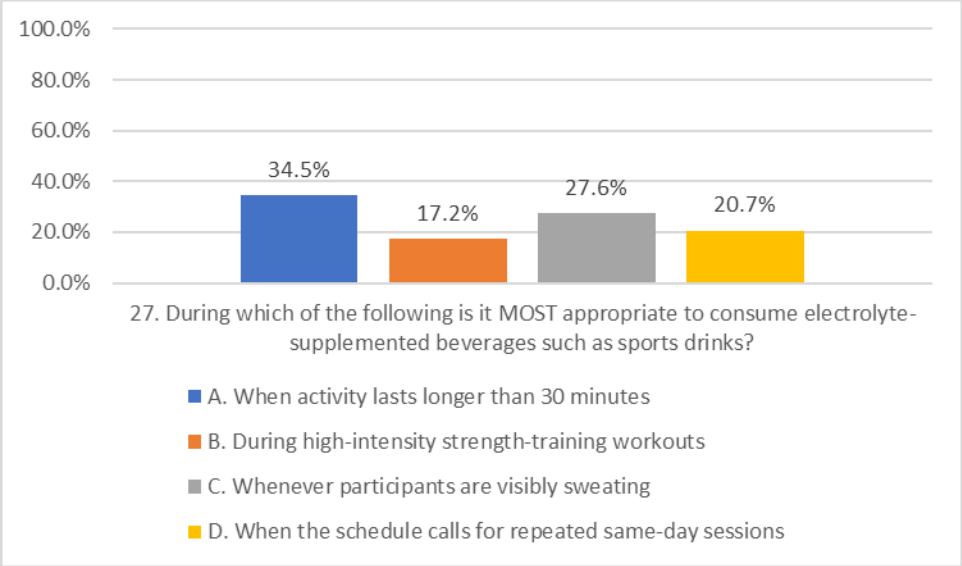

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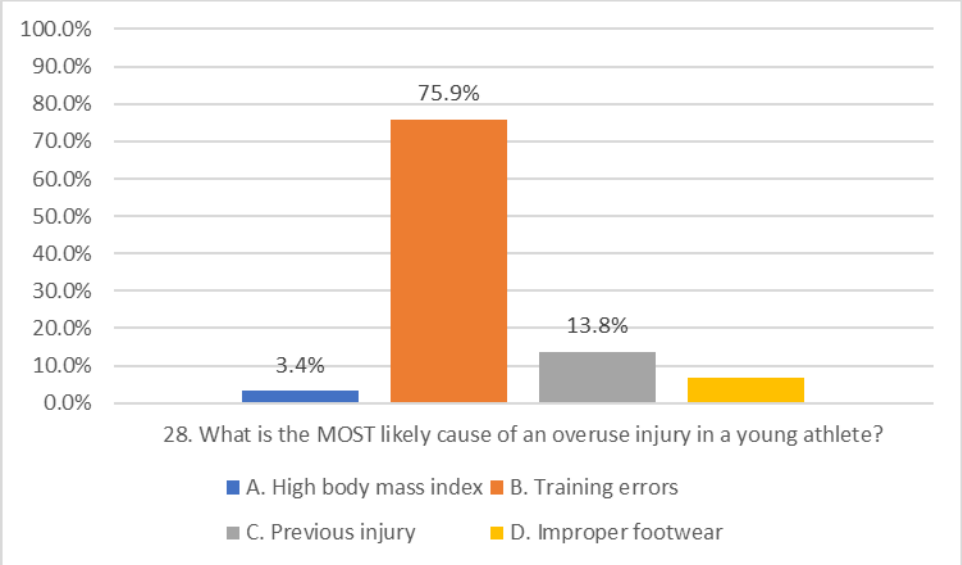

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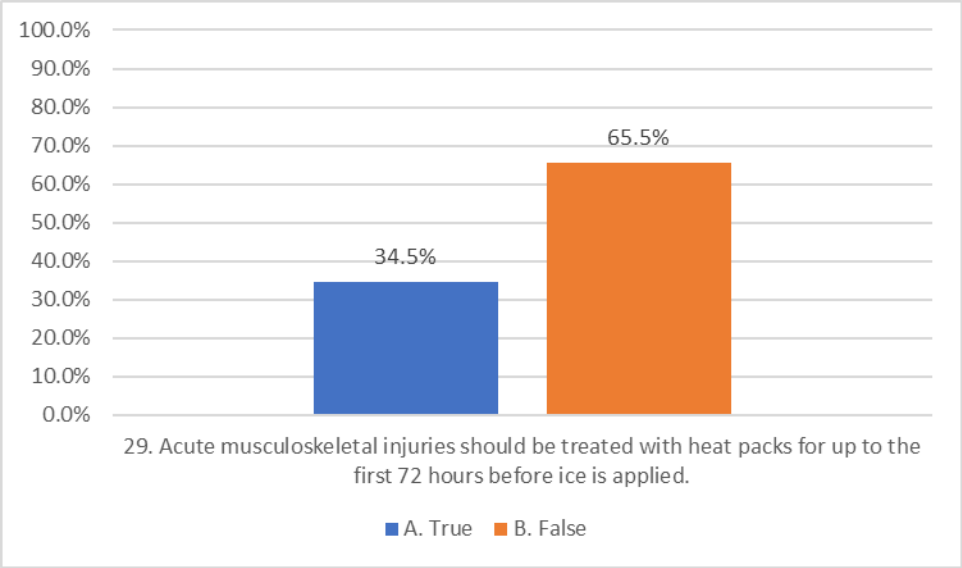

