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High school football in the United States is the sport with the most participation, with just over one million participants in all divisions in 2021-2022, according to the NFHS (2023). However, participation numbers in high school football have declined for the first time. Despite many benefits, participation in youth football has declined, with many blaming concussion risk. While there is a risk, not participating in youth football leads to missing out on the sport's physical, social, and psychological benefits (Murphy et al., 2017).

High school football coaches in North Carolina are often one of the first lines of defense regarding player safety and reducing the risk of high school football players sustaining a sports-related concussion (SRC). Current research has provided numerous methods a high school football coach can use to reduce the risk of SRC. One of the methods that all coaches can use in their programs is proper football helmet fitting to reduce impact kinematics. In North Carolina, studies have yet to determine if high school football programs follow helmet manufacturer fitting guidelines or if someone in their programs is tasked with properly fitting football helmets. This study investigates high school football coaches' knowledge, understanding, and experiences with proper football helmet fitting in their respective high school programs.

High school football coaches in North Carolina completed a survey (n=84) that included questions about coach demographics, school demographics, and experiences with helmet fitting. Following the survey, coaches (n=11) completed a semi-structured interview on changes they noticed in high school football and helmet fitting questions regarding their programs. Coaches identified helmet fit as an essential task, but constraints do get in the way of ensuring proper fit. The top constraints to proper helmet fit are time constraints, lack of

education and emphasis, lack of finances, and hair. The enabling factors for helmet fit were helmet sales representatives and fitting stations. These findings will provide information to ensure coaches have the resources necessary to fit football helmets in their respective programs.

AN EXAMINATION OF NORTH CAROLINA HIGH SCHOOL FOOTBALL COACHES  
RELATIVE TO FOOTBALL HELMET FITTING

by

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Approved by

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Dr. Ben Dyson  
Committee Chair

## DEDICATION

*This dissertation is first and foremost dedicated to my Father, from who all things are possible. To my parents who have always been there for me and challenged me to chase my dreams, thank you for all the support. Your love cannot be measured. To my committee and chair, thanks for all your guidance and always being willing to help. To all my former teachers, coaches, teammates, equipment managers, and colleagues, without your influence none of this is possible. There is one person I would like to acknowledge specifically. Dr. Vic Aeby, thank you for all the guidance and mentorship throughout the years. From being my advisor and mentor for both degrees to the occasional drop in meetings in your office, thank you for all your support and belief in my endeavors. Your guidance has shaped me into the teacher I am today. Thanks to you all!*

APPROVAL PAGE

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## CHAPTER I: PROJECT OVERVIEW

High school football is the most popular interscholastic high school sport in the United States, with an average of one million student-athletes annually (NFHS, 2023). Nationally, participation rates in high school football have dropped by 10 percent since 2009, the first drop since statistics have been recorded for the sport (Niehoff, 2020). In North Carolina alone, the number of those participating in high school football has declined by 29.3 percent over the last decade (Stevens, 2019). With the recent prevalence of concussions and head-related trauma in football, many academic and medical professionals, along with some state legislators, are calling for the end of football, especially in high school (Curren & Blokhuis, 2021; Miles & Prasad, 2016; Leopold & Dobbs, 2016). Sports-related concussions (SRC) have always been a concern of football coaches and players. However, since 2008, there has been more reporting of SRC, and much has been learned in the discipline (Obana et al., 2021).

Concussions and safety in football continue to be a significant concern, especially in high school sports. In 2008, two North Carolina high school football players died unintentionally from Second Impact Syndrome sustained during football practice and games (UNC, 2011). As a result of these deaths, the Gfeller-Waller Concussion Awareness Act was passed in North Carolina, which focused on four major areas of concern: education, emergency action, post-concussion protocol implementation, and clearance/return to play or practice following concussion (UNC, 2011). Significant advancements in legislation and safety protocols have passed to ensure that the risk of this traumatic event occurring again is mitigated in high school football in North Carolina. Rule changes, hiring of athletic trainers, coach education, player education, and practice modifications have all been employed to reduce the risk of SRC (NCHSAA, 2018).

Even though legislation has been passed in almost all states concerning return to play after concussions, statistics show concussions during practices are still a significant concern in high school football (Kerr et al., 2021). According to Obana et al. (2021) and (McGuine et al., 2020), although concussions have been reduced in some instances, concussions are still prevalent during practice and games. One of the methods that all high school football programs can employ is the proper fitting of football helmets. It needs to be determined what percentage of high school football coaches in North Carolina fit football helmets or who is responsible for fitting helmets. In a study by Edkins (2020), 26% of North Carolina high school athletic trainers reported that fitting protective equipment was their responsibility. Currently, in North Carolina, there is no requirement for programs to fit football helmets according to the standards set by helmet manufacturers. In addition, there are also no sanctioned educational opportunities in football helmet fitting in North Carolina. Even though multiple members are included in a high school football program, the head coach is ultimately responsible for overall player safety.

### Background Literature

In a study completed by Kerr et al. (2021), football has significantly more SRCs than any other sport. Approximately two-thirds of SRC in football occur in competition, and 83% involve contact with another player (Nicolosi et al., 2021). Football is a collision sport with multiple impacts during every practice and game. The reporting incidence of SRC has increased significantly since 2008, and the thought behind the increased reporting incidence of SRC is based on education efforts rather than more SRCs happening during competitions. Other reasons why more SRCs are being reported include coaching education, employment of athletic trainers, player education, and rule changes at all levels in the sport of football.

## **Headgears**

Since the beginning of football, there have been significant advancements to protect players and reduce the risk of injury. One of the first advancements was the football helmet. Earlier helmets were made of leather and made little to no impact on preventing injury or fatality (McDonald, 2020). Football helmets eventually changed from leather headgear to plastic shells with suspension liners and then the addition of energy-absorbing padding with facemasks (Levy et al., 2004). In 1971, Wayne State University worked with the National Operating Committee on Standards for Athletic Equipment (NOCSAE) to develop standards for football helmets that reduced the risk of serious head injury (Hodgson, 1975). Since 1975, football helmets under the guidance of NOCSAE standards have evolved significantly and provide much better protection against fatal head injuries and reduction in cranial fractures. The original purpose of football helmets was not to prevent SRC, nor do they today. Instead, the original meaning behind the football helmet was to prevent catastrophic head trauma and fatalities due to traumatic brain injuries.

Since 2010, there have been vast improvements in how football helmets are designed, tested, and reconditioned because of what has been learned through research and data collection. Before a helmet is approved for use, it must pass NOCSAE helmet testing. NOCSAE standards are performance-based and design-neutral so that manufacturers are not restricted in design or engineering, allowing innovation in design (NOCSAE, 2015). All football governing bodies (NFHS, NCAA, NFL) must use helmets that have passed the NOCSAE pass/fail test. This testing ensures that all players wear helmets exceeding a threshold level of protection to prevent catastrophic injury (Bailey et al., 2020). The standards set forth by NOCSAE have effectively reduced the rate of severe and fatal football head injuries.

Virginia Tech tests football helmets in a biomechanics lab and rates them on their ability to reduce impact kinematics (Rowson & Duma, 2011). This study shows that some helmets are better at reducing impact kinematics in various locations than others. These tests are supposed to be used by coaches and athletic administrators as another tool before purchasing football helmets. In a study by Viano & Halstead (2012), modern helmets attenuated forces better than older helmets. However, with the development of new technologies, it takes little investigation to find that newer helmets have reduced impact kinematics (Cecchi et al., 2021; Viano et al., 2012).

Reducing liner/rotational acceleration may reduce the risk of a concussion, but a clearly defined injury threshold has been elusive. Guskiewicz & Mihalik (2011) state, “it may be difficult to establish a threshold for concussive injury that can be applied to football and other helmeted contact sports.” The threshold at which a concussion occurs seems to be dependent on the person and the circumstances. Some concussions occur at low impacts, while some occur at high impacts. For example, some athletes can sustain a high number of head impacts in a season that are above the theorized threshold and never sustain a diagnosed concussion (Mihalik et al., 2019).

It is worth noting that a study was performed by Smith (2016) for an unpublished Master’s Thesis (under the direction of Drs. Rowson and Duma), evaluated the effect of helmet fit and performance. In the study, the researcher used a NOCSAE headform on a Hybrid III neck because it provides the most realistic fit between the headform and helmet (Cobb et al., 2014). The helmets were impacted in various conditions to represent a range of impact conditions experienced by players in on-field scenarios. The researcher tested three different brands of helmets under four different fitment conditions (minimum, loose, best, and tight). The

fit conditions used in the study represent fitting scenarios in which an athlete is administered a properly and improperly sized helmet and cases in which the helmet is too loose, too tight, and properly adjusted according to the manufacturer's recommendations (Smith, 2016).

The study results show that “best fit” was not universally better in all impact performances; however, for most tests, the best fit condition outperformed the minimum fit condition. In certain circumstances, the minimum fit outperformed the best fit, but this is attributed to increased padding thickness in the larger helmets. In real-world application, this may show that the initial step of measuring the player's head and identifying the proper size is the single most important step in the helmet fitting process. Smith (2016) stated, “Determination of the ideal fit condition is likely helmet and person-specific, but this study demonstrates that helmet fit is an important factor in helmet performance.”

The study indicates that padding in the helmet must make contact with the head in order to be compressed and dissipate impact energy. Modern football helmets are designed with padding meant to contact the face around the cheekbones and jaw. The padding in the front of the helmet and the padding in the cheek and jaw absorb energy from the front of the helmet shell and facemask. The study showed that on the Hybrid III headform, there was a gap in the padding and the headform, which can lead to greater helmet rotation relative to the headform during frontal and side impacts.

In a study conducted by Cobb et al. (2014), two headforms used to test helmets (the Hybrid III and NOCSAE Headform) were tested to see how these respective head shapes affect helmet fit and performance. The study revealed that headform shape affects helmet fit during laboratory testing of football helmets. As stated by Cobb et al. (2014), “Laboratory tests provide manufacturers and consumers with an objective measure of a helmet's ability to reduce head

acceleration due to direct impact. For test results to translate into reduced injury risk in the field, however, the tests must be representative of real-life conditions, including helmet fit.”

According to the CDC (CDC, 2020), all football helmets purchased have a ten-year lifespan, and the National Athletic Equipment Reconditions Association will not recondition any helmet over ten years old (NAERA, 2012). Teams must have football helmets reconditioned every two years to maintain warranty certification. Reconditioning becomes an essential issue in high school athletics as budgets may not allow football helmets to be reconditioned yearly, which is considered a better practice (NAERA, 2023). Each helmet is inspected for cracks or inconsistencies in the material during reconditioning, cleaned, repaired, repainted, and recertified for play by a certified professional.

A study by Collins et al. (2016) found that reconditioned helmets provide just as much protection as new ones. Breedlove et al. (2023) continued in this same notion and completed a study on impact attenuation capabilities of new and used football helmets. The used helmets outperformed the new helmets in several situations, but the authors do not advocate using used helmets over new helmets or avoiding reconditioning of helmets. As stated by Breedlove et al. (2023) “Reconditioning checks for the integrity of football helmet features which provide protection beyond impact mitigation, such as preventing abrasion or providing facemask protection.” As of 2024, the actual practices surrounding the fitting, reconditioning, and purchasing of football helmets in North Carolina high school football are unknown.

### **High School Coaches**

Almost all high school football players rely on their coaches to fit their helmets. Unlike colleges and professional teams with athletic trainers and equipment managers who ensure helmets fit properly throughout a season, most high school football players only have their

coaches to ensure proper helmet fit. Athletic trainers and certified equipment managers receive training to fit individuals for football helmets in collegiate and professional football. High school football coaches in North Carolina are not required to be instructed on how to fit football helmets. The responsibility of adequately fitting football helmets is independent of one individual or is even a requirement in North Carolina. Still, Cooper et al. (2019) recommends that every coaching or athletic staff have someone trained in properly fitting protective equipment.

As of the 2023-2024 school year, there is no requirement by the North Carolina High School Athletic Association that football coaches should be educated on proper helmet fit. There are few online educational programs football coaches can take to learn about proper helmet fit. The most prominent course is offered at [HelmetFitting.com](https://www.helmetfitting.com), which major football helmet manufacturers and injury prevention councils endorse. [HelmetFitting.com](https://www.helmetfitting.com) offers an online course providing instruction on the proper helmet fitting techniques for \$10, and after the course, individuals can print off a certificate of completion. Other resources from manufacturers and organizations offer fitting and sizing guides and instructional videos. However, it is unclear what percentage of high school coaches view and follow the recommendations for football helmet fitting.

In a study by Yeargin et al. (2021) study, 46% of youth football players' helmets were improperly fit. Furthermore, McGuine & Nass (1997) stated that in a sample of 1,671 high school football players in Wisconsin, 61.9% had a helmet that did not fit properly. Helmet fitment in high schools has been an ongoing issue and we do not know what the current helmet fit practices of North Carolina high schools are.

## Purpose and Specific Aims

The purpose of this study is to investigate high school football coaches' knowledge, understanding, and experiences with proper football helmet fitting in their respective high school programs. High school football coaches are vital in keeping players safe during practices and games. The high school football coach has far more responsibility for player safety than coaches at the collegiate or professional level. In most cases, high school coaches are the first to recognize the signs and symptoms of SRC and are the main ones to provide proper protective equipment fitting. There are multiple proven methods to improve player safety, and proper helmet fitting is one that all coaches can adhere to and follow. Even though significant advancements have been accomplished in SRC education for football coaches, education in proper helmet-fitting practices still needs to be improved.

There is a current gap in the literature regarding what high school football coaches know about helmet fitting and if they follow the recommendations of manufacturers and organizations. Currently, there are no coaches' educational efforts from the NCHSAA or coaches' organizations to instruct coaches on proper helmet fitting. In order to continue to evolve in high school football, all safety measures must be taught and implemented in high school football coaches' education. The findings may help develop resources for coaches' educational opportunities and pilot programs. Specific aims are as follows:

1. Investigate the current practices of football helmet fitting in high school football programs in the NCHSAA and NCISAA.
2. Identify current coaches' educational practices about football helmet fitting.
3. Determine if high school football coaches face constraints in meeting helmet Manufacturers' helmet fitting standards.



## Methods

### **Design**

An explanatory sequential mixed-methods design was used to address the purpose and aims (Creswell, 2013, 2021). This study included surveys and semi-structured interviews (see Appendix A for survey questions and interview guide). To address aims one and two, high school football coaches were sent an online survey to understand better current practices of football helmet fitting and educational practices about helmet fitting. To address aim three, semi-structured interviews were conducted to investigate current helmet fitting practices further and determine what constraints high school coaches may face in proper football helmet fitting.

