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The Effect of Learning Styles on Strength Training Perceptions and Satisfaction

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May 2020

To the Dean of the Graduate School:

We are submitting a thesis written by Shayna Covington entitled THE EFFECTS OF LEARNING STYLES ON STRENGTH TRAINING PERCEPTIONS AND SATISFACTION.

We recommend acceptance in partial fulfillment of the requirements for the degree of Master of Science in Sport and Fitness Administration through the Richard W. Riley College of Education.

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THE EFFECT OF LEARNING STYLES ON STRENGTH TRAINING PERCEPTIONS
AND SATISFACTION

A Thesis

Presented to the Faculty

Of the

Richard W. Riley College of Education

In Partial Fulfillment

Of the

Requirements for the Degree

Of

Master of Science

In Sport and Fitness Administration

Winthrop University

May 2020

By

Shayna Covington

Abstract

Objectives: To examine learning styles and training perceptions in NCAA Division I student-athletes and determine if perceptions of training differ among learning styles.

Participants: The participants of this study consisted of 99 student-athletes from a NCAA Division I university in the southeastern United States during the 2019-2020 school year.

Methods: Data was collected using the online survey system Qualtrics. Learning styles were surveyed using the VARK Questionnaire- Student-athletes Version and training perceptions were collected utilizing the Training Information Survey.

Results: The majority of student-athletes studied identified as predominantly visual learners ($n = 42$). Overall, perceptions of training were positive ($M = 86.09$). There was no significant difference of training perceptions across the learning styles.

Conclusion: Though perceptions of training were not altered by learning style, the learning styles among student-athletes did vary. Coaches can use this information to better develop their instructional methods in a way that can reach all four learning styles.

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Chapter 1: Introduction

According to the National Collegiate Athletes Association (NCAA), student-athletes can spend up to 20 hours a week in-season, and up to eight hours in the offseason practicing, training, and watching film for their sport (NCAA, 2019). In the offseason only two hours of required sports skill work with the sports coach are allowed with the remaining hours typically being spent participating in strength training and conditioning. In the offseason, strength and conditioning coaches can spend up to six hours a week with their student-athletes, so they should work to improve the relationship and effectiveness of his/her time with the student-athletes.

The primary role of a strength and conditioning coach is to enhance performance and reduce injuries (Lee et al., 2013). However, student-athletes want and need different things from a coach (Horn et al., 2011). For example, some student-athletes need auditory feedback almost constantly while other student-athletes prefer very minimal feedback. Though there is no set list of qualifications for strength coaches across all levels, research suggests that effective educational coaching is determined by the technical knowledge of the coach (Svedlak et al., 2015). At the collegiate level, student-athletes spend a significant amount of time with their strength and conditioning coach. At this level, the primary role of training and conditioning is to enhance performance. Ensuring strength coaches understand how to instruct student-athletes across the learning styles would aid in maximizing the quality of training in college athletics where training time is restricted by the NCAA.

Many student-athletes must adapt to different, and sometimes revolving, coaches on the field, court, and in the strength and conditioning environment. Regardless of whether intentional or not, student-athletes will connect with certain coaches better than others. There will be some coaches that present new skills in a manner that makes sense to a particular student-athlete, and other coaches who are not sure why they cannot reach that student-athlete.

Significance of the Study

Individuals have different approaches when it comes to learning (Stevens-Smith, Cadorette, 2012). The idea of learning styles is often applied to education but is rarely mentioned in the strength and conditioning literature. Learning styles refer to the modality in which people prefer to learn, and most often places individuals in one of four categories: visual, auditory, reading, and kinesthetic. Research has found that verbal instruction is the most common form of instruction in both the educational and sport setting (Landin, 1994). However, there is a gap in literature between how learning styles affect students in a classroom and how learning styles affect student-athletes in a strength and conditioning environment.

In education, teachers spend great amounts of time working on instruction preparation to present the same material in multiple different ways to meet the needs of all students, which is known as differentiation. Research suggests that teachers typically lean more towards auditory and visual modes of instruction, or a combination of the two (Pashler et al., 2008). Coaches, on the other hand, are often known for their “coaching style” and typically do not spend as much time on preparing instruction methods.

However, the professional level is the only competitive level in sports that student-athletes are not students. Student-athletes are always going to be looking to improve themselves as student-athletes and the role of a coach is crucial to their success. Coaches who want the best for their student-athletes could benefit from knowing their predominant learning style and work to present information in a way that benefits all student-athletes by utilizing instruction that reaches all learning styles.

Having a better understanding of how student-athletes learn may assist coaches on how to utilize different methods of instruction when teaching a new skill. The idea that student-athletes may not be presented information in a manner which they truly understand may also influence their perception and satisfaction of training. Also, determining whether student-athletes' current strength coaches are meeting their learning style needs could encourage coaches to better develop themselves in order to increase the satisfaction of their student-athletes. The purpose of this study was to determine the learning styles and training perceptions among NCAA Division I student-athletes. Additionally, this study will examine if differences in training perceptions exist among the different learning styles. The results would help determine how coaches should present new skills and exercises in order to reach student-athletes who have different predominant learning styles.

Definition of Terms

For the purpose of this study, the following terms are operationally defined:

1. **Learning style.** Various approaches or ways of learning (Steven-Smith & Cadorette, 2012).

2. **Visual learners.** A learner who receives their primary source of information through their eyes (Owens & Stewart, 2004).
3. **Auditory learner.** A learner who learns best through the use of language including lectures, group discussions, and audiotapes (Dakin, 2002).
4. **Kinesthetic learner.** Learners who learn by doing and process information when given the opportunity to move (Owens & Stewart, 2004).
5. **Reading learner.** A learner who requires information that they can analyze for understanding new movement concepts, principles, plays, skills and strategies (Owens & Stewart, 2004).