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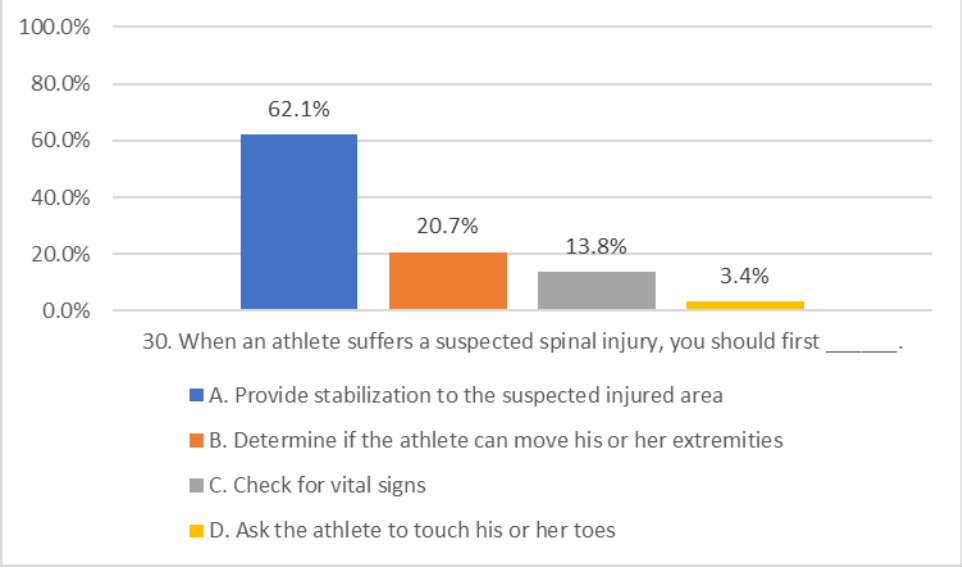

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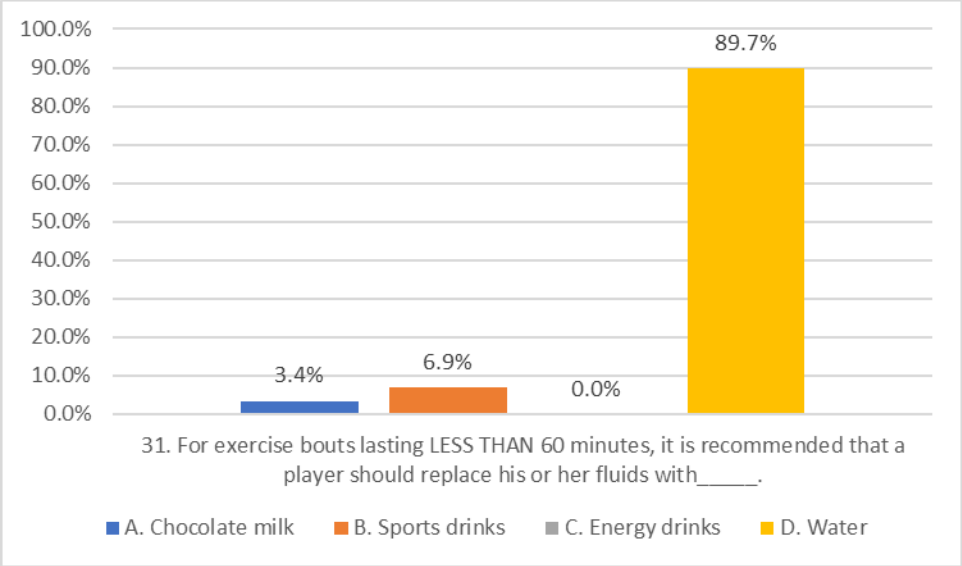

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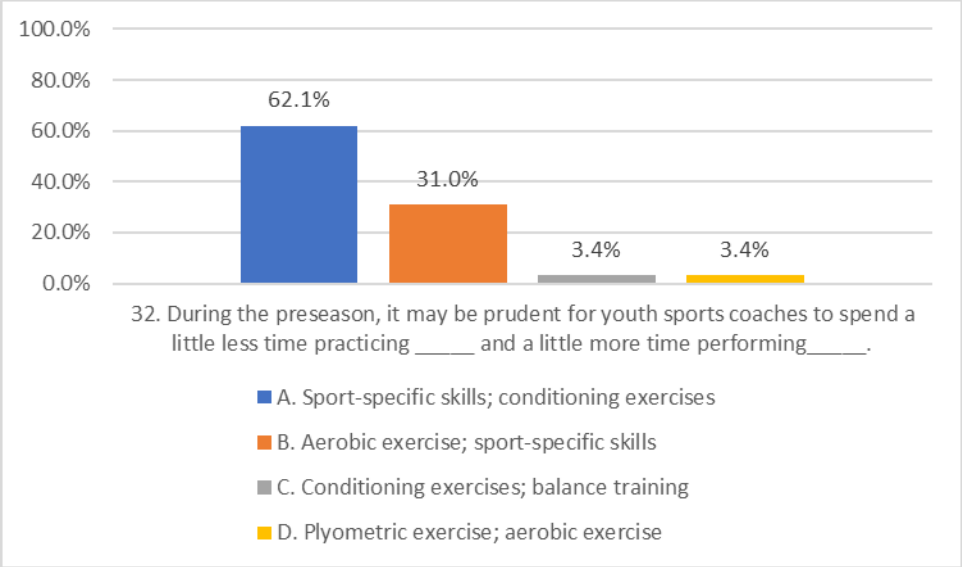