### **Positionality Statement**

The researcher is a current member of the coaching group in this case study. Before becoming a high school football coach, I was a student equipment manager at a Division I collegiate football program for five years. I also interned with a team in the National Football League. During that time, I obtained my certification from the American Equipment Managers Association, which emphasizes helmet fitting as one of their requirements for certification.

After college, I started coaching high school football and have served as an assistant and head coach. In my professional career, I have worked under six head coaches and seen the different processes used for helmet fitting. In my experiences, I have observed head coaches who emphasize helmet fitting and head coaches who do not. These experiences caused me to consider what other high school programs do regarding helmet fitting.

As a high school football coach, I have seen firsthand the number of players who wear helmets that do not fit properly. Fortunately, I have had training and understand how to fit football helmets. While teaching sports medicine at J.H. Rose High School in Greenville, North

Carolina, I became highly interested in the health and safety of high school football players. Jaquan Waller was a former J.H. Rose football player who died due to Second Impact Syndrome sustained during a game. Waller suffered two concussions in the same week, leading to his death. This event caused significant changes in the operations of high school football in North Carolina, especially in Pitt County, where J.H. Rose is located.

Before the death of Waller, Pitt County Schools did not utilize athletic trainers or emergency action plans. Since then, Pitt County Schools has athletic trainers for each of its six high schools and has emergency action plans. Since that event in 2011, football coaches' education in North Carolina has changed, teaching the signs and symptoms of concussion to implementing football rule changes (NCHSAA, 2018). The objective is to continue coach education opportunities by researching how much high school coaches use proper helmet fit or if they know manufacturers' recommendations.

As a current group member being studied, I must be conscious of my bias in this study. I must not let my experiences influence the study's results but let the data lead the direction as I facilitate the study. In the interviews, it will be imperative to ask questions not leading in nature and let literature serve as my template to guide me in the study.

## **Participants**

The coaches who were included in the study represented different geographical regions of North Carolina and were from different races and educational backgrounds. All coaches in the study were head coaches and some were the athletic directors at the school where they coach.

**Survey.** All coaches included in the study were current or former head football coaches in the North Carolina High School Athletic Association (NCHSAA) or the North Carolina Independent Schools Athletic Association (NCISAA). After acquiring Institutional Review

Board approval, the Eastern North Carolina Football Coaches Association (ENCFCA) and the NC State Football Director of High School Relations provided a list of current and former head coaches. Participants were recruited via email, and the survey was administered online using Qualtrics survey software. Of the 110 coaches who completed the survey, only 84 coaches' responses were valid for data analysis due to those coaches stating they were not current or previous head coaches. Assistant coaches were not allowed to participate in the online survey due to possible nesting issues.

**Interview.** Participants of the semi-structured interviews were a purposeful sample chosen from those who completed the online survey and volunteered for the interviews (Patton, 2023). Participants were recruited from a Google Forms link at the end of the online survey. After consent was granted, each participant completed a 20-30 minute interview. The interviews consisted of eleven coaches from all classifications of the NCHSAA. All interviewees were head coaches or former head coaches of a North Carolina High School football team in the last two years. Each coach interviewed was a current head or assistant coach at a high school in North Carolina.

### **Data Collection**

**Survey.** Before the online data collection, a pilot survey was sent to 20 high school coaches in South Carolina, leading to the current survey's structure. The initial survey used for this study was emailed to coaches in September 2023 and included four sections (personal background information, program structure, helmet fitting, and exploratory questions). The personal background information included questions about the coach's age, race/ethnicity, playing experience, and coaching experience. Program structure questions focused on the demographics of the school where the coach was employed, support personnel, and the number

of players included in their respective high school programs. Helmet fitting questions centered on helmet purchases, education, and current fitting practices. The exploratory questions were based on a 5-point Likert Scale. They included questions on coaches' feelings about helmet fitting in high school football and their confidence in completing tasks related to helmet fitting.

**Interview.** After giving consent, phone interviews were conducted with eleven participants over four weeks in January and February 2024, using a semi-structured interview guide. The interviews asked about changes coaches have noticed in high school football, their helmet fitting process, and what constraints they may face in helmet fitting (see interview guide in Appendix A). An example of questions asked include what coaches are doing to ensure the safety of their players and specifically what they do in the helmet fitting process for their respective programs. The participants were encouraged to speak freely and elaborate on questions from the interview script.

### **Data Analysis**

Survey data was downloaded from Qualtrics and uploaded into SPSS for analysis. Descriptive statistics (mean, standard deviation, and frequencies) were calculated for the closed-end survey questions. Chi-Square analysis and Crosstabs were used to determine the current helmet fitting practices, delegation of helmet fitting, and helmet fitting education.

The semi-structured interviews were recorded and transcribed using transcription software and carefully corrected manually by the researcher. Upon acceptance, each interview transcript was uploaded to Atlas.Ti 23 for coding. Each participant was given a pseudonym to maintain anonymity. Open coding was performed (Terry & Hayfield, 2021), and overarching themes emerged. To increase the trustworthiness of the interview data, in the qualitative research process of member checking (Patton, 2023 & Rubin & Rubin, 2012), transcripts were

emailed to participants for checking. The results were interrogated by peers with athletic training and football helmet fitting experience to ensure the trustworthiness of the data analysis process.

The transcripts were reviewed by the researcher multiple times in a word document to become more intimate with the material (Patton, 2023). Two-cycle coding was implemented as stated by Saldana (2015). In the First Cycle, codes from Atlas.Ti 23 were used and over 100 initial codes appeared. Data reduction occurred by sorting out minor codes into 9 major codes. In the First Cycle after identifying the 9 major codes, Structural Coding was implemented along with In Vivo coding to maintain the subjects voice (Saldana, 2015). Structural Coding both codes and initially categorizes the data corpus to examine comparable segments' commonalities, differences, and relationships (Saldana, 2015). In the Second Cycle, Focused Coding was used to group the responses of the participant by the most frequent or significant codes (Saldana, 2015). The responses of the participants were color coded and grouped based on the major codes developed.

## Results

### **Demographics**

All 84 participants who completed the survey were male; 64 identified as White/Caucasian, 14 as Black/African American, and most (61) were 36-55 years old. Most coaches have coached football for 6+ years, and 76 coaches worked full-time at the school where they coached (see Appendix B for complete demographics). Most coaches (98.7%) reported playing high school football, and (64.1%) reported playing collegiate football. In years of experience, (98.7%) reported they have more than 11 years of experience coaching football at all levels, and a majority (51.8%) indicated they had been a high school head football coach for less

than ten years. In the study, (95%) of coaches work full-time at the school they are the head coach at. All four athletic classifications in North Carolina were represented, with 2A (34.1%) being the most represented classification. Most coaches teach and coach at a rural high school (67.5%), and over half (61.3%) identified as working more than 30 hours per week during the season on football-related activities in addition to their teaching job.

**Aim #1.** To investigate the current practices of football helmet fitting in high school programs, coaches were asked if their respective high school programs have a designated fitter. A chi-square test of goodness of fit revealed that most programs did have a designated fitter ( $X^2(1) = 4.57, p = .03$ ). To determine whether there was a difference in the assignment of the designated fitter, a chi-square goodness of fit test was performed. A chi-square goodness of fit revealed that the most common designated fitter is the head coach or assistant coach ( $X^2(4) = 75.3, p < .001$ ). Coaches verified these results with the following statements from the interviews.

“So I mean, it’s just me fitting.”

“I’m the only one that does all the helmet fitting.”

“Usually, myself or the equipment guy does it when they come in.”

“So we’d have myself, I do the fitting station.”

To determine if the designated fitter had received training, the selected cases only included the head coach and assistant coach since all other categories were under five. A chi-square test of independence revealed that the relation between these variables was significant,  $X^2(2, (N=56) = 12.46, p = .002$ ). A chi-square test of independence revealed that programs with a designated person responsible for fitting helmets has a significant relationship with head coaches who have received training on how to fit football helmets,  $X^2(1, N=77) = 9.255, p = .002$ . The Phi value was .347, with an approximate significance of .002.

As of 2015 (NFHS, 2015), any player's helmet that comes completely off during a football play must exit the game for one play. The intention behind the rule is to allow coaches and athletic trainers time to look for the signs and symptoms of a concussion, check the helmet for broken parts, and ensure a proper fit. The survey revealed that most (60%) coaches designate a person to ensure fit and the helmet's integrity before a player returns to play. A chi-square test of independence was performed to examine the relation between having a designated helmet fitter and checking a helmet when it comes off during play. The relation between these variables was significant,  $X^2 (1, (N=78) = 8.353, p=.003)$ . The Phi value was .327, with an approximate significance of .004. A chi-square goodness of fit test revealed that most coaches have a full-time designated athletic trainer ( $X^2 (3) = 11.33, p= .01$ ). To determine if having an athletic trainer led to more instances of rechecking fit when a helmet comes off during play, a chi-square test of independence revealed there is not a significant relationship between having an athletic trainer and rechecking fit when a helmet comes off during play  $X^2 (2, (N=63) = .496, p=.780)$ . The Phi value was .089, with an approximate significance of .780.

In further investigating current helmet fitting practices, coaches were asked how often they inspect helmets during the season for cracks, loose hardware, broken chinstraps, faulty air bladders, etc. A chi-square goodness of fit test revealed that situations leading to helmet inspection occurred at different frequencies, with the most common situation being coaches only inspecting helmets when players bring it to their attention ( $X^2 (6) = 88.74, p= <.001$ ). Coaches were asked how often they recheck the fit of football helmets during the season. A chi-square goodness of fit test revealed that most coaches never recheck the fit of a helmet during the season ( $X^2 (6) = 17.39, p=.008$ ). Head coaches' statements provide further explanation for this finding.

“I don't know that I have thought that much about it, to be honest. Normally, we don't after we pass them out the first time.”

“No, we do not do that. That's a weakness of ours. I guarantee that we probably could do a better job of following up with that, per se as an organization.”

“No we don't. We will check the air and make sure all that is right, but as far as rechecking the fit we don't do that.”

**Aim #2.** To identify current coaches' educational practices surrounding helmet fitting, a chi-square test of goodness of fit revealed that most head coaches had received training on how to fit football helmets properly ( $X^2 (1) = 27.96, p = .001$ ). If a head coach indicated they were not the person in the program who fits football helmets, they were asked if the person fitting helmets had received training. A chi-square goodness of fit test revealed that most fitters besides the head coach had been trained, ( $X^2 (2) = 19.72, p < .001$ ). Head coaches identified that those who have received training feel more confident fitting helmets than those who have not,  $t(76) = 3.595, p < .001$ . An independent samples t-test revealed that coaches who received training understood the manufacturer's helmet fitting guidelines better than those who did not,  $t(76) = 4.235, p < .001$ . However, coaches who have been trained do not have a higher confidence level in taking a helmet apart and putting it back together,  $t(76) = 1.770, p > .271$ .

Most coaches indicated that they had received training, and a chi-square test of goodness of fit revealed that most coaches have received training, and the most common form of training is instruction from a football helmet sales representative ( $X^2 (5) = 48.9, p < .001$ ). A chi-square goodness of fit test revealed that Riddell was the most worn single brand ( $N = 21$ ), and Schutt and Riddell ( $N = 37$ ) accounted for the most combined brands ( $X^2 (6) = 94.48, p < .001$ ). Coaches' statements during the interviews showed a correlation to loyalty to a specific brand of helmet.

“I mean we're practically all Riddell SpeedFlex for all of our helmets.”

“My way is what's easiest to fit 130 kids and to me it's the Riddell SpeedFlex.”

“I'm a Riddell guy.”



“100% Riddell. There’s a couple different styles but almost all of our helmets are Speed Flexes.”

To understand if there was a relationship between the brand of helmet and helmet fit training, a chi-square test of independence revealed no significant relationship between brand of helmet and helmet fit training,  $\chi^2(6, (N=78) = 5.267, p=.510$ . The Phi value was .260, with an approximate significance of .510. This indicates that certain brand helmet sales representatives are not training coaches more than one another.

**Aim #3.** Open-ended responses from the survey were coded, and the frequencies from the survey can be found in Table 1. Open-ended responses from the semi-structured interviews were coded and grouped into emerging themes that correlated with those responses provided in the open-ended survey. The codes were then grouped into themes (time, money, education, helmet sales representatives, etc.). The most common themes generated for constraints to helmet fitting were time, finances, education, and hair. The most common themes for facilitators for helmet fit were helmet sales representatives and fitting stations.

**Table 1: Open-Ended Survey Constraints to Helmet Fitting Responses**

Constraints	Open-Ended Resp.	Constraints	Open-Ended Resp.
Time	9	Hair Styles	3
Lack of Sizes	7	Lack of Helmet Parts	2
Lack of Education	5	Lack of Brands	1
Lack of Trained Staff	5		
Lack of Finances	4		
Lack of Emphasis	3		

**Constraints**

The constraints that appeared at the highest frequencies from the survey and interviews were grouped into themes of time, education, finances, and player attributes. There was an overlap between the open-ended responses from the survey and the interviews. These themes

emerged as the ones that have the most significant impact in preventing proper football helmet fit.

*Time.* Coaches indicated in the survey that time is a significant issue preventing proper helmet fit. In the interviews, most coaches stated that they knew they had to make time to conduct helmet fitting, and most did it around May before the start of spring football practice.

“We pretty much we fit in the spring for the ones who participate (in spring football).”

“We start in the spring and it's really two coaches that do it.”

“We give out helmets in the spring before spring practice.”

Most coaches understood the importance of helmet fitting, but finding the time to fit all players was sometimes cumbersome. One coach stated, “It’s definitely time-consuming and tedious, but it has to be done.” As stated previously, most of the burden of helmet fitting falls on the head coach. One coach said, “I feel like it's my program, so I'm gonna fit each kid. Just because, you know, I feel like it’s all going to fall on me anyway.”

There are two methods coaches are using to fit players. They are fitting players all at once or a few each time over a designated period. Some coaches use instructional time to focus on proper helmet fitting. One coach responded, “At the end of the school year, we go ahead and fit equipment during the school day. Most of our players have weightlifting.” Coaches identified the most glaring issue with time and helmet fit is when players show up later in spring or fall practice apart from the designated fitting times. One coach said, “But the problem is when all of a sudden a new player walks up on day five, and another coach has to fit that player. I don’t feel good about that. Sometimes players just slip through the cracks.” Another coach added the same thought: “(A coach will say) Okay, go ahead, this helmet looks good to go because I gotta get into practice or whatever, because a straggler or somebody who just joined the program.”

*Lack of Education.* Coaches in the open-ended survey indicated a lack of education and emphasis on fitting helmets. In the semi-structured interviews, all the head coaches felt that they have a good understanding of how to fit helmets. Still, the lack of educational opportunities for assistant coaches was a prominent theme. The following are statements from coaches explaining the issue.