Chapter 2: Literature Review

Learning Styles

Learning is a complex process that is still far from being completely understood, however learning styles are not mutually exclusive, meaning they are more so a preferred style of learning (Sharp, 2008; Nancekivell, 2019). The term “learning styles” refers to the concept that individuals differ in the mode of instruction or study is most effective for them (Pashler, 2008). Most learning style theories are “type” theories, meaning individuals are placed into certain groups, rather than assigning people graded scores on different dimensions (Pashler, 2008). Traditionally, there are three main types of learning styles: visual, auditory, and kinesthetic. However, it is important that learning styles are simply a preference and individuals can use multiple different styles even if they prefer one over the others. Flemming and Mills (1992) also present reading as a fourth learning style in their Visual, Auditory, Reading, and Kinesthetic (VARK) model, one of the most common learning style inventories. In education, there is wide acceptance of the idea that instruction should be tailored to a student’s learning style (Rohrer & Pashler, 2012). Some believe that learning styles are predisposed at birth, even though no research has supported this theory. Instead, most research suggests that while a preferred learning style may be evident during childhood, it can change over time (Nancekivell, 2019).

The vast majority of learning style research has been done within the education and instruction environment. Very little research regarding learning styles has been completed within a sports setting or the strength and conditioning environment. Student-athletes are students of their sport, and sports coaches are their teachers. However, since

learning styles are not mutually exclusive, there is a possibility that individuals identify with different learning styles in their sport than they do in a classroom environment (Nancekivell, 2019). The following will provide literature findings on each type of preferred learning style.

Visual. Those who consider themselves visual learners prefer graphical and symbolic ways of representing information (Flemming & Mills, 1992). In a classroom environment these individuals must visualize words in their mind in order to spell them out loud. These individuals also learn best when there are pictures and charts involved in the instruction. In a sporting environment, these student-athletes are likely to require a demonstration of what the skill or movement should look like in order to grasp a new concept. Research has suggested that visual perception is probably the most important source of information when performing sports skills. However, a coach cannot assume that a player, especially a beginner, will know what to watch. To accommodate the visual learner coaches should enhance verbal communication with written words, diagrams, and videotapes (Owens & Stewart, 2004).

Auditory. Auditory learners have a strong preference for “heard” information, and they learn best from lectures, tutorials, and discussions with other students and faculty (Flemming & Mills, 1992). These individuals rely on language to learn and need to have opportunities to talk about what they are learning so they can share thoughts, repeat directions, and verbalize cues for others in the group. Student-athletes who are auditory learners focus on sound and rhythms to learn new movement patterns as well as verbal descriptions of the movement (Owens & Stewart, 2004). Not only will knowing the

learning styles of student-athletes allow coaches to instruct them better, but this information can also aid in finding these student-athletes a position that allows them to really hear the game going on around them. For example, auditory learners may need to be in the middle of the field or court so they are able to hear what is taking place on both sides of the field/court, allowing them to communicate that information to each other and even the other student-athletes on the field (Stevens-Smith & Cadorette, 2012).

Reading. The reading learning style is the least dominant learning style in sports, however there are student-athletes who need some information presented in this way (Dunn, 2009). Much like the auditory learners, these individuals rely heavily on thought provoking discussion. Other inventories refer to those who prefer this style of learning as the “thinker”, which has been best described as a movement scientist (Coker, 1996). These individuals require information they can analyze in order to best understand plays, skills, principles, and strategies (Owens & Stewart, 2004). Research suggests that coaches should provide evidence of success through an analysis of previous performances as one of the best ways to connect with these student-athletes on an intellectual level (Dunn, 2009).

Kinesthetic. From the limited body of research on student-athletes and preferred learning styles, kinesthetic learners make up the largest percentage of learners in athletic settings (Dunn, 2009). Kinesthetic learners prefer to learn by doing, and information is processed and learned when the performer is provided with an opportunity to move (Owens & Stewart, 2004). Although kinesthetic learners are frequently at a disadvantage in the classroom, they are in their element in sport (Dunn, 2009). Not only do these individuals

need to move, they need to know what the correct movement feels like (Stevens-Smith & Cadorette, 2012). Student-athletes who are kinesthetic learners feel they need to repeatedly practice their skills (Stevens-Smith & Cadorette, 2012). Coaches can teach and use kinesthetic learners in important ways by having student-athletes walk through a play as a demonstration for others which provides visual instruction to the team while creating good foundational knowledge for the kinesthetic student-athlete (Dunn, 2009). Demonstrations offer the student-athlete visual pathways to the kinesthetic learning that translates to correct execution of a skill or technique (Williams et al., 2017).

Multimodal. In addition to the four categories of preferred learning, there can also be learners with more than one learning style (Kai, 2019). Learners with multiple modalities represented in their learning style profile provide a great challenge and reward for coaches (Dunn, 2009). While these student-athletes can grasp information presented in multiple learning styles, they also need information to be presented in multiple learning styles. While multimodal student-athletes may be very successful when a coach presents information in multiple ways consistently, they may really struggle when one of the styles they rely on is not being utilized at all. The research suggests this is common among student-athletes (Kai, 2019). However, most student-athletes who are multimodal learners typically always present with kinesthetic propensity (Kai, 2019). The critical lesson for coaches regarding multimodal learners is to develop consistent instructions that carry across all four modalities (Dunn, 2009).

