Teamwork Makes the Dream Work: Experiences of Student-Athletes in STEM with Dual Advising

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Despite the nation's critical need for science, technology, engineering, and mathematics (STEM) college graduates, the National Collegiate Athletic Association's Division I student-athletes represent a small portion of STEM majors. Student-athletes pursuing STEM disciplines benefit from the assistance of academic and athletic advisors; this study explored student-athletes' experiences with such dual advising. Building on Terenzini and Reason's (2005) comprehensive model of influences on student learning and persistence, our findings highlighted STEM athletes' need for individualized advising, support engagement in STEM, and options and flexibility in the curriculum. The study also exposed uncertainty about the different roles of academic and athletic advising units and the ways limited communication diminishes the effectiveness of the advising units' collaborative efforts.

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The United States is a nation where organized sports are part of the formal higher education system (Coakley, 2014). Student-athletes—a term used interchangeably with *athletes*—are a special subset of the college student population that experiences challenges stemming from the dual roles of athletes and students. Athletic programs in the National Collegiate Athletic Association (NCAA) Division I comprise the highest level of U.S. college sports in terms of allocated budgets and level of competitiveness (Bass et al., 2015). This study focuses on Division I student-athletes because they graduate with science, technology, engineering, and mathematics (STEM) degrees at lower rates than non-athletes (NCAA, 2020). To date, only a limited number of studies exist on STEM athletes' experiences (e.g., Comeaux, Bachman, et al., 2017; Comeaux, Griffin, et al., 2017).

One of the benefits of the NCAA Division I is that student-athletes have simultaneous access to two types of advisors: major/program-specific academic advisors and athletic advisors. Thus, athletes have access to *dual advising* (Kelly, 2009) to support them on the path to graduation (Grandy et al., 2016; Kelly, 2009; Rubin, 2017). However, as Kelly (2009) asserted, dual advising and the ways academic and athletic advising departments collaborate to serve this unique athlete population majoring in STEM remains under-researched. This study addresses gaps in the literature by exploring STEM student-athletes' experiences with dual advising. The research questions examined in this study were:

RQ1. What are the advising needs of student-athletes in STEM?

RQ2. In what ways, if any, do academic and athletic advisors collaborate when advising student-athletes in STEM?

Literature Review

Student-Athletes in STEM

The importance of examining the STEM student-athlete experiences lies in the United States' critical need for STEM college graduates to meet the economy's rising demands (Hossain & Robinson, 2012; National Academy of Sciences et al., 2011). As defined by Fiorello (2010), STEM education is an interdisciplinary approach that seeks to incorporate a curriculum with specific learning strategies based on problem-solving, student active engagement, and the ability to explore innovative solutions. According to the National Science Foundation (2016), approximately 615,000 students attained bachelor's STEM degrees in 2013. Despite steady growth in STEM degree attainment over the past 15 years, the number of STEM college graduates fails to satisfy U.S. workforce demand. The shortage of STEM graduates affects the nation's ability to remain competitive at a global scale in STEM-related jobs, which are leading fields in technology and innovation (National Science Foundation, 2018; Tucker, 2017).

Despite STEM's national importance, student-athletes represent a small portion of students pursuing these fields. Of the nearly 180,000 athletes participating in NCAA Division I (NCAA, 2018), only 16% graduated with a STEM major between 2017 and 2018, in comparison to 26% of all students (NCAA, 2020). The discrepancies are profound for men, as only 15% of all male athletes graduated as STEM majors from 2017 to 2018, in comparison to 37% of male non-athletes. For women, 16% of female athletes and 18% of female non-athletes earned a STEM degree across the same time period (NCAA, 2020). Overall, student-athletes from non-revenue sports—meaning all sports except for football and both men's and women's basketball (Paule & Gilson, 2010)—graduate with STEM degrees at higher rates than athletes from revenue sports, which likely contributes to the discrepancies across gender (NCAA, 2020). Despite an increase in the proportion of *students* pursuing STEM, the graduation rates for STEM *student-athletes* have remained low and stagnant (NCAA, 2020).

Advising Needs of STEM Students

Scholars attribute the low representation of student-athletes in STEM to time-consuming athletic schedules that clash with the demanding STEM academic requirements, as well as scheduling conflicts between practice and laboratories (Emekalam, 2019; Stapley & Bieber, 2017). Others theorize that the discrepancies are a result of athletic staff steering athletes away from STEM to perceived athlete-friendly programs (e.g., social and behavioral sciences) so they satisfy NCAA eligibility requirements, a trend known as *academic major clustering* (Fountain & Finley, 2009; Gurney & Southall, 2013; Schneider et al., 2010) whereby more than 25% of athletes pursue a specific major (Fountain & Finley, 2009). These theories support the general perception that some student-athletes are academically underprepared for college and cannot meet the demands of the rigorous STEM curriculum. In turn, Mark and Alexander's (2019) study, focused on Black athletes, found that the lifestyle of STEM student-athletes makes them more likely to experience increased feelings of isolation and stress. Given athletes' already hectic lifestyles, this may be one of the reasons why many of them opt out of pursuing STEM fields. Furthermore, academic advisors usually do not highlight the importance of pursuing STEM-related disciplines or the impact STEM degrees can have in the long run. While the reasons for students to switch to non-STEM disciplines have been documented, Emekalam (2019) noted that one critical and under-addressed reason student-athletes do not pursue STEM degrees is the lack of appropriate accommodations. Therefore, STEM departments should implement initiatives in course flexibility, deadline extensions, emergent technologies, and additional educational strategies.