“I think sometimes we get people that don't know what they're doing. And haven't done it.”

“But you have those times where somebody has to go in and check a helmet or do something and you would like for everybody that's dealing with that to understand that process.”

“I don't like it when certain coaches do it because they don't have an idea what they are doing.”

Coaches identified that not having trained assistants or assistants they trust with the helmet fitting process put more of a burden on the head coach to fit all players, which could sometimes be overwhelming. One coach stated, “I trust me and two other coaches to help fit the players. But I know we all (coaches) don't do it like we should.”

In the open-ended survey questions, coaches indicated that a lack of emphasis on helmet fitting appeared to be an issue. In regards to emphasis, one coach added that there isn't a system of checks and balances to check the legalities of programs regarding reconditioning for football helmets. Currently, no system in place checks programs for using helmets that are not older than ten years or haven't been reconditioned in two years. Coaches provided insight on this issue in the statements below.

“There was a school out this way got busted for buying helmets off the back of a truck and they weren't legal.”

“And I think there needs to be more regulation and quite frankly, punishment for those programs that are playing an out of date helmets.”

“There needs to be some level of accountability piece.”

Coaches indicated that they felt most head coaches understand helmet fit and how to do it, but there is not as much emphasis on helmet fit as on concussion education. In North Carolina, coaches are required to complete an online course on concussions through NFHS Learn annually. When asked about a helmet fitting course, most coaches supported the idea in the survey and the interviews. One coach said, “I know there isn’t one (one helmet fitting). I’ve watched every NFHS course I can to renew my teaching license. I can’t believe they don’t have one on helmet fitting.”

One emerging underlying theme was that most coaches do not use checklists when fitting football helmets. Seven of the eleven coaches indicated they do not use checklists, and most of the coaches only go by experience. One coach indicated they have never seen guides or templates on what measurements correlate to what size helmet. The coach stated, “I’ve never seen the actual scale for what size measurement is for what helmet.” The same coach explained further, “I’ve been places where we had Schutt’s, Riddell’s, and Zenith. When you’ve got multiple brands, it’s just confusing.” Another coach explained how fitting between brands was an issue: “When we used to use (certain brand of helmet), it was hard to fit everyone.” One coach added to this issue: “The kid’s helmet size, which is hit or miss depending on the brand.” Helmet manufacturers make fitting checklists and guides, but there is no current resource that provides sizing information for multiple brands of helmets.

**Finances.** Coaches identified two main areas where finances were a constraint when properly fitting football helmets. The main areas of concern were the lack of helmets of multiple sizes and the rising cost of reconditioning helmets. In the open-ended survey responses, coaches indicated that the lack of helmet sizes is a barrier they face. Coaches are still determining how

many players will be in their program from year to year, and it is hard to pinpoint what helmet sizes they should purchase from year to year. Some coaches have had to trade with other schools that wear the same color helmet to get the correct sizes for their players because they need help to afford to buy new ones. Coaches indicated they are often put into positions where they must trade helmets to get the right size for players. One coach gave further insight, saying, “When we wore white (helmets) I traded with (another school) because we didn’t have any helmet money and the only option was to trade a size we had left for what we needed instead of forcing a kid into something not safe.”

The other issue coaches indicated as a significant theme is the rising cost of reconditioning and helmet costs. Multiple coaches stated how the increasing cost of reconditioning is a considerable concern. Reconditioning is required every two years for a helmet to be covered under the manufacturer's warranty (Source). The National Athletic Equipment Reconditioners Association (NAERA) recommends that every helmet be reconditioned and recertified annually. As indicated in the online survey, (92%) of coaches recondition every year, but now they are starting to rethink that decision. The cost of reconditioning and helmets is not an isolation issue to one type of school or another based on race and socioeconomic status. A coach at an affluent high school with 15% minority enrollment stated:

“Four years ago I paid \$4000 for reconditioning, the next year it was \$4500, then it was \$5200, and this year it was \$6200 and I don’t know what I’m going to do. The bill has been sitting on my desk and I haven’t paid it for two months. I mean, I’m thinking about going to every other year for reconditioning or having to go with someone else.”

Another coach added to the cost of reconditioning by stating, “The reconditioning bill for (certain brand of helmet) if I sent off 65 helmets for sure, that could be well over \$7,000.” One coach showed his concern with using different manufactures for reconditioning stating that,

“Reconditioning is costing so much. Here lately in the last few years, we’ve always sent out stuff to (certain helmet brand) so I feel like if I send them to (rival helmet brand) they are probably gonna kick it out (not recertify the helmet).”

Coaches expressed how the rising cost of reconditioning and helmets is causing them to stay loyal to one brand or manufacturer of helmets. Coaches provide their reasoning below.

“Because helmets are so expensive you’re eating into your reconditioning budget to save money to get better helmets so now truly keep it generic instead of (buying) the best helmets.”

The problem is right now I have 91 (brand of helmet). I mean if I start going the other way (buying another brand), now I have to have that hardware and all that stuff and that stuff is expensive.

“Like our biggest thing is I wish our school had more funds to have more of a vast variety of helmets to specifically fit each kid. There are different shapes of heads and the helmets we have are very generic.”

“I would like to have different brands (of helmets) but we can’t afford the parts.”

**Hair.** Coaches stated that hairstyles are a barrier to proper helmet fit. Hair styles were unrelated to one race or demographic, but they appeared to be an issue in multiple situations.

Coach’s responses are below:

“The hair is probably one of the biggest roadblocks sometimes to really a good, proper fit.”

“I mean, you know, kid goes from dreads to a low cut or kid has a head full of mullet hair.”

“The hair seems to always be a problem.”

What really affects (the fit) is kids hair. We get some of the kids with long hair that really affects the fit”

“We have a problem with hair or different shaped heads and how that affects what they can wear by the brand of helmet we have.”

**Facilitators.** In researching the constraints that exist with helmet fit, some facilitating themes emerged that were not expected before the start of this study. The most common themes for

facilitators for helmet fit were helmet sales representatives, peer review, and outside academic resources.

*Helmet Sales Representatives* (HSR) emerged as a main theme in properly fitting football helmets. In the survey, (76%) reported they were trained to fit helmets by an HSR, and multiple coaches identified how much they rely on their HSR to influence them on which helmets to purchase and even fitting football helmets. Coaches explain how they utilized HSR in the past with the following statements.

“I used to get the (HSR) to help me fit all of our guys to make sure we ensured a more safe fit. But I think there became a lawsuit issue with (helmet brand). And they asked the reps to stop doing that.”

“I know the first year I ever fit how much we brought in our (HSR). He fit our team instead of us doing it. So I feel like they know a little bit more.”

*Fitting Stations.* Coaches indicated in the interviews that multiple coaches are used to review the fitment of the helmet during the helmet fitting process. Even though most head coaches are the ones that fit the players, they rely on multiple checkpoints to ensure the correct fit of the helmet. Coaches use stations, and in the central fitting station, the head coach ensures the original fit and the assistant coaches check all of the auxiliary items, such as chin straps, air bladders, and facemasks. Coach statements supporting this claim are below.

“There's multiple guys, making sure that everything snugged up and everything fits and a couple of guys look at it. We'd have myself, I do the fitting station. I'd have my next best assistant on the chin strap and pull station.”

“If either of us coaches is up in the air or something we ask the other one to look at it so we have multiple eyes on it. And then we both kind of judge it.”

“One coach will fit the kid. So one of the three of us will also evaluate to make sure that the fit is secure. So we really feel like we're getting a three-prong approach to it.”

“We have three coaches in there and size and the kids. That's a big thing we do, use multiple coaches in the helmet fitting process.”

## Discussion and Implications

Proper helmet fit continues to be a concern in high school football. The coaches in this study showed positive trends but also gave insight into areas of concern. Most head coaches in this study understand the importance of helmet fitting and have been trained to do so in some capacity. However, there must be more educational opportunities for assistant coaches and resources for coaches to use in the helmet fitting process.

An evident trend is that coaches who have received training on fitting football helmets have a designated person responsible for the fitting process. Trained coaches also have a higher rate of checking the integrity and fit of a helmet when it comes off during play. A surprising finding is that having an athletic trainer does not lead to a higher incidence of checking helmet fit either in the initial fitting process or when a helmet comes off during a game. As reported in the study, 81% (N=63) indicated they have an athletic trainer associated with their program. Still, only three programs identified that an athletic trainer is responsible for helmet fit. This information is surprising because athletic trainers are trained to fit football helmets correctly in their certification process.

What was revealed in the survey and interviews is that the majority of coaches emphasize the initial fitment of football helmets. Still, coaches need to recheck the helmet fit during the season. As stated, most coaches fit football helmets in May but only recheck the fit if a player brings it to their attention. This leaves three months during the summer when a player is wearing a helmet where no contact is allowed and then wearing the same helmet at the beginning of August, where full contact will happen without checking the helmet's fit. Players sustain multiple collision events during practices and games, affecting the helmet's fit over time. Air



bladders can leak, chinstraps can become lost over time, and hairstyles can change, leading to inadequate fit.

Coaches indicated that most training on helmet fit comes from a helmet sales representative, but most coaches need more trained assistants to help in the helmet fitting process. This burdens head coaches along with many other responsibilities and decreases available time to dedicate to the helmet fit process. An explanation for this finding could be that, in most cases, only head coaches are involved in the helmet purchasing process, and they are the only ones in a program that has direct contact with a helmet sales representative. Since there currently needs to be more educational resources (online training, checklists for multiple brands) for coaches on helmet fitting, this leaves a gap in easing the burden on head coaches. Every program is different, and it is not uncommon for one coach to be responsible for fitting over 100 players.

Coaches expressed a need for more emphasis on helmet fitting and the lack of regulation on reconditioning. Coaches in the interviews expressed concern for other players in different programs who may be wearing helmets that are not certified by NOCSAE or that have not been recertified by NOCSAE in the reconditioning process. Rising costs could be a significant concern as coaches are starting to determine if they must change their reconditioning practices and recondition every two years instead of every year. Suppose there is no regulation behind reconditioning from the NCHSAA or county athletic directors. In that case, it does leave the question of whether coaches follow manufacturers' recommendations for reconditioning due to a lack of finances. Without a system of checks and balances, a coach could put a NOCSAE sticker on a helmet that is out of warranty from the manufacturer. A proper system of checks and balances behind the legalities of football helmets is worth exploring.

## CHAPTER II: DISSEMINATION

The findings from this research will be presented to coaches, athletic directors, administrators, and football helmet sales representatives. The presentation will be presented at the Eastern North Carolina Football Coaches Association business meeting. A recording of the meeting will be sent to all football coaches in North Carolina. A helmet sales company has also requested I present the findings at one of their monthly meetings. The presentation should take 15-20 minutes to be respectful of all who attend. Meetings with county Athletic Directors will be requested to share the research findings with athletic directors of all high schools in those counties and regional Athletic Director meetings. The full presentation can be found in Appendix D, and the handout for the coaches can be found in Appendix E.

### PowerPoint Presentation Script

#### **Slide 1**

Hello everyone. My name is Garrett Wingate, and I am currently an assistant football coach at Ayden-Grifton High School and a doctoral graduate of the Department of Kinesiology at the University of North Carolina at Greensboro. My research has examined the current practices around football helmet fit in North Carolina High School football programs.

#### **Slide 2**

High school football is the most popular interscholastic sport in the US. On average, more than one million students play football every year. However, since the tracking of participation statistics, participation is decreasing for many reasons, but one of the significant reasons is considered Sports-Related Concussions (SRC). One method of risk reduction all football programs can use is helmet fitting. A properly fit helmet reduces impact kinematics, and

even though helmets do not prevent concussions, an appropriately fit helmet can reduce impact kinematics.

### **Slide 3**

The genesis of this study started when I was a student equipment manager in college and an intern in the NFL. In those positions, I observed players always getting fit for helmets and constantly having their helmets rechecked for fit. When I became a high school coach, I learned that each school program looks at helmet fit differently. Some emphasized it, and some did not. In 2008, multiple NC high school football players died due to second impact syndrome. Since then, numerous rules and changes have been created to improve player safety, especially regarding SRC. In North Carolina, the Gfeller-Waller Act was signed, emphasizing emergency action plans and concussion education. High school football has a significantly higher SRC rate than any other sport. One of the significant changes that has taken place is most schools have an athletic trainer.

### **Slide 4**

Even though there has been a strong emphasis on concussion awareness and education, one thing all coaches can employ is proper helmet fit. As a point of emphasis, football helmets are designed to prevent fatal head injury, not prevent SRC. All NFL and major college football teams have personnel that have been trained to fit helmets. Each player goes through a fitting process multiple times during the calendar year. The question is, “What are the current fitting practices of North Carolina High School football teams?”

### **Slide 5**

The purpose of this study is to investigate high school football coaches’ knowledge, understanding, and experiences with football helmet fitting. The three main objectives are to

find out what coaches are doing in their respective programs regarding helmet fit, understand what educational opportunities exist for coaches in learning about helmet fit, and determine if there are any constraints in meeting helmet manufacturers' guidelines.

#### **Slide 6**

This study was a mixed-methods study. The first part of the study was an online interview sent to all current and previous head coaches whose schools are in the NCHSAA or NCISAA. The survey was emailed to over 700 active or previous head coaches. One hundred ten coaches started the study, but only 81 completed it. The survey included questions about the coaches' demographics, schools, demographics, resources, and helmet-fitting practices. Following the initial study, coaches were invited to participate in semi-structured interviews. Eleven coaches participated in the phone interviews.

#### **Slide 7**

The quantitative results revealed that most programs have a designated fitter. In most cases, the fitter is the head coach or assistant coach. Most coaches who do the fitting have been trained one way or another. The most common form of training was through a helmet sales representative. In further investigation, the brand and the helmet sales representative doing the training were similar. In other words, multiple sales reps are training coaches. Coaches who have been trained indicated that they feel more confident in fitting helmets. When a helmet comes off during a game, a player has to exit the game for one play. This rule is designed to allow time for coaches and trainers to look for the signs and symptoms of concussion and check the helmet's integrity. Coaches were asked if they could recheck the fit and inspect the helmet before they allowed players to return to play. 60% of coaches identified that they do have a designated person responsible for checking the helmet and the fit before a player returns to play.

## **Slide 8**

A surprising finding is that coaches who have been trained do not feel more confident in taking a helmet apart and putting it back together. Depending on the brand of helmet, part of the helmet fitting process requires pieces to be removed and checked throughout the season. Most coaches identified that they distribute helmets and do the fitting process during the spring before spring football, but they do not recheck the fit of helmets during the year. Most coaches also indicated they do not inspect helmets unless a player brings it to their attention. This is an area of concern because, over time because chinstraps and screws can become loose, air bladders can leak, and facemasks can have exposed metal. Essentially, players are getting fit in May and will wear the same helmet over the next six months, but the fit is never rechecked. Many variables can occur during this time: hairstyles, weight gain/loss, and growth.