Literature on Coaching and Instruction

A coach can be referred to as an athletic instructor or trainer, but a coach is really a teacher in a different setting. However, there is a cultural perception that coaches are not teachers because of the higher value placed on sport, as opposed to education (Drewe, 2000). When student-athletes do not feel they learn from their coaches, they consider the coaching to be poor. The term coach not only refers to the sports coach who teaches and helps an student-athlete in skills directly to their sport, but also the strength and conditioning coaches who help support sports coaches and their student-athletes. Research suggests that student-athletes reported that poor coaches were not good at teaching, therefore did not provide useful instruction and did not individualize their teaching to fit the unique needs of each student-athlete (Gearity, 2012). The same can be seen in an education setting when teachers are not presenting information in a way that allows efficient learning for all students.

The research implies that students and student-athletes learn best when teaching and learning style match (Stevens-Smith & Cadorette, 2012). In a study that compared physical education teachers and sport coaches, student-athletes perceived that coaches provided instruction and training more often than the physical education teachers (Ayers, 2011). This may be due to the greater number of individuals that the physical education teachers must instruct at one time. However, student-athletes also reported that their coach provided more positive and specific feedback than their physical education teacher (Ayers, 2011). Though competition adds an aspect to sport that is not present in education, there are many commonalities between sport and education that have significant implications for coaching and teaching (Drewe, 2000).

Feedback. During a game or match sports coaches are not on the field their student-athletes, they are often yelling commands and giving feedback from the sideline. The strength and conditioning coach plays an even smaller role on gameday, as “gameday” takes place in the weight room or during a conditioning session. Coaches of all kinds are always looking for ways to better communicate with their student-athletes and one way this happens is with different types of feedback. Inherent feedback is information the body receives through the senses. For example, a runner with a lot of experience may be able to feel when their running posture is poor and adjust accordingly. Augmented feedback is from an external observer, and in athletics, this is typically a coach or another student-athlete and is common between the instructor and learner when it comes to learning a skill (Hasan & Aris, 2010).

Different types of feedback appeal to different types of learners. Kinesthetic learners rely very heavily on inherent feedback while auditory, visual, and reading learners rely more heavily on augmented feedback (Hasan & Aris, 2010). Auditory and visual feedback are the most common forms of augmented feedback that coaches use (Eriksson et al., 2011). Visual feedback can either consist of a demonstration or a recording of the student-athlete performing the skill. Auditory feedback usually consists of being told what to change. An example of this would be a strength and conditioning coach explaining to a student-athlete the correct form of a squat by giving verbal instructions. Both forms of feedback appeal differently to the different types of learners. In a study comparing visual and auditory feedback to adapt running technique, the auditory feedback had better results on the runner’s technique. However, as mentioned in

the study, the researchers did not consider the learning styles of the student-athletes possibly having an effect on the results (Eriksson et al., 2011).

Cueing. Within the realm of coaching, communication typically consists of verbal instructions, cues, and feedback (Benz et al., 2016). Coaches often use the terms instruction, cues, and feedback interchangeably; however, they are different. Cues are concise phrases, typically just one or two words, that are meant to direct attention to a relevant task, or prompt a key movement pattern within a motor skill (Landin, 1994). For example, a baseball would cue a student-athlete to “follow through” on their swing. A cue is a brief type of communication that can mean something more specific. Every strength and conditioning coach has their own set of cues they use with all of their student-athletes. Whether it be “chest up” or “hips back” their student-athletes know what these short phrases mean, however these auditory cues may only be reaching those student-athletes who classify as auditory learners.

While most cues are verbal appealing to the student-athletes who rely heavily on auditory learning, Pinto and colleagues (2017) studied the effect of tactile cues in changing movement during weightlifting. Tactile cues are sensory information used to change how people move. Their research suggests that tactile cues can provide vital feedback information when used to cue human lumbar spine movement during repeated lifting and lower weightlifting tasks. Lifting objects with high magnitudes of trunk flexion can increase the risk of developing lower back pain. This type of cueing proved to be effective in reducing lumbar flexion during lifting even after the tactile cue was removed (Pinto et al., 2017). This form of tactile cueing would likely appeal to the

kinesthetic learners who need to feel the “right way” to perform a movement to truly understand how to make the needed adjustments.

Coach-student-athlete relationships. Communication plays a major role in developing positive coach and student-athlete relationships. For strength and conditioning, coach's communication can take place when teaching a new skill or movement, to correct a movement with cues and feedback, or even praise for an student-athlete doing a movement well. It is important to remember communication does not have to be verbal and it could simply be a demonstration, a high-five, or even the coaches body language. While all coaches have their preferred way of teaching new skills and movements, they should also be aware that their student-athletes also have preferred ways of learning. With communication playing an important role in instruction as well as coach-student-athlete relationships one may very well affect the other. Research suggests that in order to develop a positive team culture, the coach and student-athlete relationship must be at the foundation of all coaching (Camire et al.,2019). These positive coach and student-athlete relationships have been shown to aid in meeting the psychological needs of the student-athletes (Camire et al., 2019). While there is no one-size fits all approach to coaching, all student-athletes have their preferred coaching styles and preferred forms of feedback. When coaches meet their student-athletes desired coaching behaviors research suggests that then maximum performance and student-athlete satisfaction can be achieved (Horn et al., 2011).