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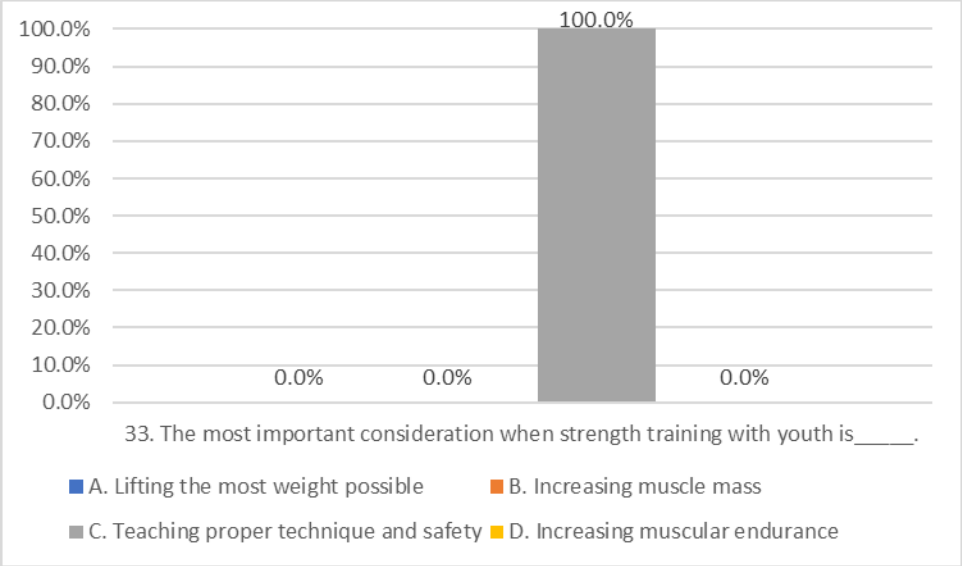
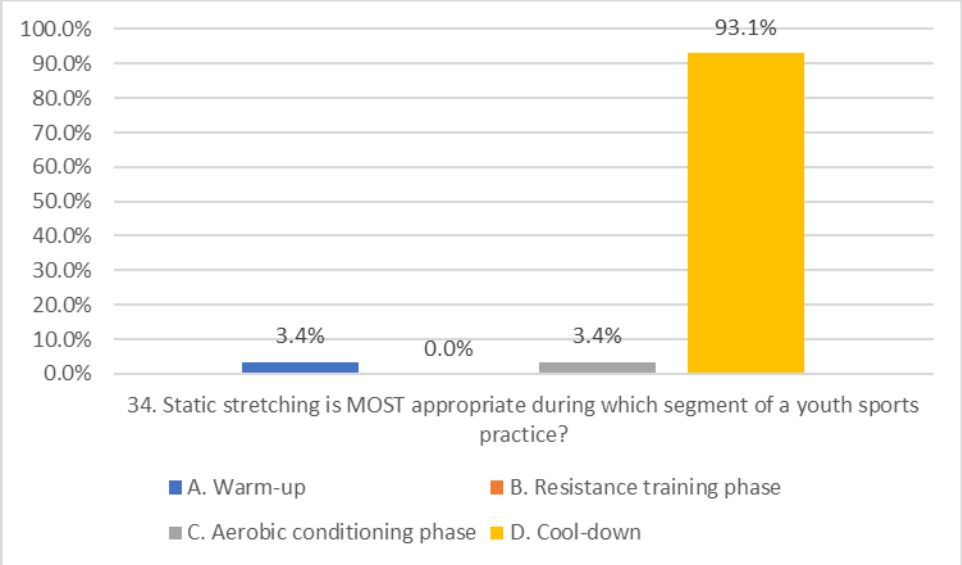
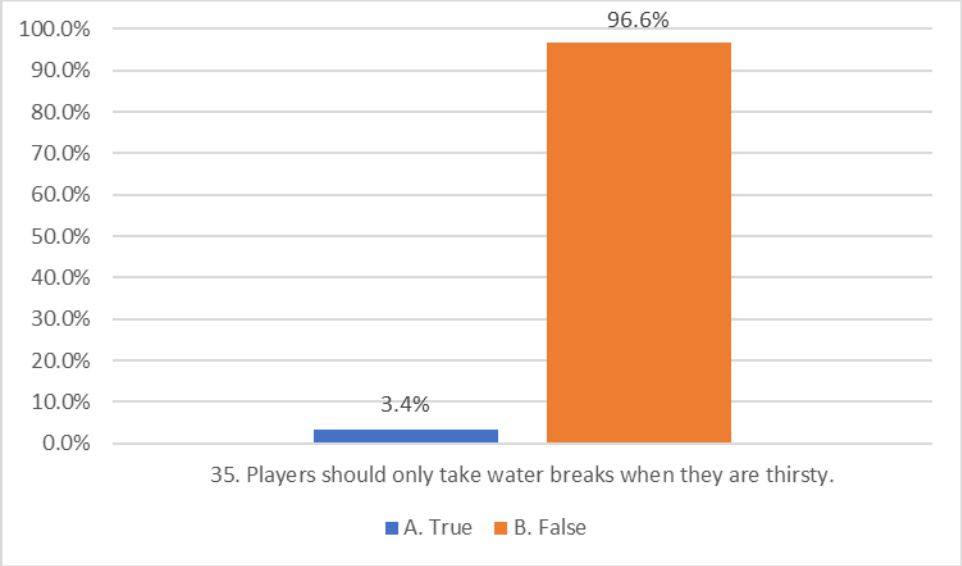