Another interesting finding is that coaches reported only three percent of athletic trainers help in the helmet-fitting process. Most programs reported that they have an athletic trainer, and athletic trainers are trained to fit football helmets in their certification process; however, it does not seem that they help coaches issue and recheck helmets during the season.

## **Slide 9**

Four main themes emerged from the interviews. Those themes were time, education, finances, and hair. It was discovered that most coaches fit during the spring before spring practice. Coaches indicated they had the most trouble fitting players if they showed up after the designated fitting times. Coaches said they feel like the burden of fitting falls on them as the head coach, and they feel responsible for being in the fitting process. Coaches felt like time was a constraint because they did not have assistants they could trust to fit or help in the process. It is

not uncommon for a head coach to be responsible for fitting over 100 players along with their other duties as a head coach.

Lack of education seemed to be a constant theme among coaches. Even though most head coaches have been trained, there is a lack of educational resources and opportunities for assistant coaches. This, in turn, made head coaches feel like the helmet fitting process needed to take more time. If they had trained help to remove some of the burden of fitting, it would help overall. One area where there is a lack of resources is that with helmet fit checklists. Some coaches indicated they have seen and used them, while others have never seen one. Each manufacturer makes a fitting guide, but there is not currently a checklist with the steps of helmet fit that can be universally used with helmet sizes attached. With a lack of education, coaches indicated a lack of emphasis on helmet fitting and regulation. Coaches said there is great emphasis on concussion education but not much on how to fit helmets, which focuses more on prevention. With regulation, coaches said there is not currently a system of checks and balances to ensure coaches are following the rules regarding reconditioning. Some coaches explained in their interviews:

“There was a school out this way got busted for buying helmets off the back of a truck and they weren't legal.”

“And I think there needs to be more regulation and quite frankly, punishment for those programs that are playing an out of date helmets.”

“There needs to be some level of accountability piece.”

Coaches indicated finances were always an issue but now they are starting to become an issue in a different aspect. Coaches felt like all the advancements with helmet technology and safety are great, but with increased advancements comes increased cost. New helmets cost more

than they ever have and reconditioning cost is rising. One coach gave his experiences with reconditioning and said:

“Reconditioning is costing so much. Here lately in the last few years, we’ve always send out stuff to (certain helmet brand) so I feel like if I send them to (rival helmet brand) they are probably gonna kick it out (not recertify the helmet).”

Coaches expressed how the rising cost of reconditioning and helmets is causing them to stay

loyal to one brand or manufacturer of helmets. Coaches provide their reasoning by saying:

“Because helmets are so expensive you're eating into your reconditioning budget to save money to get better helmets so now truly keep it generic instead of (buying) the best helmets.”

The problem is right now I have 91 (brand of helmet). I mean if I start going the other way (buying another brand), now I have to have that hardware and all that stuff and that stuff is expensive.

“Like our biggest thing is I wish our school had more funds to have more of a vast variety of helmets to specifically fit each kid. There are different shapes of heads and the helmets we have are very generic.”

“I would like to have different brands (of helmets) but we can't afford the parts.”

In terms of hair, coaches indicated that hair styles and different head shapes were constraints. Hair styles was not specific to one race or another. Coaches understood that certain types of helmets fit some players heads better than others, but they always can't afford to buy the other brand of helmets due to rising parts cost.

## **Slide 10**

During the survey and the interviews, themes started to emerge that showed there are some facilitators to helmet fit. Those include helmet sales reps and fitting stations. As stated before, most coaches have been trained by a helmet sales representative, but some coaches indicated they also used them to fit players until liability issues. This brings in the question: “Where does the liability fall?” As I mentioned in the education piece, there is currently no

regulation to ensure coaches follow reconditioning rules. Coaches are using other coaches on staff trained to fit helmets at multiple checkpoints to ensure players' helmets fit correctly. Most coaches use fitting stations to fit players and have multiple eyes look at the fit and feel of helmets on players. When asked if coaches use any outside resources when they purchase helmets, such as the Virginia Tech Helmet Study, they indicated they do look at the study results to ensure the helmets they buy are the best they can afford.

### **Slide 11**

The first step in this process will be to distribute helmet fit checklists to all the football programs in North Carolina. These checklists contain universal helmet fitting guidelines and sizing charts for all the major manufacturers. This checklist will be available online, so coaches can print off the checklists and use them during fitting. These checklists may also help assistants unfamiliar with the helmet fitting process.

I will check with helmet sales representatives to see if we can have a helmet fitting workshop in which coaches can come and learn about the different helmets and how to fit players properly. There used to be programs that taught helmet fitting, but they are no longer offered. I plan to investigate what athletic directors are doing with helmet regulation and see if there should be a regulation process for football helmets to ensure manufacturers' warranties.

Since most coaches do not recheck the fit of helmets during the season, I plan on creating posters that coaches can hang in locker rooms that explain to players how their helmets are supposed to fit. If they notice something wrong, they should meet with their coach to adjust the fit of their football helmet.



Lastly, a field study could be completed using a helmet fit checklist created by Yeargin et al. (2021) to understand if coaches are fitting their players correctly. Coaches have indicated they have been trained and fit players, but a field study could reveal whether players are fit.

### CHAPTER III: ACTION PLAN

The overall goal of this research is to increase player safety in football. Many individuals need to be made aware of this study's findings and have access to resources that can help individuals in the helmet fitting process. Head Coaches are the main stakeholders who must be aware of the information. Still, Athletic Directors, Administrators, NCHSAA Directors, helmet manufacturers, and helmet sales representatives will all be contacted about the research. The action plan will contain three phases: short-term, mid-range, and long-term goals.

Phase one of the action plan is to present the information to high school coaches in a multi-faceted approach. Research has revealed that coaches need a universal, reliable checklist for helmet fit. Since most coaches use different brands of helmets, this checklist includes the main steps to fitting a football helmet that all manufacturers use. The checklist's second section contains specific manufacturer fitting instructions and helmet sizes. Instead of a coach having to use multiple sheets of paper from each manufacturer for helmet fitting, now they will have a guide of two sheets of paper for them to follow. These worksheets can be easily duplicated for multiple fitting stations or multiple coaches. Head coaches can use this information with their respective programs and will be encouraged to share it with their middle school coaches and youth programs. The helmet fit checklist will be housed online under the education tab at [ENCFCA.org](http://ENCFCA.org). This website is the home website for the Eastern North Carolina Football Coaches Association. Coaches will have access to this document and can print as needed.

Phase two will include presentations to stakeholders about the helmet fitting process. This includes head coaches, helmet sales representatives, and athletic directors. The prominent organizations I will share the information with are the North Carolina Football Coaches Association (NCFCA), the North Carolina Coaches Association (NCCA), and the Eastern North

Carolina Football Coaches Association (ENCFCA). Using the PowerPoint presentation, I will present my findings at one of the monthly ENCFCA business meetings. I have been in contact with the board of directors of the ENCFCA, and they have agreed to have a helmet fitting seminar in which helmet representatives and I will instruct coaches on the proper way to fit football helmets and the best practices to use.

There will be opportunities to present the findings on a broader range at various clinics and businesses. I have scheduled meetings with football helmet sales representatives. Sales teams have asked that I present at one of their monthly business meetings and present the research findings. Research has shown that helmet sales representatives play a significant role in purchasing and fitting football helmets. I have contacted all clinic directors, and final dates will be set. At these clinics, I will give a quick presentation on the research findings and provide an avenue in which coaches can utilize resources to help them fit football helmets properly. These clinics include:

- NCCA Clinic (Greensboro, NC)- July 2024
- ENCFCA Clinic (Greenville, NC)- January 2025
- NCFCA Clinic (Greensboro, NC)- February 2025
- Playbook Clinic (Charlotte, NC)- February 2025
- Glazier Clinic (Charlotte, NC)- March 2025
- NC State Football Mega Clinic (Raleigh, NC)- April 2025

Phase three plans include contacting multiple stakeholders to share the climate of football helmet fitting in North Carolina High School Football. The most pertinent plan includes finding grant money to produce posters that contain the same information as the coach's helmet fitting checklists. The vision is to give these posters free to each high school program to display in the area where they fit football helmets.

In my time interning in the NFL, professional locker rooms have posters that explain to players how to keep their heads out of plays, how they should be dressed, and other

informational posters that pertain to the game. I envision creating a poster that coaches can put up in locker rooms that instructs players on how their helmets should fit and look. This poster would include when players need to seek the help of their coach for fitting or hardware issues.

The third part of phase three is to reach out to the NCHSAA and the NFHS educational directors. I would like to present the research information and the quotes of coaches who desire an online helmet fitting course added to the instructional materials they must complete each year. On a broader scale, if a course existed on the topic, all state athletic associations could use it, and a wider audience could be reached.

The ultimate goal of this action plan is to educate coaches on the benefits and proper ways to fit football helmets. In this action plan approach, the first goal is to inform the high school head coaches of North Carolina where they can have the most immediate impact and then educate assistant coaches and players. Presenting the information on multiple levels will help prevent injuries and keep the game of football safer.

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## APPENDIX A: SURVEY MEASURES

### Survey Instrument

To be eligible for this survey, you must be a current or former high school football coach at a member school in the NCHSAA or NCISAA. Your participation is voluntary and the survey may be exited anytime by closing the browser. You may skip any questions you wish.

- I certify that I am a current or former NCHSAA/NCISAA head football coach
- I am not a current or former NCHSAA/NCISAA head football coach

*Skip To: End of Survey If To be eligible for this survey, you must be a current or former high school football coach at a m... = I am not a current or former NCHSAA/NCISAA head football coach*

---

What is your age?

- 18-25
- 26-35
- 36-45
- 46-55
- 56-65
- 66+

What is your race/ethnicity?

- White/Caucasian
  - Black or African American
  - Asian
  - Hispanic or Latino
  - American Indian or Alaskan Native
  - Native Hawaiian or Pacific Islander
  - Other/Self Describe
  - Prefer Not to Say
-

What best describes your gender?

- Male
  - Female
  - Non-binary / third gender
  - Prefer not to say
- 

What is your highest level of education obtained?

- High School Diploma or GED
  - Associates Degree
  - Bachelor's Degree
  - Master's Degree
  - Advanced Certificate
  - Doctoral Degree
-

Did you play high school football?

Yes

No

---

Did you play college football?

Yes

No

---

Did you play professional football?

Yes

No

---

How many years' experience do you have as a head high school football coach?

1-5

6-10

11-15

16-20

21-25

26+

---



How many years' experience do you have coaching football at all levels?

1-5

6-10

11-15

16-20

21-25

26+

---

What levels have you coached football at? (Select all that apply)

High School

College

Professional

Do you work full time at the school you coach at?

Yes

No

---

During the season, how many hours per week do you spend on all things related to coaching football? This includes practice, games, film study, equipment, field maintenance, etc.

1-10

11-20

21-30

31-40

41-40

51+

---

What classification is the school you coach at?

4A

3A

2A

1A

---

What is the setting of your school?

Rural

Urban

---

How many players on average are included in your program? (Freshman, JV, and Varsity)

10-20

21-30

31-40

41-50

51-60

61-70

71-80

91-100

101+

---

How many coaches do you have on your staff? (Paid and Volunteer)

1-4

5-10

11-14

14+



What is your estimated total annual budget for your football program? (This includes school allotment for reconditioning, fundraising, donations, booster club, etc.) Note: This does not include coaching supplements

- \$0-\$10,000
  - \$10,001-\$20,000
  - \$20,001-\$30,000
  - \$30,001-\$40,000
  - \$40,001-\$50,000
  - \$50,001-\$60,000
  - \$60,001-\$70,000
  - \$70,001+
-

Does your school have an athletic trainer or first responder?

- Full-time designated athletic trainer
  - Full-time designated athletic trainer who also teaches at the school
  - Part-time designated athletic trainer
  - Part-time athletic trainer that is shared with other schools
  - Only a first responder
  - No athletic trainer or first responder
-

Approximately, how many total football helmets do you have in your program?

10-20

21-30

31-40

41-50

51-60

61-70

71-80

81-90

91-100

101+





What brand of helmets do you have in your program? (Select all that apply)

Schutt

Riddell

Xenith

Rawlings

VICIS

Light

SG

Other

---

How often are your helmets reconditioned?

Every year

Once every two years

Three years or more

---

Have you ever received training on how to properly fit football helmets?

Yes

No

*Skip To: Q30 If Have you ever received training on how to properly fit football helmets? = No*

---

If you have received training, how was that training delivered?

Online Course

In-person clinic

Football helmet representative/sales person

---

Do you have a designated person who is responsible for fitting football helmets?

Yes

No

---

Who is the designated person who is responsible for fitting football helmets in your program?

- Head Coach
  - Assistant Coach
  - Athletic Trainer
  - First Responder
  - Equipment Manager
  - Other
-

If you are not the person who is responsible for helmet fitting in your program, has the designated person in charge of fitting received any training in proper helmet fitting to your knowledge?

Yes

No

Not Sure

---

How often do you inspect all helmets during the football season for cracks, loose hardware, broken chinstraps, air bladders, etc.?

- Every day
  - Every other day
  - Once per week
  - Before every game
  - Once per month
  - Once per season
  - Only when players bring it to my attention
  - Never
- 

During a game when a players helmet comes off during play, do you have a designated person who ensures helmet integrity and fit before that player returns to play?

- Yes
- No

---

How often do you or a staff member recheck the fit of football helmets that your players wear during the season?

- Every day
  - Every other day
  - Once per week
  - Before every game
  - Once per month
  - Once per season
  - Never
-

Do you think there should be an emphasis put on proper helmet fitting in high school football?

- Yes
  - The educational opportunities now are sufficient
  - No
- 

How confident are you in properly fitting football helmets for your players according to manufactures recommendations?

- Not at all confident
  - Slightly confident
  - Moderately confident
  - Very confident
  - Extremely confident
-

How well do you understand manufactures' guidelines for fitting football helmets?

- Not well at all
  - Slightly well
  - Moderately well
  - Very well
  - Extremely well
- 

How confident are you in taking a helmet apart and putting it back together? This includes removal of facemask, interior pads, jaw pads, chinstraps, air bladders, etc.

- Not confident at all
  - Slightly confident
  - Moderately confident
  - Very Confident
  - Extremely confident
-



What is the likelihood of you completing a helmet fitting course on NFHS Learn if it was free of charge?

- Not likely at all
  - Slightly likely
  - Moderately likely
  - Very likely
  - Extremely likely
-

What is your current level of concern for players wearing helmets that do not fit properly?

- Not concerned at all
  - Slightly concerned
  - Moderately concerned
  - Very concerned
  - Extremely concerned
-

In your opinion, what is the importance of having players wear properly fitted football helmets?