Coaching and Learning within Strength and Conditioning

At the collegiate level, student-athletes not only develop strong relationships with their sports coaches they also develop relationships with their strength and conditioning coaches as well. A student-athlete's relationship with a strength and conditioning is separate from that student-athlete's relationship with his/her sports coach in that the time spent with each is generally different. The strength and conditioning coach's focus is to develop strength, speed, endurance, and power, while the overall role of strength and conditioning coach is to enhance athletic performance and reduce athletic injury (Lee et al., 2013). While strength coaches spend fewer hours with student-athletes during the regular season than sport coaches do at the collegiate level, positive and meaningful can be formed, especially during the off-season when time spent with the strength and conditioning coach is likely greater than that spent with the sports coach. Instruction, technical knowledge, and feedback have proven to be essential in delivering effective strength and conditioning (Lee et al., 2013). However, more recent research suggests that trust, respect, motivation, and inspiration are equally as important to student-athletes (Svedlak et al., 2015).

Perceptions of Strength Coaches. Research suggests that elite student-athletes find having a good relationship with their strength and conditioning coach as an integral part of their performance success (Foulds et al., 2018). Positive coaching behaviors have shown to improve perceptions of strength and conditioning coach and student-athlete compatibility in both male and female student-athletes (Lee et al., 2013). These positive coaching behaviors differ between genders, male student-athletes focused on the technical knowledge and instruction, whereas female student-athletes focused on respect,

motivation, and inspiration provided by their strength and conditioning coach (Svedlak et al., 2015). While this suggests that instruction is important, it does not say that a strength coaches' instructional methods are the most important piece when it comes to an student-athlete's perceptions of their strength and conditioning coach.

Perceptions of Training. Research findings continue to be produced on the benefits of strength training however, participation among the general population, specifically females remain low (Zach & Adiv, 2016). At the collegiate level, student-athletes have very little choice as to whether they participate in strength training or conditioning, it is a part of what they agreed to when committing to play at an elite level. While the main roles of strength and conditioning coaches is to increase athletic performance and reduce injuries, they must also get their student-athletes to “buy-in” to their programs and methodologies similar to sport coaches. If a student-athlete does not have a positive perception of training, increases in performance are less likely. Recent research suggests that obtaining information on training perceptions is important to the development of programs for student-athletes that best fit their individual needs and performance goals (Boyd et al., 2017).

A bigger issue seems to arise when looking at the intensity of training. Studies suggest coaches often underestimate the intensity of training perceiving a training session to be easier than what the student-athletes feel. Players perceive their intensity and training load as significantly harder than what was intended by their coaches which can lead to more negative perceptions of training (Brink et al., 2014). As a strength and conditioning coach, it is important to gain feedback from student-athletes on their

perceptions of a training session to ensure the training session matched the intent. By doing so, perceptions of training among collegiate student-athletes will be more positive allowing the strength and conditioning coach to focus on their role of increasing performance and reducing athletic injuries. Communication is a key component of the strength and conditioning coach and student-athlete relationship with that communication including instruction. When different teaching methods cater to specific learning preferences this can motivate student-athletes to learn and ultimately influence their performance in a positive way (Kai, 2019).

Summary

With the influence that strength and conditioning coaches have on student-athletes, these coaches should have all the tools necessary to be able to coach all their student-athletes successfully. While technical knowledge and experience are important, if information is not being presented in a way that benefits all student-athletes, some student-athletes may not benefit from their coaching. Educating coaches on the learning styles of their student-athletes may not only improve their coaching, but also increase training perceptions and satisfaction among these student-athletes.

Chapter 3: Methods

This study was designed to examine learning styles of NCAA Division I student-athletes, perceptions of strength training, and to determine if learning styles affect their perceptions of strength training. This study used an internet-based survey from a volunteer sample of collegiate student-athletes at one southeastern university in the United States. Questionnaires included 56 total items which assessed learning styles and perceptions of training. Additionally, questionnaires measured demographic information, including age, gender, race, year in school, sport, and major.

Purpose

The purpose of this study was to examine the d between learning styles and perceptions of training in a strength and conditioning environment. In accordance with Winthrop University policies, the study was submitted and approved by the Institutional Review Board for the use of human subjects prior to data collection.

Research Question

In order to examine the relationship between learning styles and training perceptions the following research questions were addressed:

1. Do student-athletes rely on certain learning styles to learn in the strength and conditioning environment?
2. Does a student-athletes' learning style affect their perception of strength training?

Participants

Data was collected from student-athletes attending a mid-major university in the southeastern United States during the spring 2020 semester via an internet-based survey. A questionnaire assessed student-athletes predominant learning style as well as their perceptions of training. Additionally, the questionnaire assessed demographic information, including, age, gender race, year in school, and sport played.

Inclusionary and exclusionary criteria for this study are listed next.

Inclusion criteria:

1. College student-athletes who attended Winthrop University during the 2019-2020 academic year.
2. College student-athletes who were at least 18 years of age.
3. College student-athletes who agreed to complete the survey.

Exclusion criteria:

1. College student-athletes who did not attend Winthrop University during the 2019-2020 academic year.
2. College student-athletes who were younger than 18 years of age.
3. College student-athletes who did not agree to take the survey.

Instrumentation

Assessments for this study were conducted through a popular online survey and assessment tool, Qualtrics (Provo, UT). Qualtrics allows researchers to create questions based on type and customize the survey to meet the needs of the project. Qualtrics also allows the researchers to define the rules for skip logic patterns, which is a feature that changes what question or page a respondent sees next based on how a previous question was answered. Skip logic was applied to questions regarding age and student-athlete status. If the participants were not at least 18 years of age and a current student-athlete at the university, they were taken to the end of the survey. Time to complete the survey was approximately 10 minutes.

Demographics information was collected at the beginning of the survey and consisted of six self-report items sections including age, race, gender, sport, major, and year of athletic eligibility.