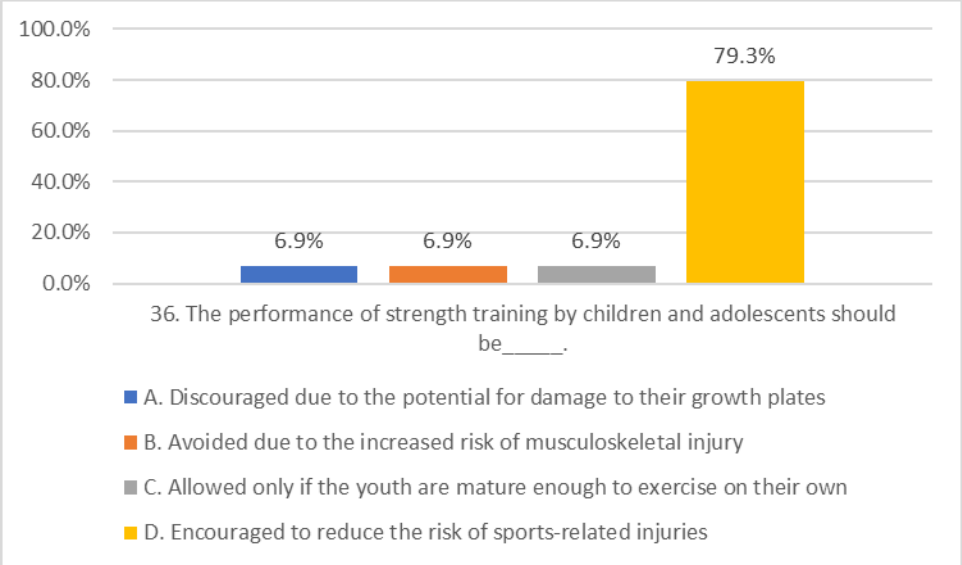
Question 34



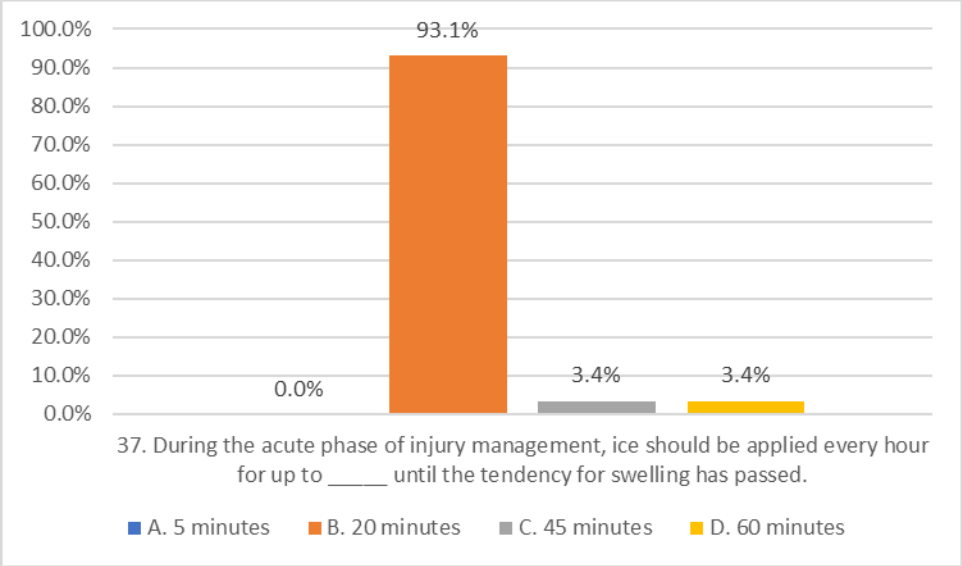
Question 35



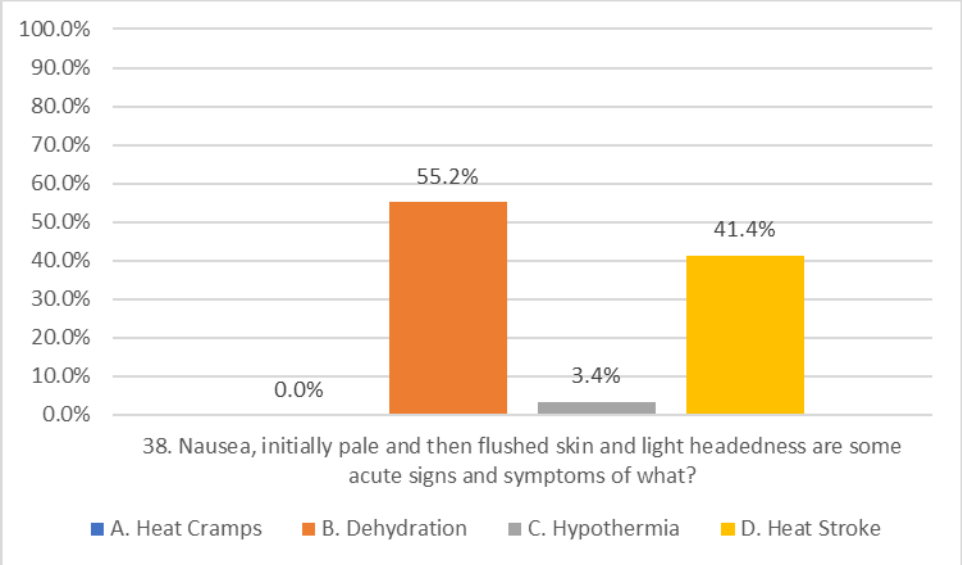
Question 36