- Not important at all
- Slightly important
- Moderately important
- Very important
- Extremely important

---

As a football coach, what barriers are there (if any), that prevent you or your staff from properly and continually fitting your players football helmets?

---

Here is the optional Google Form link to enter your name into a random drawing to win one of eight \$50 gift cards. You do not have to leave your information in the Google Form.

[Google Form Link](#)

I understand and filled out the Google Form link

I prefer not to fill out the Google Form link

End of Block: Default Question Block

---

## **Semi-Structured Interviews**

After the online survey, coaches will be asked if they want to participate in semi-structured interviews. These interviews will take place over Zoom. Each interview will be recorded by using the Zoom record feature. Each main topic of the interview will have questions that are structured and pre-written, but the questions will allow for the conversation to flow naturally.

## **Interview Script**

### **Introduction**

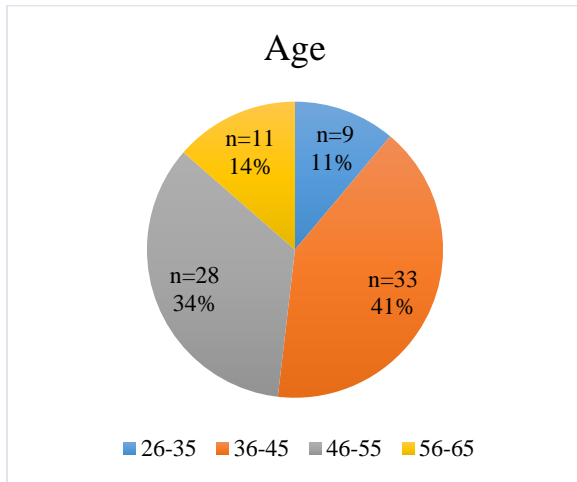
- Hello, my name is Garrett Wingate and I am a doctoral student at the University of North Carolina at Greensboro. I am an assistant football coach at a high school in North Carolina and have worked in college and professional football.
- The reason for this interview is to find out further information from the survey about the thoughts and procedures your program uses for football helmet fitting. The findings from this research may help create educational opportunities to help reduce the risk of injury and severity of concussion symptoms in football players.
- Ground rules for the interview
  - The interview is voluntary
  - You may abstain from answering certain questions if you feel uncomfortable
  - There are no right or wrong answers
  - Everything said in the interview is confidential
  - Our interview will be recorded and transcribed. Names and likeness will be removed to preserve confidentiality. You will be sent the transcript later for your review.

**Main Idea 1:**

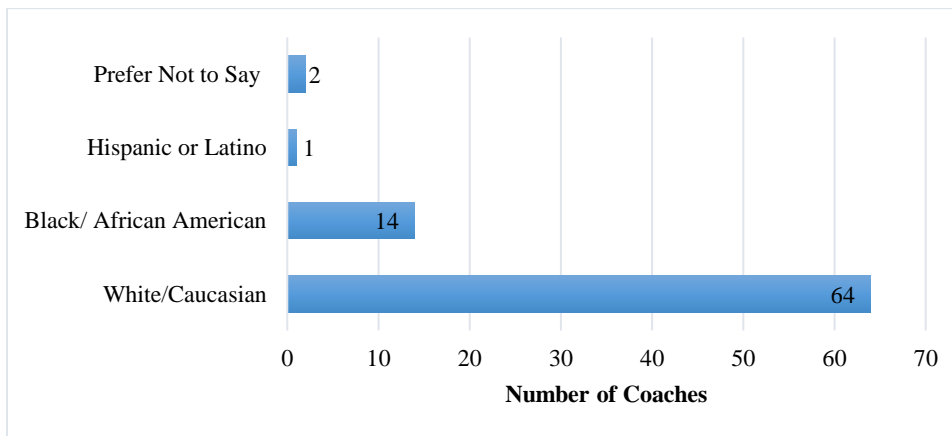
- I. In your opinion, have there been numerous changes to the game of high school football in North Carolina, in regard to the safety of players?
  - A. What changes have you noticed the most?
  - B. Do you feel like the game of football is safer now than it used to be?
  - C. What methods are you using to improve the safety of players?
  
- II. How do you pass out helmets to football players each year?
  - A. When you pass out helmets, do you or someone on your staff fit each football player?
  - B. What influences you when you purchase new football helmets for your program?
  - C. What guide do you use to purchase new football helmets? (VT Study)
  - D. What guidelines are used when football players are fit for helmets?
  - E. Have you been trained on how to properly fit football helmets?
  - F. Do you feel confident that you or someone on your staff fits football players properly according to manufacturers' guidelines?
  - G. What barriers do you think exist when it comes to fitting players' football helmets?

## APPENDIX B: PARTICIPANT DEMOGRAPHICS

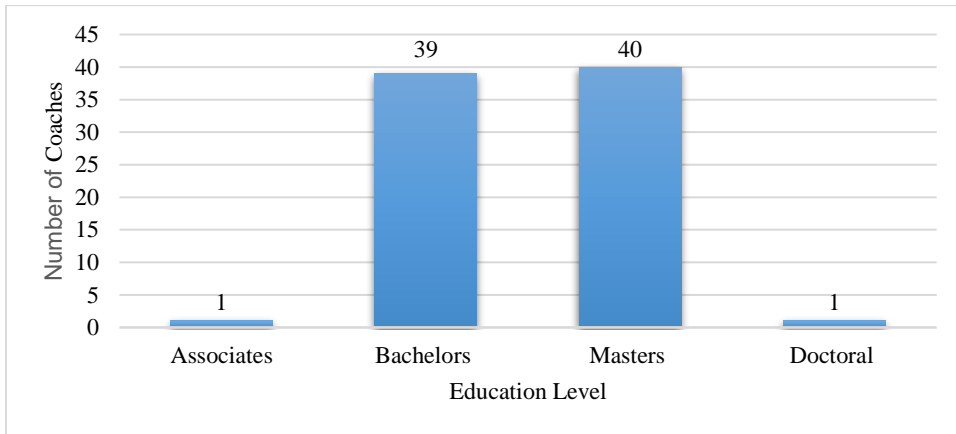
### Age of Survey Participants



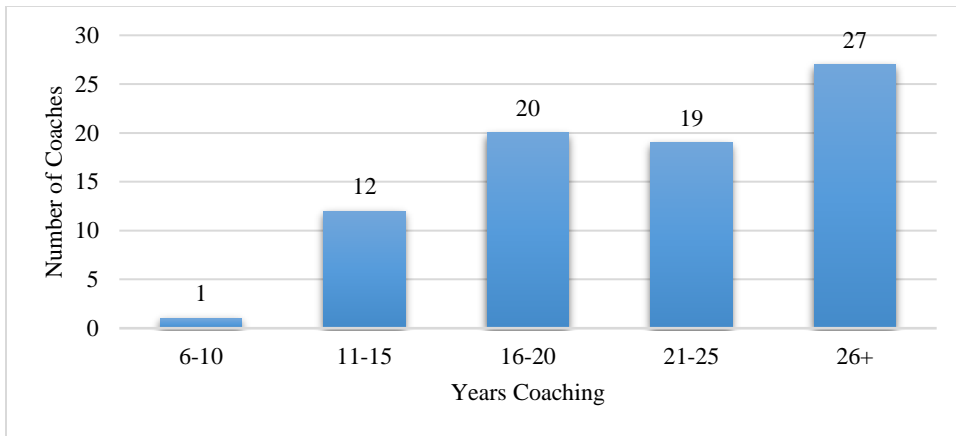
### Race/Ethnicity of Survey Participants



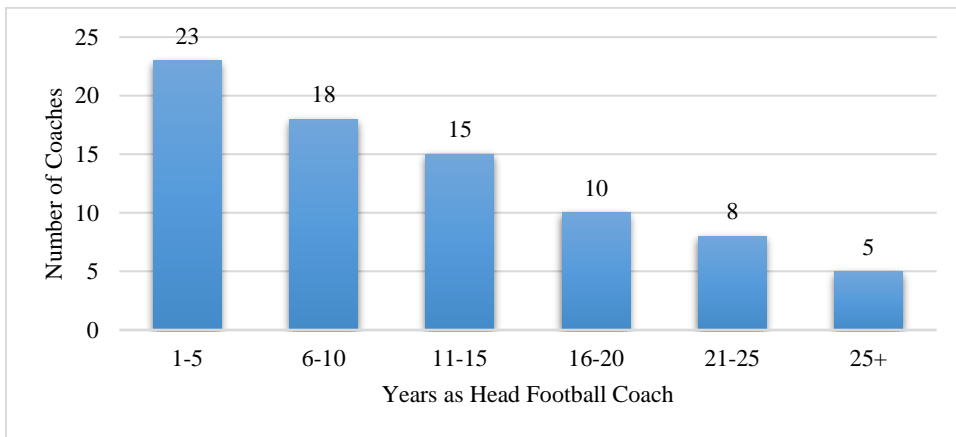
### Highest Level of Education of Survey Participants



### Number of Years Coaching Football

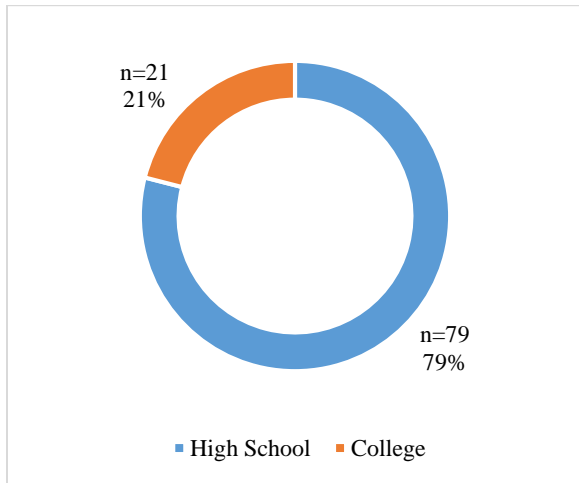


### Number of Years as a Head Football Coach

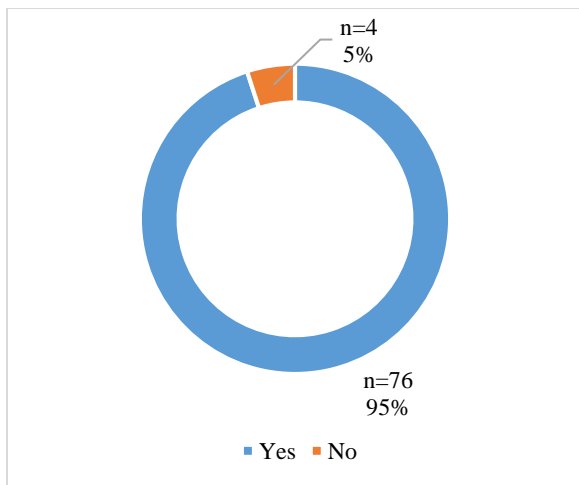




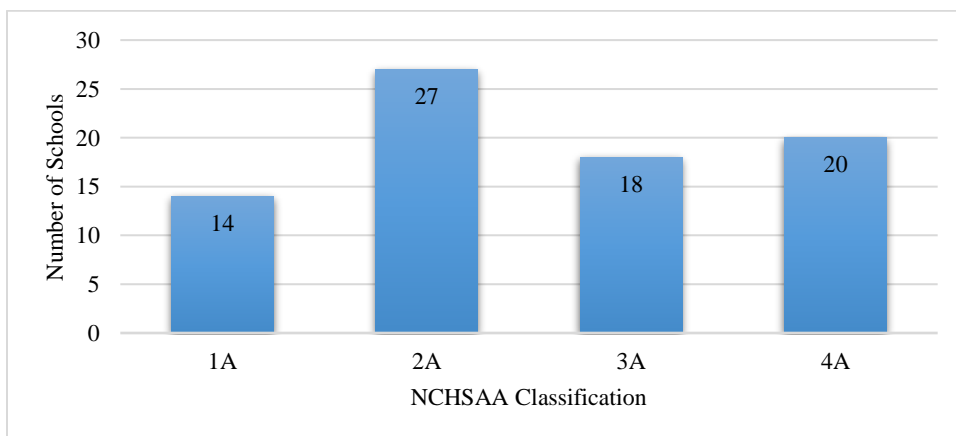
### Levels Coached



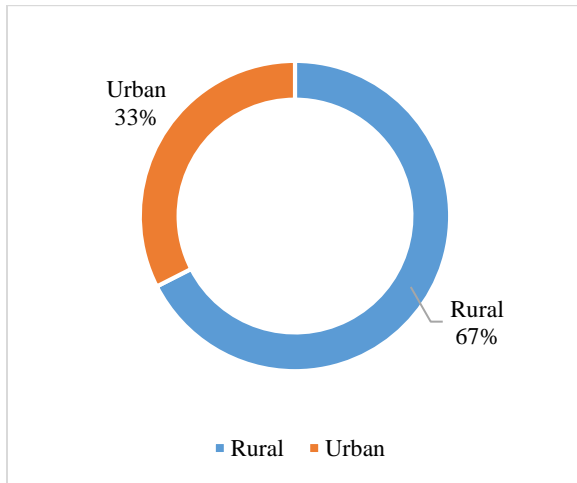
### Full-Time Employment Status at School