The VARK Questionnaire – Student-athletes Version was used to determine the predominant learning style of each student-athlete (Bonwell & Fleming, 2001), and included 13 multiple choice questions. Example items included scenario-based questions such as “you have a knee injury; which statement best describes your preference of the doctor or athletic trainer,” and “you are about to learn a new statistical program on a computer, you would....” Participants then selected the option they would most likely do based on each statement. Learning styles were then determined by categorizing the answer choices to one of the four learning styles and determining which learning each participant reported most often. In this study, the reliability was $\alpha = .31$.

Perceptions of training were collected using the Training Information Survey (Poiss, et al., 2004). The Training Information Survey was designed to gather individual perceptions on general sport conditioning and weight training, and the importance of weight training to sport-specific training. As rated by professionals in the field of exercise science, this instrument demonstrated both content and criterion related evidence supporting its face validity (Poiss, et al., 2004). The survey gathered basic weight training and sport-specific training information, including perceptions of the importance of weight training for both traditional and nontraditional seasons of participation. This questionnaire consisted of 21-items regarding perceptions of training, and included statements such as “strength training helps me feel better mentally” and “strength training is essential to my overall development as an student-athlete.” Responses were scored on a 5-point Likert-scale and ranged from strongly disagree (1) to strongly agree (5). Items were summed for a total score. Total scores range from 20 to 100, with higher scores indicating more positive perceptions of training. Reliability for this instrument was $\alpha = .83$ for this study.

Procedures

Before recruiting any participants for this study, Institutional Review Board approval was attained. An email was sent to the associate athletic director of a small, mid-major Division I university in the southeast to gain permission to conduct research on student-athletes. After permission was granted from the deputy athletic director, each head sports coach was made aware of the study via email. The compliance director was asked to send an email out to all student-athletes that consisted of the informed consent as

well as the link to the Qualtrics survey. Student-athletes were given a two-week window to complete the survey and were reminded of the survey twice a week when their team was scheduled to be in the weight room. The survey took approximately 10 minutes to complete.

Statistical Analysis

Once the surveys were completed the data was entered into a Statistical Package for Social Sciences (SPSS). Descriptive statistics and frequencies were calculated for the demographic information, learning styles, and perceptions of training. Learning styles were categorized into predominant learning styles based on responses to the VARK Questionnaire-Student-athletes Version. Perceptions of training were then analyzed using the mean score from all responses. A one-way Analysis of Variance (ANOVA) was used to analyze the strength training perceptions to the different categories of learning styles.

Chapter 4: Results

A total of 125 participants began the student-athlete survey, 4 which were excluded for not meeting the requirement of being a student-athlete at the university. Twenty-two participants were excluded due to the high amount of missing data. Ninety-nine participants completed the VARK Questionnaire-Student-athletes Version piece of the survey for analysis of learning styles and 91 completed enough of the survey for perceptions of training data. As seen in Table 1, the majority of the participants were female and Caucasian, with the greatest number of completed surveys coming from lacrosse. Responses from all eleven of the university's sports were collected.

Learning Styles

Of the 99 participants who completed the learning styles questionnaire 40.4% (n=40) classified as visual learners, 22.2% (n= 22) as auditory learners, 13.1% (n=13) as reading learners, 2.02% (n=2) as kinesthetic learners, with the remaining 22.2% (n=22) classifying as multimodal. Multimodal refers to responding to the items equally in at least two of the categories.

Perceptions of Training

The perceptions of training results are presented in Table 2 which showed positive perceptions of training for the sample with a mean score of 86.09. The highest score of the sample was 98 with the lowest being 56. There was no significant difference in training perceptions across the learning styles which can be seen in Table 3.

Chapter 5: Discussion

The purpose of this study was to evaluate predominant learning styles in NCAA Division I student-athletes and determine if those learning styles affected strength training perceptions. Though the predominant learning style among athletes was predicted to be kinesthetic found that the majority of participants (40.4%) classified as visual learners while only 2% identified as kinesthetic learners. Overall perceptions of training were positive ($M = 86.09$) suggesting the student-athletes are knowledgeable of strength training as Zack & Adiv (2016) found the more knowledgeable athletes were on the topic of strength training the more positive their perceptions of strength training. Learning styles have been found to impact satisfaction and perceptions in education which is why perceptions of training were analyzed across the learning styles (Kai, 2019). While there was no significant difference among the groups regarding training perceptions, a larger sample size may indicate a difference in perceptions of training across the learning styles.

Visual perception has been noted as the most important source of information in sports (Stevens-Smith & Cadorette, 2012), this likely explains why so many of the participants in our study were classified as visual learners. However, this does not explain why many other studies have found the majority of student-athletes to be kinesthetic learners (Dunn, 2009; Owens & Stewart, 2004). With visual information being the most important source of information in sports, it is possible student-athletes may have adapted to visual instruction over time, but this does not explain why this idea of adaption is not seen in other research. It is important to remember learning styles can differ depending on the environment, meaning a student-athletes learning style in the classroom may be

different than their learning style in a sports setting. According to Dekker and colleagues (2012) matching instruction to learning style positively affects learning which is an important reason for strength and conditioning coaches to know and understand the learning preferences of their student-athletes.

Previous research discussing learning styles in sport found that other than multimodal learners, kinesthetic learners make up the largest percentage of learners in athletic settings (Dunn, 2009). In this study, the majority of student-athletes in this study were classified as visual learners and only two participants being classified as predominantly kinesthetic learners. The VARK Questionnaire- Student-athletes Version asked student-athletes to respond to questions as to what they think they would do in certain situations which may be different than what they would actually do, which may explain why there were so few kinesthetic learners. There has been no previous research on the role of learning styles in the strength and conditioning environment, as much of the research on learning styles of student-athletes has been done in a sports setting. Previous research within the sports setting suggests that individuals want and need different things from their coach which can refer to relationships, communication, and even instruction (Horn et al., 2011).