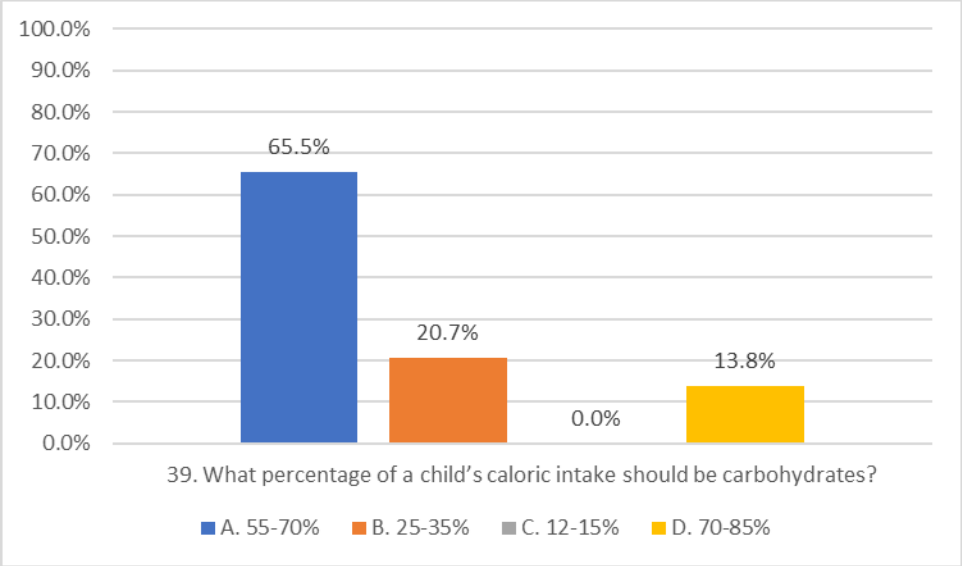
Question 37



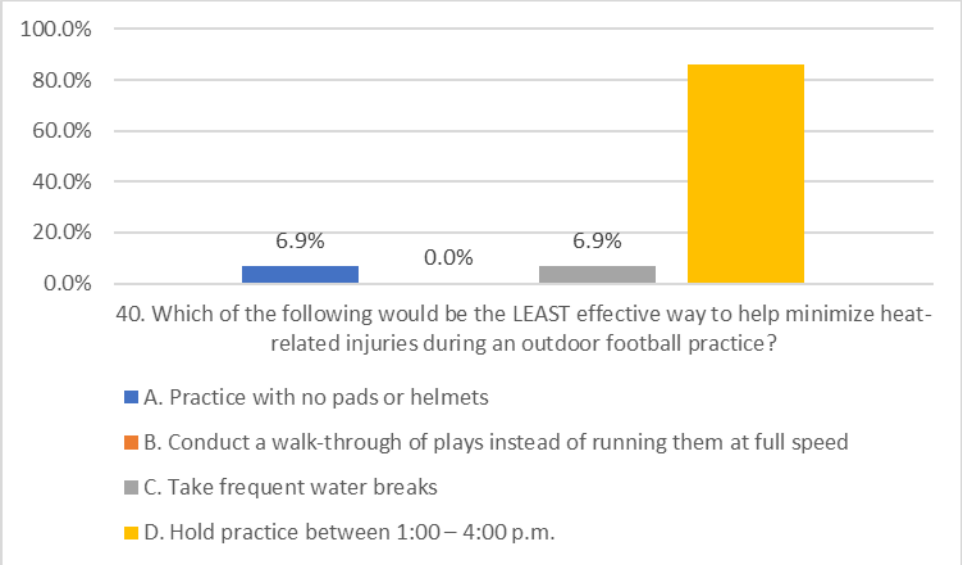
Question 38



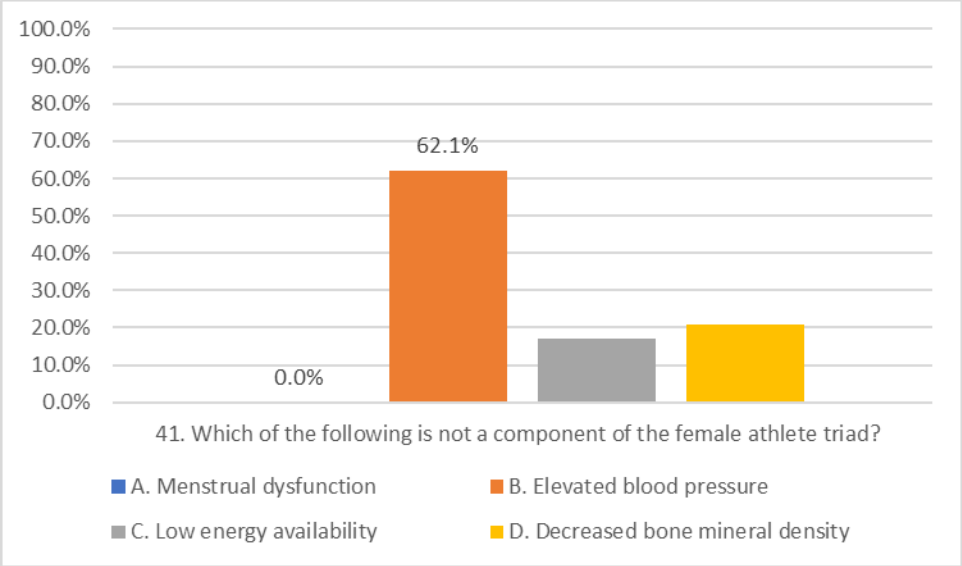
Question 39