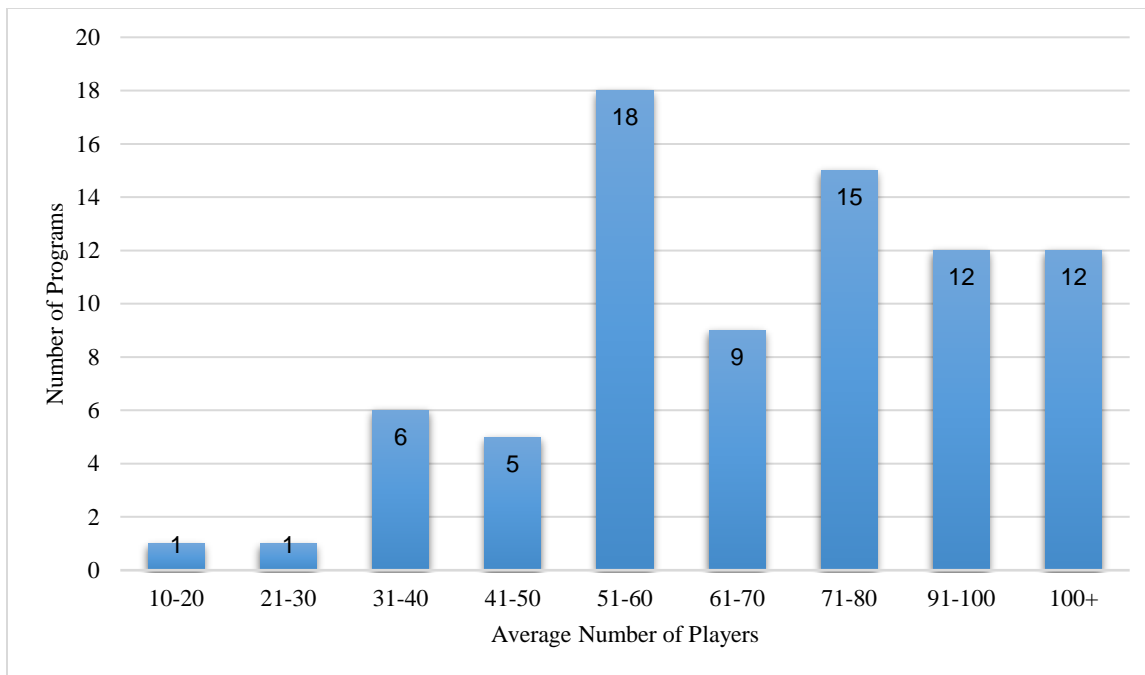
### School Classification



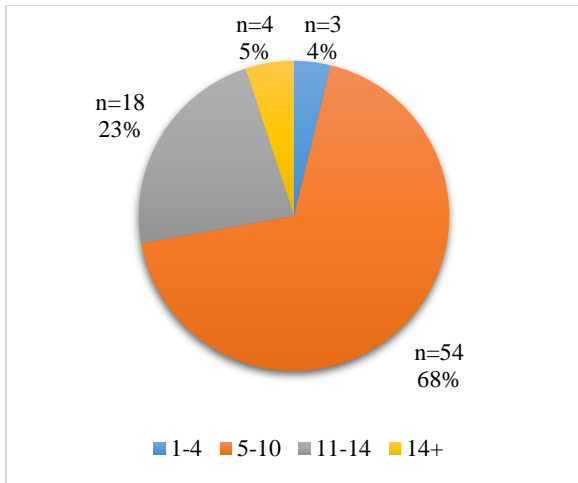
## School Setting



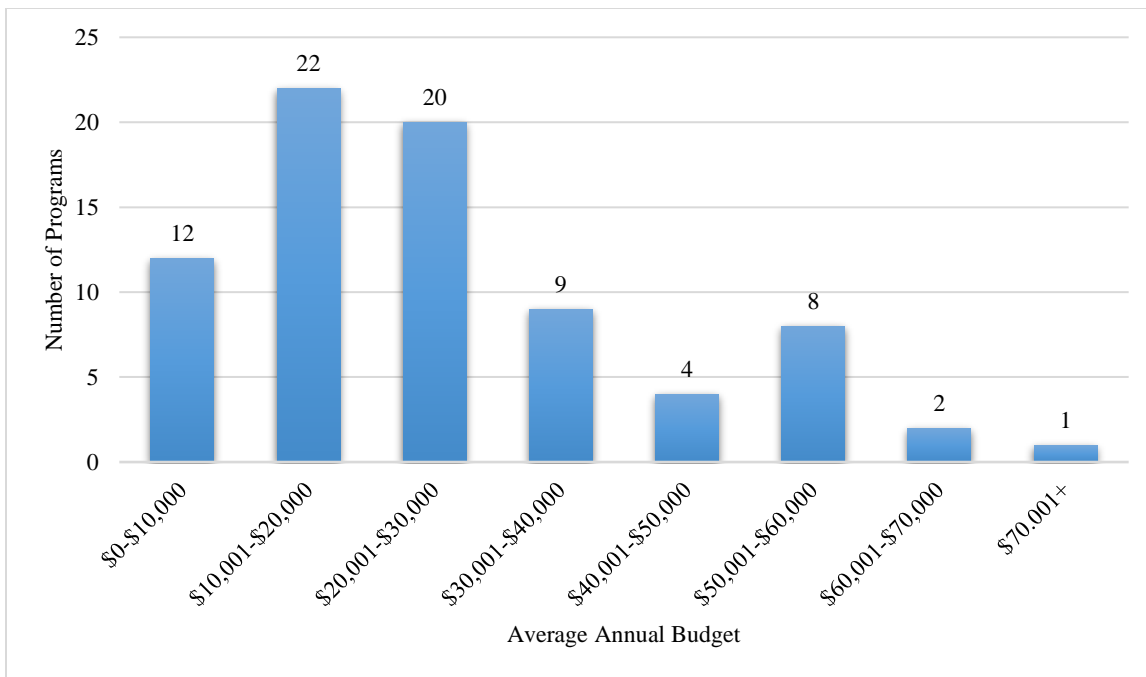
## Average Number of Players in Program Annually



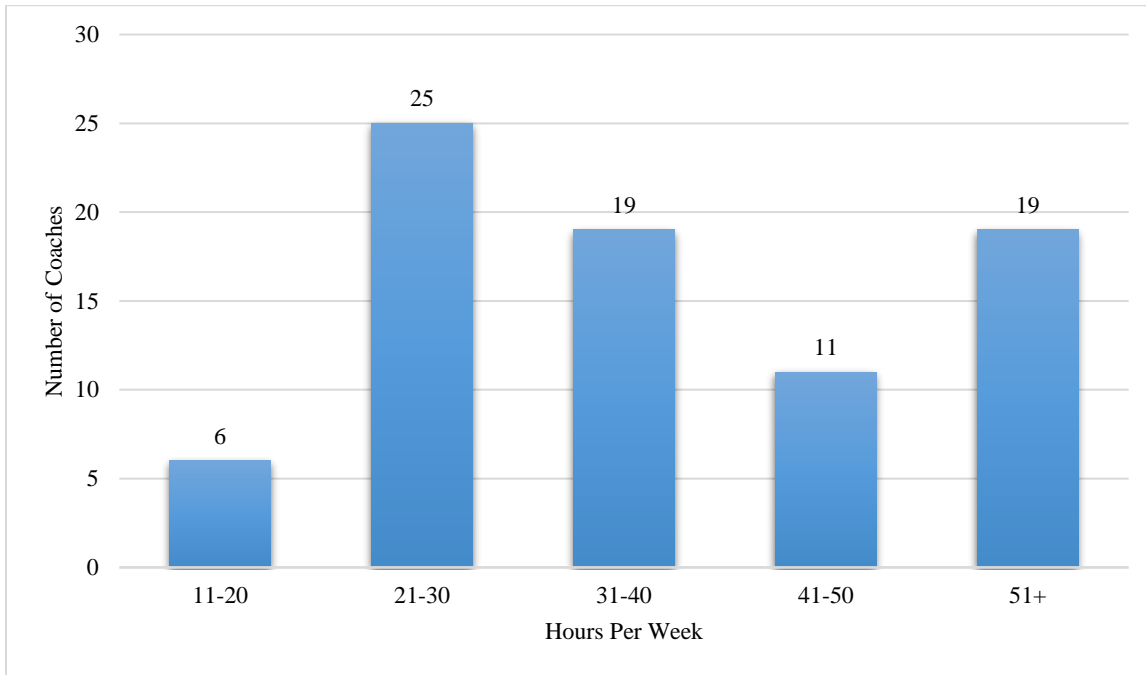
### Number of Assistant Coaches on Staff



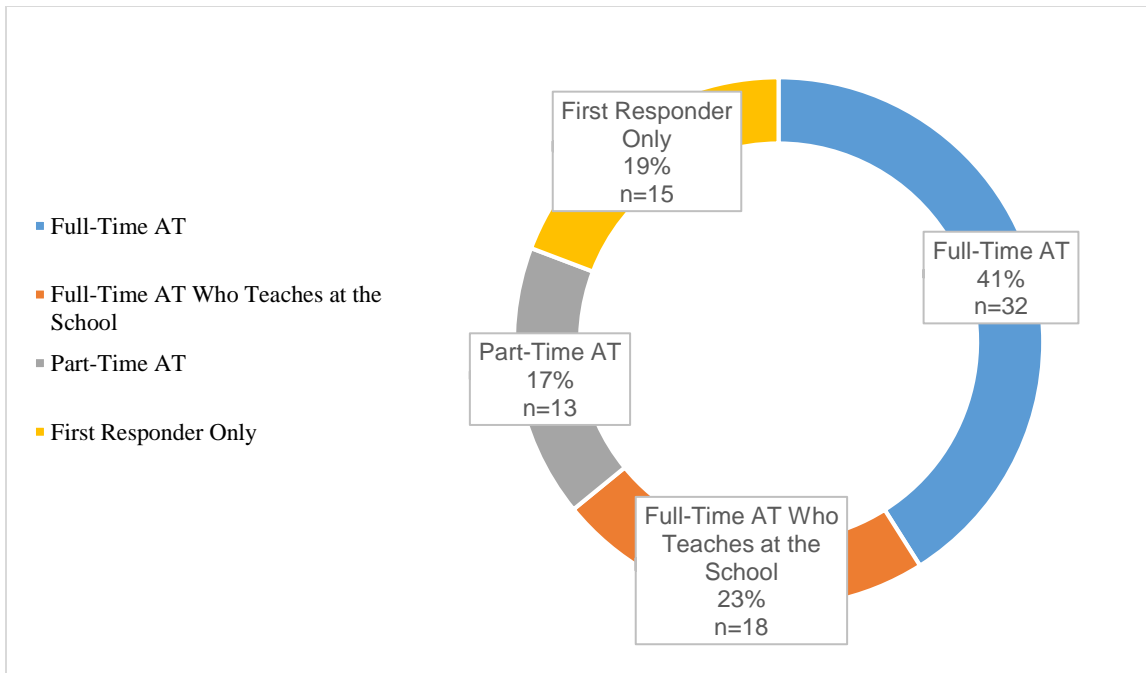
### Total Annual Football Budget



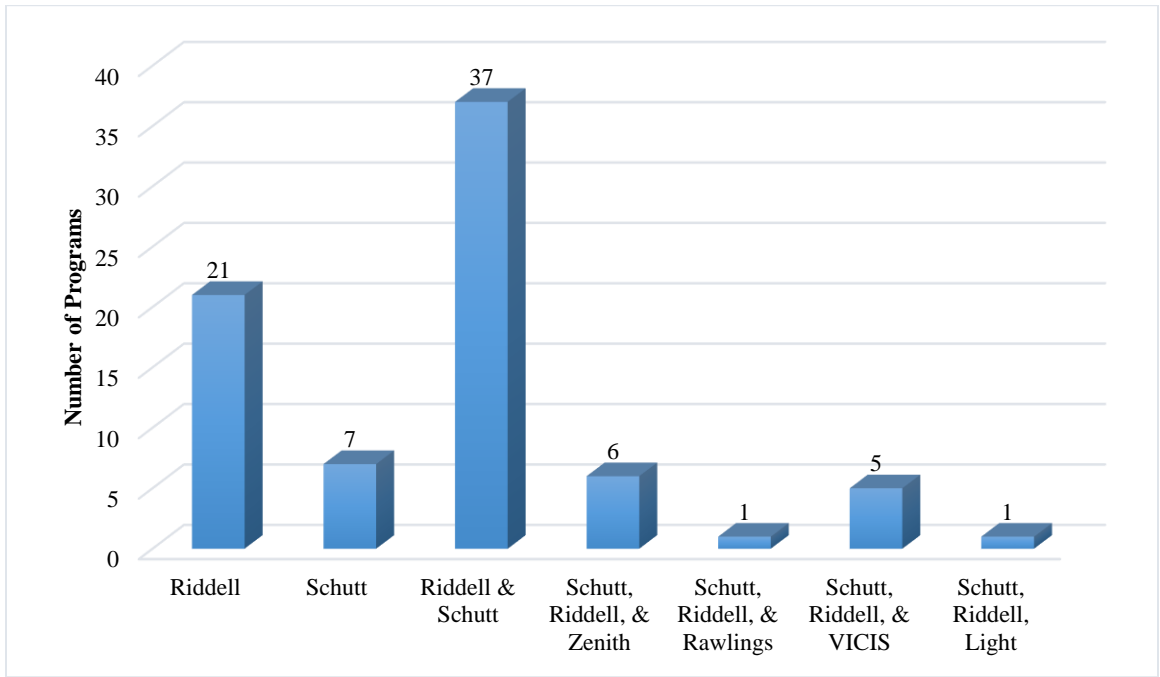
### Hours Worked Per Week for Football Alone



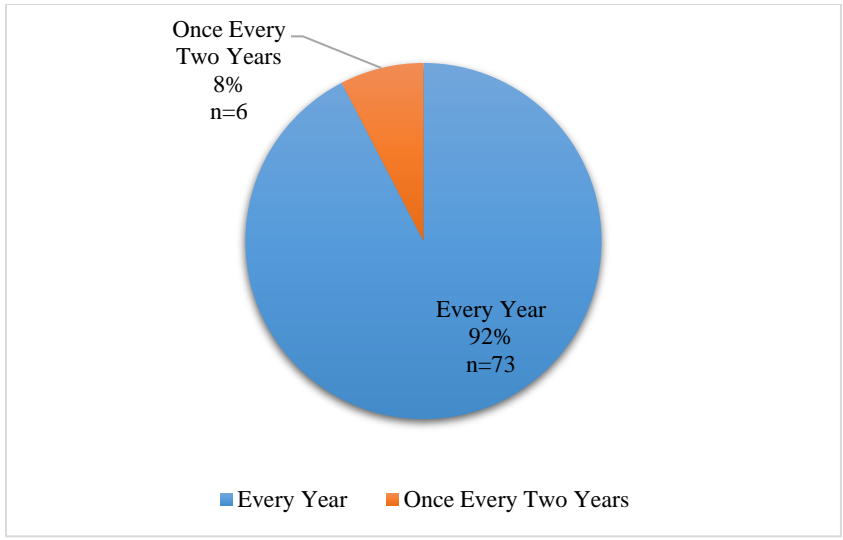
### Athletic Trainers or First Responders