Though the results comparing training perceptions across the learning styles were not significant, this study found that the majority of participants had positive perceptions of training ($M = 86.09$). To strength and conditioning coaches, this information should be encouraging, it suggests that the student-athletes understand the importance of training in order to improve performance and find it in some way beneficial to them as student-

athlete. However, there were responses with much lower scores, suggesting some student-athletes have more negative perceptions of training. This should remind strength and conditioning coaches that there is no one size fits all model when it comes to coaching student-athletes (Lee et al., 2013). These student-athletes may be struggling to grasp the information being provided by the strength staff or there could be many other reasons for negative perceptions of training. The lower scores may also represent those student-athletes who do not have a lot of knowledge regarding strength and conditioning as the research suggests those who have more knowledge of strength and conditioning tend to have higher perceptions of training (Zack & Adiv, 2016). Regardless of the reason, the information provides strength and conditioning coaches with an opportunity to better educate their student-athletes on not only the physical and psychological benefits of training. While perceptions of training do not directly speak to satisfaction with the instructional methods of strength and conditioning coaches, this information does suggest that student-athletes are pleased with their training experience. Although the student-athletes' who were studied have relatively positive perceptions of training it is still unclear if coaches are meeting the learning style needs of their student-athletes or if the student-athletes are adapting to the instructional methods of their strength and conditioning coaches suggesting a need for further research.

Strengths and Limitations

This is the first study to examine learning styles of student-athletes in the strength and conditioning environment, providing a foundation for future research. Previous research on learning styles addresses the different types of learning in the educational and

sports setting. This research provides grounds for future research on the topic of learning styles in the strength and conditioning environment while also demonstrating a mostly positive perception of training amongst the student-athletes. Participants in this study participated in a variety of different sports and there were student-athletes from different years.

Limitations of this study may include that a self-report survey was used and the timeline to collect data was roughly two weeks, limiting the number of responses. This research could have benefited from a larger sample size, as there were not enough results to find any significant variation among perceptions of training for different learning styles. Learning disabilities, which may affect learning styles, were also not taken into consideration. The Coronavirus pandemic (COVID-19) is a limitation of history as this study was started and completed in the spring of 2020, when NCAA canceled spring sports championships and student-athletes were no longer on campus likely limiting the number of survey responses. Finally, the reliability of our VARK questionnaire was low, indicating that those that completed the survey may not have fully read or understood the questions.

Future research on learning styles in the strength and conditioning environment should look to determine if the alignment of student-athletes learning styles and the strength and conditioning coach's instruction methods positively influences the student-athlete's perception of strength training. Further research may also address the most common learning styles in individual sports as well if the effect of learning styles on training perceptions varies between genders and other demographics.

Practical Application

Previous research suggests that there is no one size fits all model when it comes to coaching (Lee, Magnusen, & Cho, 2013). It is important for coaches at all levels to understand that all student-athletes do not learn the same, therefore information may need to be presented in multiple different ways to a group of student-athletes. Strength and conditioning coaches spend a significant amount of time with their student-athletes, sometimes more than the actual sports coach so it is equally as important for them to understand the preferred learning styles of their student-athletes as well be aware that all student-athletes do not have a positive perception of strength training and do their best to reach all student-athletes on the same level. Student-athletes with low perceptions of training may have a strength and conditioning coach that does not present information that corresponds with his/her learning style making training more of a negative experience. In addition, the coaches teaching style may not be the issue, there could be other underlying issues as to why they perceive their training experience as negative. No matter the reason the strength and conditioning coach should try his/her best to create a positive training experience for his/her student-athletes. Strength and conditioning coaches can use their understanding of learning styles to better prepare how they are going to work with all student-athletes, especially those with whom that they struggle to develop a positive coach-student-athlete relationship. This information may push strength and conditioning coaches outside of their comfort zone because it encourages them to try new methods of instruction.

Conclusion

The way strength and conditioning coaches present information to their student-athletes should address all four different learning styles. Though perceptions of training were not altered by learning style, the learning styles among student-athletes did vary. Coaches can use information to better develop their instructional methods in a way that can reach all four learning styles. Based on the research the strength and conditioning coaches are doing their part to create a positive training experience for their student-athletes regardless of their learning style.

Table 1

	n	%
Gender		
Male	27	27.3
Female	72	72.7
Age		
18	19	19.2
19	20	20.2
20	20	20.2
21	28	28.3
22	10	10.1
23	2	2.0
Year in school		
Freshman	27	27.3
Sophomore	25	25.2
Junior	23	23.3
Senior	23	23.2
Graduate Student	1.0	1.0
Race/ethnicity		
White	76	76.8
Black	16	16.2
Asian	1	1.0
Native Hawaiian/ Pacific Islander	1	1.0
Other	5	5.1
Sport		
Baseball	4	4.0
Basketball	4	4.0
Cross Country	5	5.1
Golf	8	8.1
Lacrosse	21	21.2
Soccer	18	18.2
Softball	8	8.1
Tennis	6	6.1
Track (sprinters)	14	14.1
Track (throwers)	4	4.0
Volleyball	9	9.1

Note: n= number of participants, %= percent of participants

Table 2**Perceptions of Training Among NCAA Division I Athletes**

N	
Valid	91
Missing	8
Statistics	
Mean	86.0879
Median	87.0
Standard Deviation	6.71259
Range	42.0
Minimum	56.00
Maximum	98.00