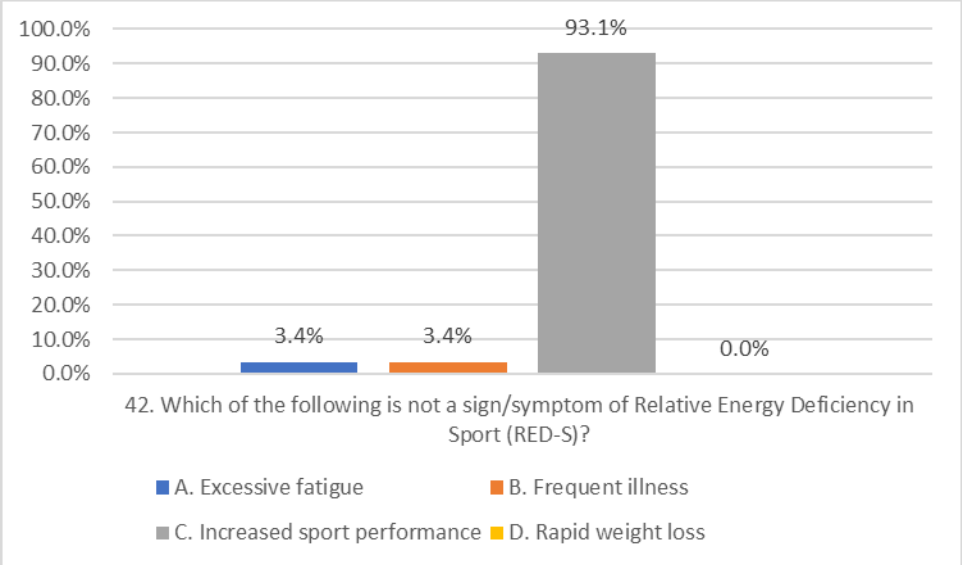
Question 40



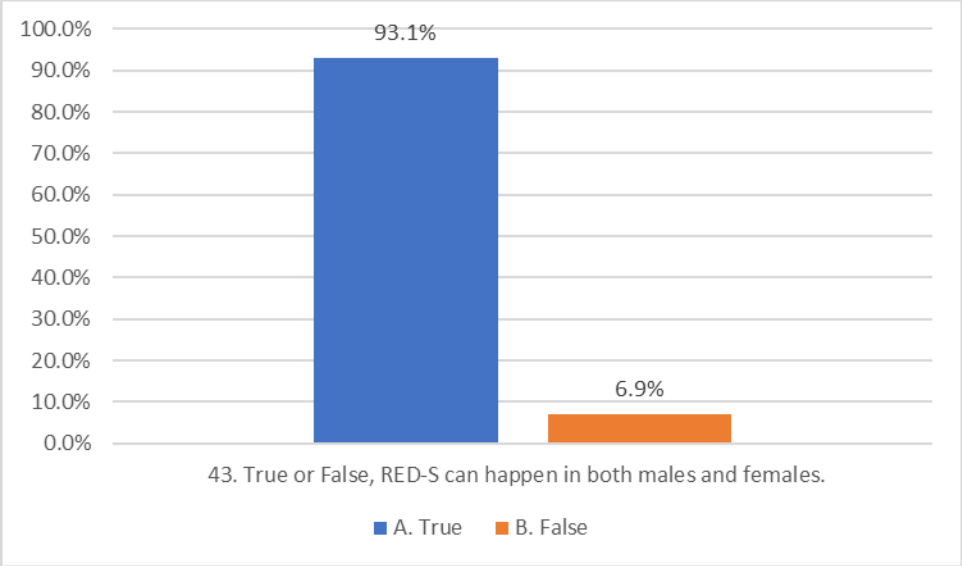
Question 41



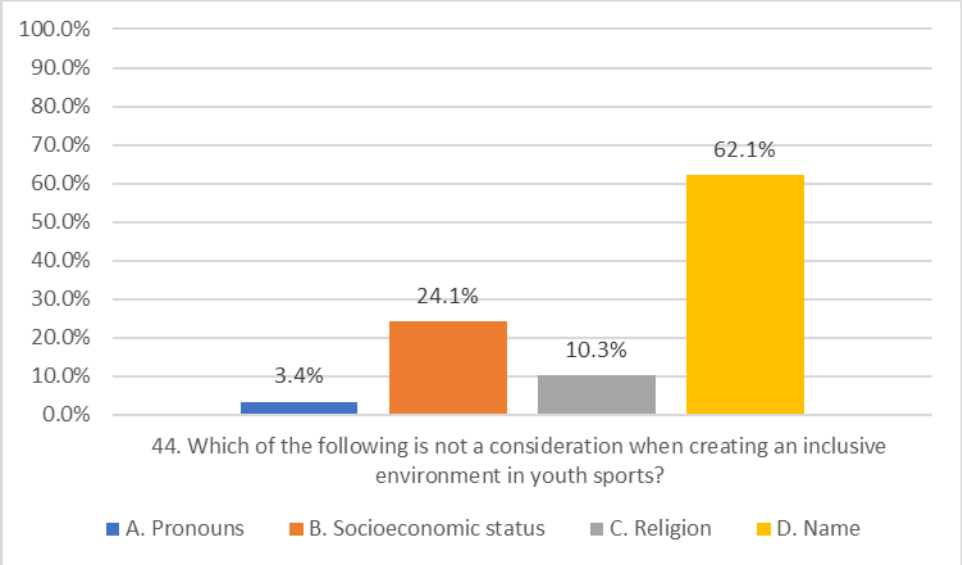