### Distribution of Helmet Brands in Programs



### Helmet Reconditioning



APPENDIX C: SAMPLE PARTICIPANT RESPONSES

**Survey and Interview Open-Ended Questions for Constraints to Helmet Fitting**

Theme	Source	Supporting Responses
Time: Helmet fitting takes time	Survey & Interviews	<p><i>We spend more time properly fitting equipment.</i></p> <p><i>If you got one coach who is trying to go through by himself that could definitely take some time.</i></p> <p><i>So twice we fit and then yet really it's a pain cause its takes time.</i></p> <p><i>It's definitely time consuming, but as far as for the best overall interest of the kid and safety and keeping the game and if we want to keep playing football, and play for the next 20 years, helmet safety is a big one.</i></p> <p><i>I think everybody can make time for it. But it can be a rush, when you get all your freshmen to come in at one time, and you want to get all the equipment out.</i></p> <p><i>Lack of staff and lack of time.</i></p> <p><i>Time constraints. Way too many responsibilities and things going on. I take great care to fit them properly and adjust them during the beginning of the year, but do not take time to regularly inspect them.</i></p> <p><i>Manpower to do such in time limitations.</i></p>
Time: Time of year fitting takes place	Survey & Interviews	<p><i>I'll fit them for spring ball.</i></p> <p><i>We start in the spring and it's really two coaches that do it. Me and another coach I trust.</i></p> <p><i>We pretty much we fit in the spring for the ones who participate.</i></p> <p><i>We give out helmets in the spring before spring practice.</i></p> <p><i>We have a couple of weeks in the spring.</i></p> <p><i>We wit fit in the spring before spring practice.</i></p>
Time: Players Joining Programs After Fitting Windows	Survey & Interviews	<p><i>Players coming in late or starting the season late.</i></p> <p><i>I know myself and two other coaches know how to fit players, but the problem is when all of a sudden a new player walks up on day five, and all of a sudden another coach has to fit that player. I don't feel good about that. Sometimes players just slip through the cracks.</i></p>

		<p><i>Okay, go ahead, this helmet looks good to go because I gotta get into practice or whatever, especially as you get as mentioned earlier, a straggler or somebody who just joined the program.</i></p>
<p>Education: Lack of Education</p>	<p>Survey &amp; Interviews</p>	<p><i>We've had some of that in the past where there's some of the JV coaches aren't as with it as the varsity coaches are.</i></p> <p><i>I think sometimes we get people that don't know what they're doing and haven't done it.</i></p> <p><i>But you have those times where somebody has to go in and check a helmet or do something and you would like for everybody that's dealing with that to understand that process.</i></p> <p><i>I don't like it when certain coaches do it because they don't have an idea what they are doing. But I know that all of us don't do it like we should.</i></p> <p><i>But the actual technical level of knowing exactly what it's supposed to be, you know, having the right measurements and helmets fitted for kids exactly right, that might be the only thing I see as a barrier.</i></p> <p><i>Education on how to properly fit the helmet.</i></p> <p><i>Training for everyone.</i></p> <p><i>No known training.</i></p> <p><i>Specific proper helmet fitting training.</i></p>
<p>Education: Lack of Consistency</p>	<p>Survey &amp; Interviews</p>	<p><i>Different coaches fitting players.</i></p> <p><i>We give out helmets at different times so it is never the same person that does it.</i></p> <p><i>The numerous times that we give out equipment. It's never the same person</i></p> <p><i>I don't like it when certain coaches do it because they don't have an idea what they are doing.</i></p>
<p>Education: Lack of Emphasis (Legalities)</p>	<p>Survey &amp; Interviews</p>	<p><i>There was a school out this way got busted for buying helmets off the back of a truck and they weren't legal and everything and there's a lot of just safety concerns with it.</i></p> <p><i>There needs to be more regulation and quite frankly, punishment for those programs that are playing an out of date helmets.</i></p> <p><i>Reconditioning needs to be regulated tighter in counties and maybe the state needs to be a little bit tighter on reconditioning.</i></p> <p><i>There needs to be some level of accountability piece.</i></p> <p><i>The emphasis just isn't there.</i></p>

		<i>Turnover in staff, security of equipment, time and no emphasis.</i>
Education: Need for Online Helmet Fitting Course	Survey & Interviews	<p><i>More resources would definitely be a good thing. I think that having everybody on your staff understand the process of fitting would be a very good move.</i></p> <p><i>To me, that's a no-brainer.</i></p> <p><i>We take the concussion course, but the majority of that is recognizing signs and symptoms and how to treat concussions and how serious it is, but we don't have any education on things that can prevent it. We're not required to take any education on your own on the possible ways of preventing, or at least reducing the risk of of suffering from a concussion.</i></p> <p><i>It should be a whole separate course. I think it's a simple yes.</i></p> <p><i>If you're gonna make it free, then you should require it for everyone.</i></p> <p><i>It'd be okay to do it. Not every year like concussion but maybe one time.</i></p> <p><i>If the course was created and was to the point, it might be more beneficial.</i></p> <p><i>A separate course wouldn't be more beneficial than just tagging it along into the concussion course itself.</i></p> <p><i>I'd much rather do a course on proper helmet fitting and shoulder pad fitting than another course on concussions.</i></p> <p><i>I can't believe they don't have one on helmet fitting and I think would be great (to have an online course on helmet fitting).</i></p>
Education: Coaches are not Rechecking Helmet Fit	Survey & Interviews	<p><i>We don't after we pass them out the first time. We only recheck if the kids tell us something is wrong with their helmet.</i></p> <p><i>No, we don't.</i></p> <p><i>We don't refit but we do look for when kid's helmets might be getting loose.</i></p> <p><i>As far as a let's recheck the fit, no we do not do that.</i></p> <p><i>As far as doing like a recheck of the entire team like we do when we first issue equipment, now we don't.</i></p> <p><i>No we don't.</i></p> <p><i>We will check the air and make sure all that is right, but as far as rechecking the fit we don't do that.</i></p>
Education: Fitting Guides	Survey & Interviews	<p><i>I've never seen the actual scale for what size measurement is for what helmet.</i></p> <p><i>As far as a like set list of things to look for or a checklist, no we don't.</i></p> <p><i>There should be checklists printed based on the company you buy from.</i></p>



		<p><i>No I don't use any. I go by experience.</i></p> <p><i>We don't have any posters or anything like that.</i></p> <p><i>No we don't use any posters or checklists.</i></p> <p><i>We do not use anything.</i></p> <p><i>Having different brands of helmets (is a barrier to proper fit).</i></p>
<p>Finances: Lack of Sizes</p>	<p>Survey &amp; Interviews</p>	<p><i>Not having enough of the proper sizes for players, as well as a lack of parts for repair or replacement of air bladders if needed.</i></p> <p><i>Not enough proper equipment to properly fit every player with the perfect helmet.</i></p> <p><i>As long as we have the required number and sizes we are okay.</i></p> <p><i>Having enough helmet sizes.</i></p> <p><i>Not having enough of each sized helmet.</i></p> <p><i>Having enough of the correct sized helmets to make sure each kid gets correct size.</i></p> <p><i>Size availability of helmets in the program.</i></p> <p><i>Sizing in general. Making sure we have enough helmets to size every player is a challenge.</i></p> <p><i>Each year the number of helmets per size differs. As soon as we add more large helmets, we need more mediums and have to use a shim kit. This works the other way too.</i></p>
<p>Finances: Reconditioning Cost</p>	<p>Survey &amp; Interviews</p>	<p><i>Reconditioning is costing so much.</i></p> <p><i>Their reconditioning cost is near a third of what the other brands are.</i></p> <p><i>Four years ago I paid \$4000 for reconditioning, the next year it was \$4500, then it was \$5200, and this year it was \$6200 and I don't know what I'm going to do. I mean, I'm thinking about going to every other year for reconditioning or having to go with someone else.</i></p>
<p>Finances: Helmet Cost</p>	<p>Survey &amp; Interviews</p>	<p><i>Monetary limitations to access more helmets.</i></p> <p><i>Then now because helmets are so expensive, feeding into your shoulder pads budget, or now you're eating into your reconditioning budget to save money to get better helmets so now truly keep it generic instead of the best helmets.</i></p> <p><i>It's the difference between being able to afford 10 helmets and being able to have three helmets.</i></p>

		<p><i>I think, to me, when it comes to player safety and aiming directly at helmets, I think the helmet cost is obviously something that gets in the way.</i></p> <p><i>The biggest thing is I wish our school had more funds to have more of a vast variety of helmets to specifically fit each kid. There are different shapes of heads and the helmets we have are very generic.</i></p>
<p>Player Attributes: Hair styles</p>	<p>Survey &amp; Interviews</p>	<p><i>The biggest barriers we face in fitting helmets properly are the hair styles when there is a large of amount of hair a player has.</i></p> <p><i>Hair styles that prevent tight fits.</i></p> <p><i>The big one is haircuts. I mean, you know, kid goes from dreads to a low cut or kid has a head full of mullet hair and then now he's got the dreads cut or kids grow his hair out.</i></p> <p><i>Hair styles where kids are wearing bigger helmets than they should.</i></p> <p><i>Hair Styles.</i></p> <p><i>The hair seems to always be a problem.</i></p> <p><i>I would say the hair is probably one of the biggest roadblocks sometimes to really a good, proper fit.</i></p> <p><i>What really affects it is kid's hair. I would love to go to a true course or seminar on what helmet reps would suggest.</i></p> <p><i>Sometimes we have a problem with hair or different shaped heads and how that affects what they can wear by the brand of helmet we have.</i></p>

### Survey and Interview Open-Ended Questions for Facilitators to Helmet Fitting


Theme	Source	Supporting Responses
<p>Helmet Sales Representatives: Assist in the Fitting Process and Influence of Purchasing</p>	<p>Survey &amp; Interviews</p>	<p><i>We've even brought in helmet reps in the past. I used to get the helmet rep to help me fit all their all of our guys to make sure we ensured a more safe fit.</i></p> <p><i>We use our regular sales rep and (our sales rep) is like one of the owners and he's been there forever. He's gonna recommend the best thing out there.</i></p> <p><i>Our old coach is now the helmet rep so we like only having one brand of helmet. I've been places where we had Schutts and Riddells and Zenith. when you've got multiple brands it's just confusing. You've got to get pieces for all of them and that just a pain.</i></p> <p><i>We rely on our sales reps big time that they're going to push us in the right area to the best helmet for the kids.</i></p>

		<p><i>I know the first year I ever fit (the players) we brought in our helmet rep. He fit our team instead of us doing it. So I feel like they know a little bit more.</i></p> <p><i>We use our sales reps for sure. We actually do a little bit of research based off our sales rep.</i></p> <p><i>The helmet sales rep comes in and I normally buy whatever we can afford from that company.</i></p> <p><i>When we started having issues, it opened our eyes that maybe (brand of helmet) was not such a bad product and alot of that has to do with our sales representative. If we had a good relationship with the salesperson, it made us more likely to buy from that person or company.</i></p>
<p><b>Multiple Fitting Stations: Coaches use Others to Assist in the Helmet Fitting Process</b></p>	<p><b>Survey &amp; Interviews</b></p>	<p><i>We also have two or three other coaches in the room with him when he does it. So like there's multiple guys, making sure that everything snugged up and everything fits and a couple of guys look at it.</i></p> <p><i>We'd have myself, I do the fitting station. I'd have my next best assistant on the chin strap and pull station. We have a coach come by and double-check us to make sure that the kid hasn't at the end of the day come by and adjusted his chin strap or done some things he shouldn't have done because it's not cool. Just to kind of have that triple check.</i></p> <p><i>If it's too loose or doesn't fit right. If either of us coaches is up in the air or something we ask the other one to look at it so we have multiple eyes on it. And then we both kind of judge on our do we want to try this you know we go through either smaller ear pads, less air, whatever it is, or more or better, more air than the helmet to see. So we just kind of walk through it that way.</i></p> <p><i>One coach will fit the kid if you will, and then myself or my associate head coach and or defensive coordinator because that's where we're going to have the most impact is going to be from a defense standpoint for them.</i></p> <p><i>So one of the three of us will also evaluate to make sure that the fit is secure. So we really feel like we're getting a three-prong approach to it.</i></p> <p><i>Number one, the kid has a safety piece of it. Number two, we have one coach, look at it and fit it, and then we have a kind of a checks and balances with an additional coach that has more experience like myself and the assistant head coach or defensive coordinator will be the third person to try to ensure a fit.</i></p> <p><i>We have three coaches in there and size and the kids. We pass out the helmets. Make sure we teach them how to tighten the straps because we got the (helmets) with the pull chinstraps. Make sure they're safe and it's the same thing with shoulder pads and bring them in and make sure they're sized and fitted right. Make sure you got the proper equipment for when he leaves out of there. That's a big thing we do, use multiple coaches in the helmet fitting process.</i></p>

<p>Outside Academic Resources: Coaches are using Resources in Conjunction with Purchasing and Fitting.</p>	<p>Survey &amp; Interviews</p>	<p><i>We look at the Virginia Tech helmet safety scale, but you know, it's also price point is there too, because we want to be able to fit now as many guys as on our team as possible in the safest and newest product that's the safest.</i></p> <p><i>I think we all try to glance at Virginia Tech's grading. We might not understand it to a great degree. But we recognize the highest-performing ones. It's a good resource (VT Helmet Scale). It's a good piece to validate just to make sure that the helmets that you're looking at aren't scoring super low on the scale. As long as they're kind of grouped together. So I use that Virginia Tech study as a resource more than anything.</i></p> <p><i>I have used the Virginia Tech study and I have looked at that. But sometimes those those really top-of-the-line helmets are just they just price us out. Those you can't buy. It's the difference between being able to afford 10 helmets and being able to have three helmets.</i></p> <p><i>Virginia Tech (Scale), was my big go to because I knew they were doing it, so it was easy. For me to just oh look up Virginia Tech study and read through it and start to see which brand is better for our kids versus which price point.</i></p> <p><i>I look at the Virginia Tech helmet study multiple times.</i></p>
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## APPENDIX D: PRESENTATION

Slide 1



### Examination of Helmet Fit in North Carolina High School Football

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Slide 2

## Introduction



High school football is the most popular interscholastic high school sport in the US

- 2009- 1,110,527 Participants (NFHS, 2009)
- 2022- 976,886 Participants (NFHS, 2023)



Participation is decreasing and Sports Related Concussion is thought to be one of the major reasons why (Mahaffey, 2012).



Proper helmet fitting is one method all high school football programs to use to reduce concussion severity.



Slide 3

## Background Information


In 2008, multiple NC high school football players died due to Second Impact Syndrome.

2011: Concussion legislation- Gfeller-Waller Act was signed in North Carolina which oversees concussion education

- Gfeller-Waller Form
- NFHS Concussion Course

High School football has significantly more SRC than any other sport (Harmon et al., 2013)

There has been a major emphasis on reducing concussions in high school football since 2008. (Rule Changes, AT)



Slide 4

## Background Information


Helmets today do provide more protection and when worn properly can reduce the symptoms of SRC (NFL, 2022; Rowson et al., 2014)

Most essential variable in reducing the risk of an SRC is proper helmet fit. (Southerland & Hildebrand, 2020)

The goal of football helmets is to prevent fatal head injury, not prevent SRC.

All NFL and FBS NCAA schools have personnel who fit football helmets.

Question: What are the current fitting practices of NC High School Football Teams?



Slide 5


## Objectives

The purpose of this study is to investigate high school football coaches' knowledge, understanding, experiences, with proper football helmet fitting in their respective high school programs.