Note: n=number of participants

Table 3

Perceptions of Training by Learning Style

	n	Mean	Minimum	Maximum
Visual	42	84.9762	56.00	98.00
Auditory	22	86.5909	60.00	94.00
Reading	13	87.5385	82.00	93.00
Kinesthetic	2	91.0000	88.00	94.00
Multimodal	12	86.6667	72.00	94.00
Total	91	86.0879	56.00	98.00

Note: n=number of participants

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Appendix A

Dear Student-athlete,

We are surveying Division I student-athletes to evaluate the effects of learning styles on strength training perceptions and satisfaction. Therefore, we ask for your help to spend approximately 10 minutes of your time to complete the survey. The only criteria are that you must be 18 years of age and a student-athlete at Winthrop during the 2019-2020 academic year. This information will be used to determine whether or not learning styles have an impact of strength training perceptions and satisfaction.

Your assistance is greatly appreciated. Please complete the survey in the link below by February 29th.

Sincerely,

Shayna Covington, CSCS

Appendix B

Thesis Student-athlete Survey Q1 You are invited to take part in a research study whose purpose is to examine learning styles and perceptions of training in NCAA Division I student-athletes. Specifically, the study will evaluate preferred learning styles and determine if this preference relates to perceptions of training. This study is open to adults over the age of 18. Your decision to take part in this study is voluntary. You are free to choose whether or not you will take part in the study. Even if you decide to participate now, you may change your mind and stop at any time. You may choose not to answer an individual question, or you may skip any section of the survey. Simply click “Next” at the bottom of the survey page to move to the next question. Your participation will last about 10 minutes and you will be completing an anonymous online survey. This project is deemed as no more than minimal risk. The research team does not foresee or anticipate any risk greater than that encountered in your routine daily activities. While you may not receive any direct benefit for participating, we hope that this study will contribute to the growing field of strength and conditioning. A number of studies have been done on learning styles in an educational setting however, there is little research on learning styles in the strength training environment and even fewer look at the correlation between learning style and perceptions of training. If you are interested in learning the results of the study, you may contact the researchers after April 30th. Your cost to participate in the study is the time that you will dedicate to this activity. Researchers will make no attempt to link your survey responses to you. We may publish the results of this study, but will not include any information that would identify you.

If you have questions about this research study, you may contact me Shayna Covington via email at covingtons5@mailbox.winthrop.edu.

You may also contact me through my faculty advisor Joni Boyd at boydj@winthrop.edu or 803-323-4936.

You may also contact: Grants and Sponsored Research Development Winthrop University Rock Hill, SC 29733 Telephone: 803-323-2460

The Winthrop University Institutional Review Board has determined that this study is exempt from IRB oversight. By clicking on “Yes, I agree to participate,” you agree that you have read this informed consent agreement, you understand what is involved, and you are consenting to participate in this research study. If you do not wish to participate, select “No, I do not wish to participate” to exit the survey.

Yes (1)

No (2)

Q2 How old are you?

- 17 or younger (1)
- 18 or older (2)

Skip To: End of Survey If How old are you? = 17 or younger

Q3 Are you a current student-athlete at Winthrop University?

- Yes (1)
- No (2)

Skip To: End of Survey If Are you a current student-athlete at Winthrop University? = No



Q4 What is your current age? Please use whole numbers.

Q5 What is your gender?

- Male (1)
- Female (2)

Q6 How would you describe yourself?

- African American (1)
 - American Indian or Alaska Native (2)
 - Asian (3)
 - Native Hawaiian of Pacific Islander (4)
 - White (5)
 - Other (6)
-

Q7 What year would you consider yourself in your athletic career at the time you are completing this survey?

- Freshman (1)
 - Redshirt Freshman (2)
 - Sophomore (3)
 - Redshirt Sophomore (4)
 - Junior (5)
 - Redshirt Junior (6)
 - Senior (7)
 - Redshirt Senior (8)
 - Graduate Student (9)
-

Q8 What sport do you play? (select all that apply)

- Baseball (1)
 - Basketball (2)
 - Cross Country (3)
 - Golf (4)
 - Lacrosse (5)
 - Soccer (6)
 - Softball (7)
 - Track (sprinters) (8)
 - Track (throwers) (9)
 - Volleyball (10)
-

Q9 Who is your strength and conditioning coach for the semester in which you are completing this survey?

- Ben Abbott (1)
 - Shayna Covington (2)
 - Eli Foy (3)
 - Natalie Kamerer (4)
-

Q10 Are you a transfer student?

- Yes (1)
 - No (2)
-

Q11 What is your major?

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Break

Q12 You will now answer a series of questions based on your learning style. The questions will ask about different scenarios. Please choose the answer which is MOST likely for you in that particular situation.

Q13 You are about to give directions to an student-athlete who is standing with you. The student-athlete is new to town and needs to get to the athletic complex. The student-athlete has a bike. Which statement best describes how you would assist the student-athlete?

- draw a map on paper (1)
 - tell him/her the directions (2)
 - write down the directions (without a map) (3)
 - bike with them to the complex. (4)
-

Q14 You have just been told you have a chronic injury. You would like to get more information, but are not sure whether a word should be spelled 'tendonitis' or 'tendinitis'. Which answer best describes your next move?