Question 42



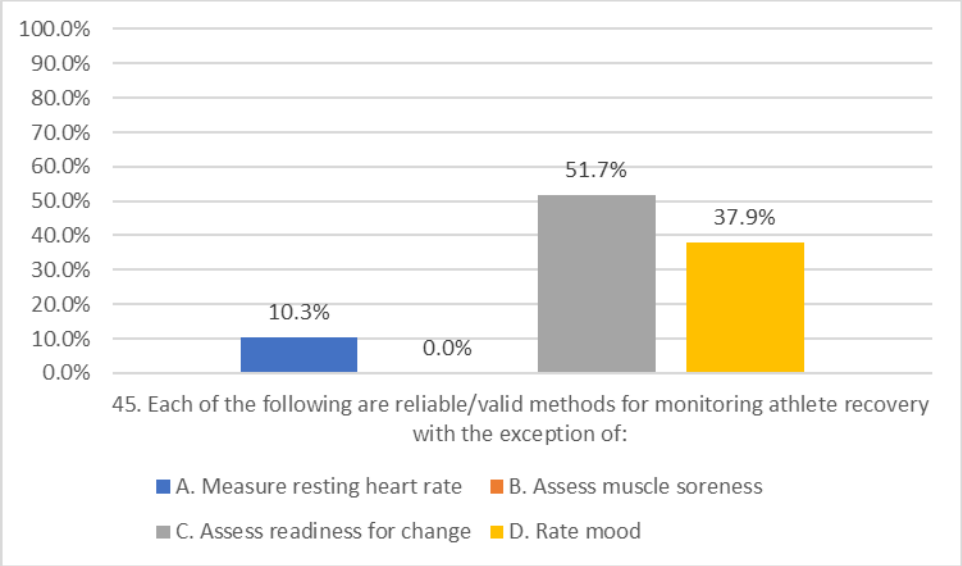
Question 43



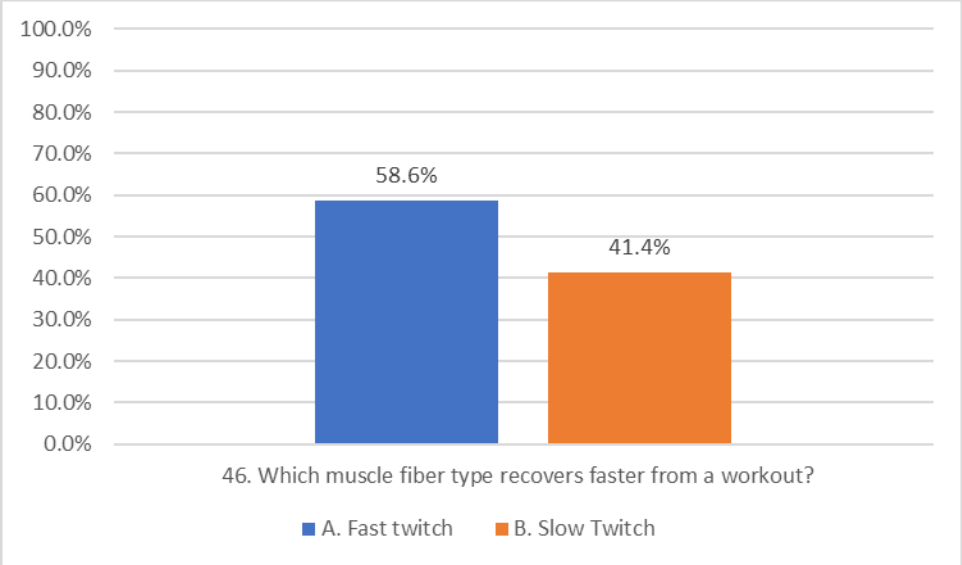
Question 44



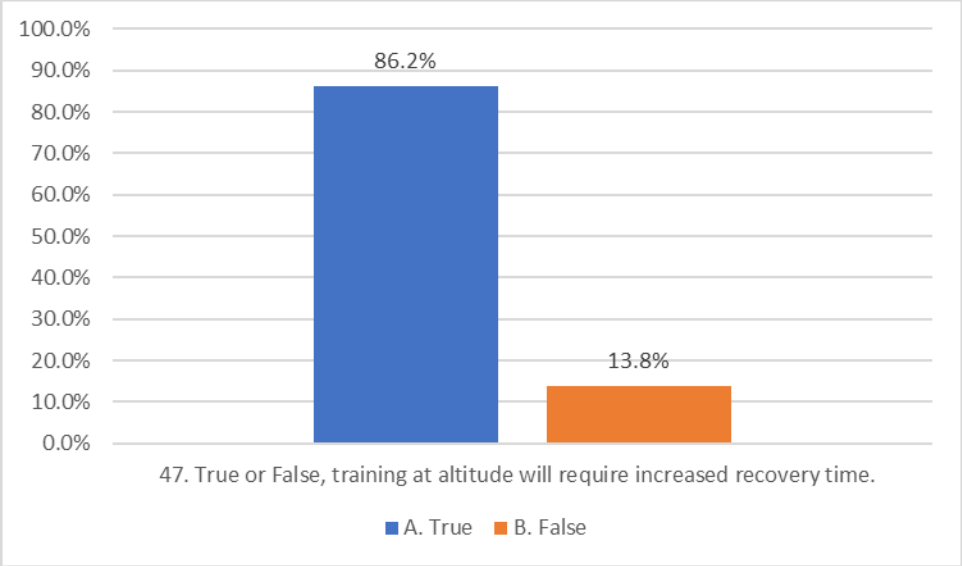