To investigate the current practices of football helmet fitting in high school football programs in NC

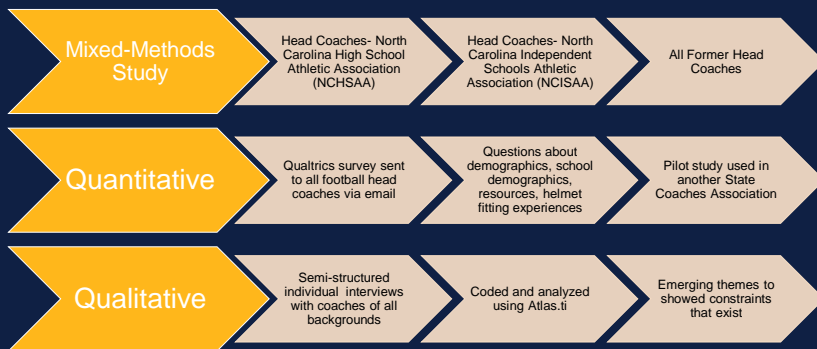
To identify current coaches' educational practices about football helmet fitting

To determine if high school football coaches face constraints in meeting helmet manufacturers' helmet fitting standards




Slide 6

## Methods



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graph LR; subgraph Mixed-Methods; direction LR; M1[Head Coaches- North Carolina High School Athletic Association (NCHSAA)] --> M2[Head Coaches- North Carolina Independent Schools Athletic Association (NCISAA)]; M2 --> M3[All Former Head Coaches]; end; subgraph Quantitative; direction LR; Q1[Qualtrics survey sent to all football head coaches via email] --> Q2[Questions about demographics, school demographics, resources, helmet fitting experiences]; Q2 --> Q3[Pilot study used in another State Coaches Association]; end; subgraph Qualitative; direction LR; Q4[Semi-structured individual interviews with coaches of all backgrounds] --> Q5[Coded and analyzed using Atlas.ti]; Q5 --> Q6[Emerging themes to showed constraints that exist]; end;
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## Slide 7

### Aim 1 Results:

- Most programs do have a designated fitter (62%,  $n=49$ )
- Most common fitter is a head or assistant coach (87%,  $n=69$ )
- 69% of designated fitters have received training.
- 60% of coaches surveyed designate a person to check a helmet when it comes off during play. Having a designated fitter increases this statistic.
- 64% of programs have a full-time athletic trainer.
- There is not a significant relationship between having an AT and rechecking the fit when a helmet comes off during play.
- 46% of coaches never inspect helmets during the season for loose hardware, facemask, or loose chinstraps.
- 42% of coaches are not rechecking the fit of helmets during the season.



## Slide 8

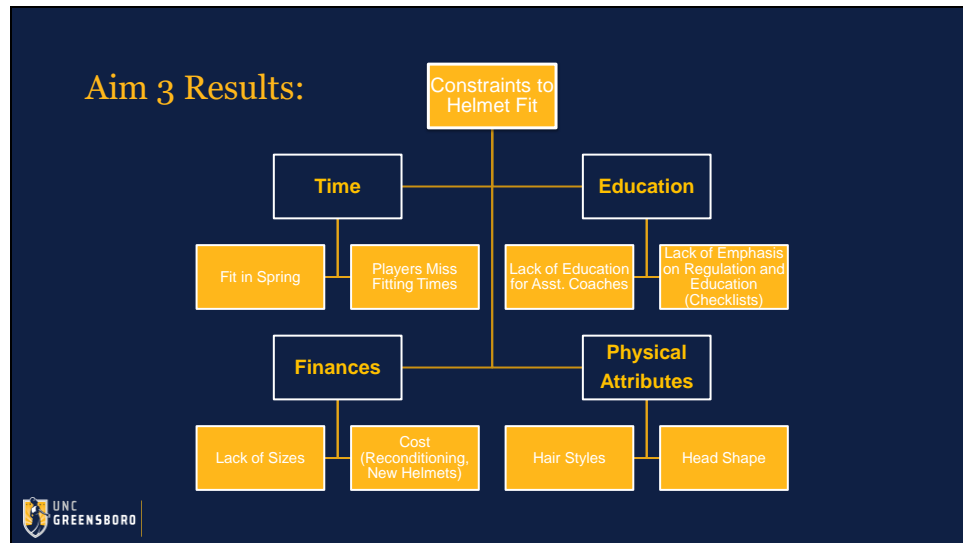
### Aim 2 Results:

- 69% of designated fitters have received training.
- Those who have been trained are more confident and understand manufactures guidelines better.
- Those who have received training do not have a higher confidence in taking a helmet apart and putting it back together.
- The most common form of training is from a football helmet sales representative. (76%)
- 83% of programs wear either Riddell or Schutt helmets.
- There is not a significant relationship between a certain brand of helmet and training from a helmet sales rep.

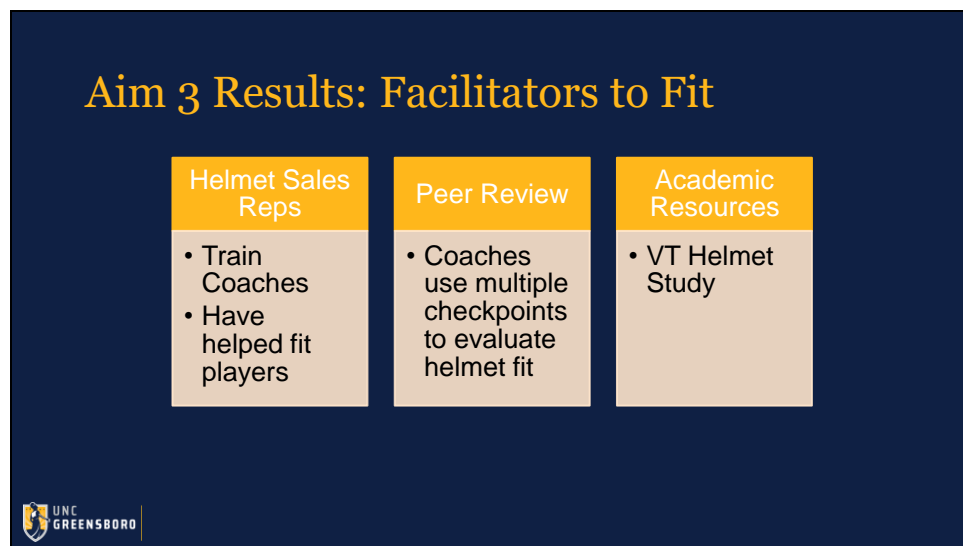




Slide 9



Slide 10



## Next Steps

- Checklist to fit helmets with manufacturer sizing charts
- Educational Opportunities
- Regulation for the reconditioning process (County AD's)
- Player poster – “How is my helmet supposed to fit?”
- Field study with payers and helmet fit checklist from Yeargin et al., 2021



**7 STEPS TO PROPERLY FITTING FOOTBALL HELMETS**

**#1 PREP**  
Inspect helmets for cracks/holes, chipped facemasks, loose hardware and make sure every helmet has a current NFCCAP sticker on the back.

**#2 WET HAIR**  
Create a game-like situation by wetting the player's hair. The helmet's hair should make what it will be during the season. Shampoo hair before fit.

**#3 MEASURE**  
Measure the circumference of the player's head 2 above the eyebrows. Refer to the size chart, and if between sizes, pick the smaller size.

**#4 ADJUST**  
Lock for gaps along the jawline and replace pad pads if needed. Adjust the chinstrap by having the player hold the chinstrap in place as you secure and adjust the buckle. Check the air bladder for over or under inflation. The front of the helmet should fit above the eyebrows.

**#5 FIT**  
1. Front of the helmet is 2 finger widths above the eyebrows.  
2. Facemask is 2-3 finger widths away from the player's nose.  
3. Facemask is not more than 2-3 finger widths away from the chin.  
4. Ear pads align with ears.  
5. Back of the helmet covers the base of the skull.

**#6 TEST**  
\*\*Get the player to keep their head and neck still while playing!  
1. Vertical - Pull up and down. If the helmet moves excessively, it is an improper fit.  
2. Horizontal - Turn the helmet side to side. The helmet should not slide on the head.  
3. Crown - Knock back hands and push down on helmet. There should be no pressure on the crown, just the forehead.  
4. Front - Spin the helmet in the front. If more than 25° gap appears = improper fit.  
5. Back - Push the back of the helmet. If more than a 25° gap appears = improper fit.

**#7 RECHECK**  
1. At the start of every preseason and season.  
2. Within the first two days after initial fitting.  
3. If hair styles/length change.  
4. If player gets into helmet at different level.  
5. Several times throughout the season.

UNC GREENSBORO

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### HELMET FITTING SIZE CHARTS

#### Riddell

SIZE	HI SIZE	CIRCUMFERENCE (CM)	CIRCUMFERENCE (IN)
<b>S</b>	up to 6 1/2"	46 to 50 3/8"	46 to 52cm
<b>M</b>	6 1/2" - 7"	50 3/8" - 52"	52 - 56cm
<b>L</b>	7" - 7 1/2"	52" - 53 1/2"	56 - 60cm
<b>XL</b>	7 1/2" and up	53 1/2" and up	60cm and up

#### schutt

Adult Size	Head Size	Head Circumference
Small	6 - 6 1/2"	19 - 20 1/2"
Medium	6 1/2" - 7"	20 1/2" - 22"
Large	7" - 7 1/2"	22" - 23 1/2"
XLarge	7 1/2" - 8"	23 1/2" - 25"

#### VICIS

HELL SIZE	COMPONENT SIZES (CM)
SMALL	19.0 - 19.5
MEDIUM	20.0 - 20.5
LARGE	21.0 - 21.5
EXTRA LARGE	22.0 - 22.5

#### XENITH

#### LIGHT HELMETS

VARSITY	SMALL	MEDIUM	LARGE	EXTRA LARGE
19.0"	19.5"	20.0"	20.5"	21.0"
21.0"	21.5"	22.0"	22.5"	23.0"
23.0"	23.5"	24.0"	24.5"	25.0"

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## APPENDIX E: HANDOUTS




# 7 STEPS TO PROPERLY FITTING FOOTBALL HELMETS




### #1 PREP

Inspect helmets for cracks/dents, chinstraps, facemask, loose hardware and make sure every helmet has a current NOCSAE sticker on the back.




### #3 MEASURE

Measure the circumference of the player's head 1" above the eyebrows. Refer to the size chart, and if between sizes, pick the smaller size.



### #5 FIT


1. Front of the helmet is 2 finger widths above the eyebrows
2. Facemask is 2-3 finger-widths away from the player's nose
3. Facemask is not more than 2-3 finger-widths away from the chin
1. Ear holes align with ears
2. Back of the helmet covers the base of the skull



### #7 RECHECK


1. At the start of every preseason and season.
2. Within the first few days after initial fitting.
3. If hair style/length changes.
4. If athlete gets new helmet or different brand.
5. Several times throughout the season.

### #2 WET HAIR




Create a game-like situation by wetting the player's hair. The athlete's hair should match what it will be during the season. Shorter hair equals better fit.

### #4 ADJUST




Look for gaps along the jawline and replace jaw pads if needed. Adjust the chinstrap by having the player hold the chinstrap in place as you secure and adjust the buckles. Check the air bladder for over or under-inflation. The front of the helmet should fit 1" above the eyebrows.

### #6 TEST



\*\*Tell the player to keep their head and neck still and in place!!

1. Vertical - Pull up and down. If the helmet moves excessively, it is an improper fit.
2. Horizontal - Turn the helmet side to side. The helmet should not slide on the head.
3. Crown - Interlock hands and push down on helmet. Player should feel pressure on the crown, not the forehead.
4. Front - Push the helmet in the front. If more than .25" gap appears = improper fit.
5. Back - Push the back of the helmet. If more than a .25" gap appears = improper fit.



# HELMET FITTING SIZE CHARTS

## Riddell

SIZES	HAT SIZE	CIRCUMFERENCE (IN)	CIRCUMFERENCE (CM)
<b>S</b>	up to 6 1/2	up to 20 3/8"	up to 52cm
<b>M</b>	6 1/2 - 7	20 3/8 - 22"	52 - 56cm
<b>L</b>	7 - 7 1/2	22 - 23 1/2"	56 - 60cm
<b>XL</b>	7 1/2 and up	23 1/2" and up	60cm and up

## schutt

Adult Sizes	Head Size	Head Circumference
Small	6 - 6 1/2	19 - 20 1/2
Medium	6 1/2 - 7	20 1/2 - 22
Large	7 - 7 1/2	22 - 23 1/2
XLarge	7 1/2 - 8	23 1/2 - 25

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## VICIS

SHELL SIZES		COMPONENT SIZING OPTION				
SHELL SIZE	HEAD SIZE	HEAD CIRCUMFERENCE	PART	AVAILABLE OPTIONS EACH HELMET COMES WITH FIT KIT		
MEDIUM	6 1/2 - 7	20 1/2" - 22"	DLTA PODS	0.50" <small>CROWN (1) SIDES (2) REAR BOSS (2)</small>	0.625" <small>OCCIPITAL (1)</small>	STABILIZER PADS <small>1.00" <small>INSTALLED</small> 1.25" <small>EXTRA</small></small>
LARGE	7 - 7 1/2	22" - 23 1/2"	DLTA PODS	0.50" <small>CROWN (1) SIDES (2) REAR BOSS (2)</small>	0.625" <small>OCCIPITAL (1)</small>	STABILIZER PADS <small>0.75" <small>INSTALLED</small> 1.00" <small>EXTRA</small></small>
X-LARGE	7 1/2 - UP	23 1/2" - UP	DLTA PODS	0.50" <small>CROWN (2) SIDES (2) REAR BOSS (2)</small>	0.625" <small>OCCIPITAL (1)</small>	STABILIZER PADS <small>0.75" <small>INSTALLED</small> 0.625" <small>EXTRA</small></small>

EXTRA DLTA PODS COMES WITH 3 YELLOW (0.625) / 3 GREEN (0.75)

## XENITH

VARSITY HELMETS		SIZE COMPARISON CHART
HEAD CIRCUMFERENCE		
CENTIMETERS		
INCHES		
SHADOW XR	<div style="display: flex; justify-content: space-around;"> <span>MEDIUM</span> <span>LARGE</span> <span>X-LARGE</span> </div>	
SHADOW	<div style="display: flex; justify-content: space-around;"> <span>MEDIUM</span> <span>LARGE</span> <span>X-LARGE</span> </div>	
X2E+	<div style="display: flex; justify-content: space-around;"> <span>SMALL</span> <span>MEDIUM</span> <span>LARGE</span> <span>X-LARGE</span> </div>	

## LIGHT HELMETS

Varsity	Small	Medium	Large	Extra Large
19.0"	19.5"	20.0"	20.5"	21.0"
21.5"	22.0"	22.5"	23.0"	23.5"
24.0"	24.5"			