- look it up in the dictionary. (1)
 - see the word in my mind and choose by the way in looks. (2)
 - sound it out in my mind. (3)
 - write both versions down on paper and choose one. (4)
-

Q15 You have just received a copy of your itinerary for an upcoming athletic trip. The itinerary is of interest to a friend. You would:

- phone him/her about it and tell him/her about it. (1)
 - send him/her a copy of the printed itinerary. (2)
 - show him/her on a map of the region. (3)
 - share what the team plans to do at each location. (4)
-

Q16 You are going to make a fruit smoothie for a pre-practice snack. You would:

- mix some familiar food items without the need for instructions. (1)
 - thumb through the blender cookbook looking for recipes. (2)
 - refer to a specific cookbook where there is a good recipe. (3)
-

Q17 You have been assigned a group of international student-athletes that want to learn about campus life. You would:

- walk them around campus. (1)
- show them a photograph slide show of campus. (2)
- give them pamphlets or the campus handbook. (3)
- give them a talk about life on campus. (4)

Q18 You are the team captain. The coach has asked you to put together a collection of songs for a warm-up tape. What would most influence your decision to include a song on the tape?

- My teammates told me I should include it. (1)
 - I read the song lyrics and thought they would be great. (2)
 - I played a little bit of each song to see how it sounded. (3)
 - The album cover design is cool. (4)
-

Q19 Recall a time in your life when you learned how to keep the official score (in a scorebook or stat sheet) for your particular sport. Which choice best describes how you learned?

- visual clue -- pictures, diagrams, charts (1)
 - written instructions. (2)
 - listening to somebody explaining it. (3)
 - doing it or trying it. (4)
-

Q20 You have a knee injury. Which statement best describes your preference of the doctor or athletic trainer?

- I would like to be told what was wrong. (1)
 - I would like to be showed a diagram of what was wrong. (2)
 - I would like the doctor or athletic trainer to use a model to show me what was wrong. (3)
-

Q21 You are about to learn to use a new statistic program on a computer. You would

- sit down at the keyboard and begin to experiment with the program's features. (1)
 - read the manual which comes with the program. (2)
 - telephone a friend and ask questions about it. (3)
-

Q22 You are on the road with an athletic team. You are staying in a hotel and have use of the team van. You need to head over to the athletic complex earlier than the rest of your teammates, but you don't know the address or location. You would like someone who has been there before to:

- draw me a map on paper. (1)
 - tell me the directions. (2)
 - write down the directions (without a map). (3)
 - drive me to the complex in the team van. (4)
-

Q23 There is a book out on innovative game strategies for your particular sport. Besides price, what would most influence your decision to buy the book?

- you have used a copy before. (1)
 - you overheard your coaches discussing the book at practice. (2)
 - quickly reading parts of it. (3)
 - the way it looks is appealing. (4)
-

Q24 An opponents game film has arrived in the athletic offices. What would most influence your decision to watch (or not watch) the game film?

- I heard my teammates critiquing it. (1)
 - I saw the box score and stat sheet and wanted to see the game. (2)
 - I saw parts of it when I was in my coach's office. (3)
-

Q25 You prefer a coach who likes to teach a new game by:

- using a playbook and/or handouts. (1)
- mapping it out on the whiteboard. (2)
- using practical skill and technical sessions. (3)
- by bringing in an expert position coach to teach it. (4)

Page
Break

Q26 The next set of questions will ask about your perceptions of your strength and conditioning program that you are in currently. For the first statement, please select the option that best fits your opinion from extremely unsatisfied to extremely satisfied.

	Extremely dissatisfied (1)	Somewhat dissatisfied (2)	Neither satisfied nor dissatisfied (3)	Somewhat satisfied (4)	Extremely satisfied (5)
Overall, how satisfied are you with your current strength and conditioning coach? (1))))))

Q27 For each of the following statements please select the option that best fits your opinion from strongly disagree to strongly agree. Do not spend too much time on any statement, and answer how you feel about each statement.

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
Strength training is essential to my overall development as an student-athlete. (1))))))
Women should participate in strength training. (2))))))
Strength training is beneficial to women. (3))))))
Men should participate in strength training. (4))))))
Strength training is beneficial to men. (5))))))
Strength training should be part of every training program regardless of sport. (6))))))

My strength training techniques are adequate so that I can avoid injury from strength training. (7)

My strength training techniques are adequate to help me improve my performance. (8)

Strength training increases muscle size. (9)

Strength training increases muscle strength. (10)

Strength training increases body weight. (11)

Strength training helps me feel better physically. (12)

Strength training helps me feel better mentally. (13)

Strength training helps me look better. (14)

Strength training is a masculine activity. (15)

Strength training is a feminine activity. (16)

Strength training is fun and enjoyable. (17)

Strength training has significant health benefits. (18)

Strength training enhances body and self-image. (19)

Strength training is only possible with encouragement from others. (20)

Page
Break

Q28 For each of the following statements please select the option that best fits your opinion from complete incompetence (cannot complete the task) to complete competence (successfully completes the task). Do not spend too much time on any statement and

answer how you feel about each statement.

How competent is your strength coach in her or her ability to....

	Complete Incompetenc e (1)	Low Competenc e (2)	Moderate Competenc e (3)	High Competenc e (4)	Complete Competenc e (5)
help student-athletes maintain confidence in themselves? (1))))))
build the self-esteem of his/her student-athletes? (2))))))
demonstrate the skills of strength and conditioning ? (3))))))
motivate his/her student-athletes? (4))))))
coach individual student-athletes on technique? (5))))))
build the self-confidence of his/her student-athletes? (6))))))

develop student-athletes' abilities? (7)

detect skill errors? (8)

teach the skills of strength and conditioning? (9)

build team confidence? (10)

End of Block: Default Question Block