Question 45



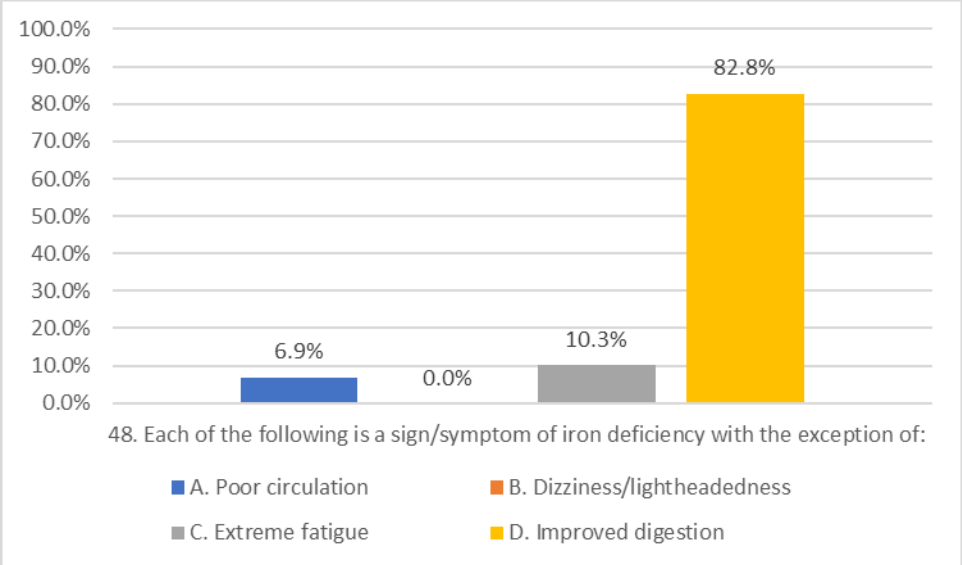
Question 46



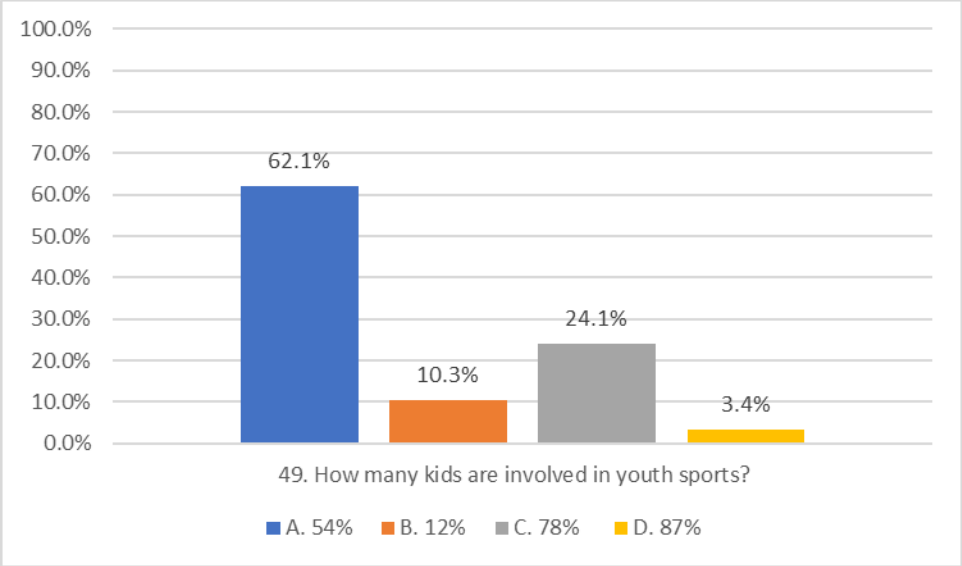
Question 47



Question 48



Question 49



Question 50