Dual Advising

Among other factors, scholars note the importance of academic advising for student retention and persistence to degree attainment (Kuh, 1997; Kuh et al., 2010; Tinto, 2006). STEM students benefit from academic advising because it connects them to campus support systems and provides them with discipline-specific learning opportunities (Drake, 2011; Kuh, 2006). In a model known as *dual advising*, NCAA student-athletes work closely with both academic and athletic advisors to address their unique needs (Kelly, 2009).

Academic advisors are important in assisting students with their integration into higher education (NACADA, 2006). They are institutional representatives who guide students in the areas of academic, social, and personal matters (Kuhn, 2008). Much of their duties entails curriculum guidance (Self, 2008). Similarly, athletic advisors support athletes in the areas of academics (e.g., study skills and career exploration) and development (e.g., time management) but also athletics (e.g., NCAA eligibility education; Rubin, 2017). In general, misunderstandings exist between academic and athletic advisors regarding their different roles in advising athletes (Rubin & Lewis, 2020). While most institutions require athletes to meet with both advisors to ensure they are on a path to graduation (Stokowski et al., 2016), athletes are often confused why they have two advisors; many question the role of academic advisors (Rubin & Lewis, 2020). Athletes typically interact with athletic advisors far more frequently, sometimes daily (Rubin & Moreno-Paredo, 2018) in comparison to the once or twice per semester interactions they have with academic advisors (Rubin & Lewis, 2020).

One of the major challenges both advising units face is class scheduling. As Rubin and Lewis discussed (2020), due to the complexities of student-athletes' schedules, institutions utilize different notes systems or repositories that are

often ineffective. These types of systems do not guarantee a better service for students; it's the quality of shared information and level of transparency across advising units that makes a difference. Implementing "monitoring and early intervention systems" (Museus & Ravello, 2010, p. 56) is another strategy to track students' academic performance and meet their needs. Overall, studies cite the lack of communication between academic and athletic advisors (Rubin & Lewis, 2020; Stokowski et al., 2020) as a barrier to successful collaboration.

The misunderstandings and lack of communication between advising units often results in advisors providing inaccurate or outdated information to students. One of the reasons for such miscommunications: academic and athletic advising units often operate on different parts of campus; students agree that if the two offices were closer to one another, students would interact with them more (Rubin and Lewis, 2020). Additionally, it is critical that advisors humanize their interactions with minoritized students through specific actions such as calling advisees by their names, pronouncing their names correctly, and showing empathy and care (Museus & Ravello, 2020).

Overall, more successful collaborations between academic and athletic advisors are essential to increasing the number of athletes who pursue and graduate with STEM degrees. As Stapley and Bieber (2017) noted, "it takes a village" to advise student-athletes (para. 1). According to Kuh (2006), "advising and student success is considered a tag team activity" (para. 6). Comeaux (2018) added that collaboration and coordination between stakeholders from athletic and academic divisions are necessary to facilitate the academic success of student-athletes.

Conceptual Framework

Terenzini and Reason's (2005) model of college influences on student learning and persistence guides this study. According to this model, students arrive on campus with unique characteristics and experiences which combine with their college experiences to influence their learning, persistence, and other outcomes. Terenzini and Reason (2005) posited that there are three types of college experience: classroom, curricular, and out-of-class experiences such as volunteer work, employment, community gatherings, and residence hall activities. These experiences happen within a certain *peer environment*, defined as "ethos of the study body" (p. 11), which refers to a set of influences on students such as an institution's values, attitudes, and expectations (Terenzini & Reason, 2005). The college experience also occurs within an *organizational context*, which includes the ways internal organizational practices, policies, and faculty cultures shape the college experience and impact students' learning and persistence. While Terenzini and Reason (2005) developed this framework with first-year students in mind, they posited that the model can be applied to succeeding years of college as well. Therefore, we adapted this theory to student-athletes of all academic standings. Only a few other studies previously applied this theory to analyze the student-athlete population's experiences (e.g., Ortega, 2020; Reisinger, 2016).

In the context of this study, we argue that STEM student-athletes' experiences include interactions with academic and athletic advisors within the organizational context and the peer environment. At most institutions, athletic departments require student-athletes to meet major-specific academic advisors to ensure they are on track towards graduation. Typical meetings with these advisors include curriculum and career planning (Friedman, 2008). STEM programs have rigorous academic standards, and athletic advisors may lack familiarity with STEM degree requirements, especially since many athletic advisors do not receive adequate training and are self-taught (Steele & McDonald, 2000; Vaughn & Smith, 2018). In contrast, academic advisors are familiar with STEM requirements but may lack knowledge of NCAA eligibility requirements and the overall student-athlete experience (Stokowski et al., 2016).

In general, student-athletes interact more with athletic advisors than academic advisors because athletic departments offer specialized academic services housed in athletic facilities to keep athletes eligible and academically retained (Friedman, 2008; Hazzaa et al., 2018; Huml et al., 2014; Otto et al., 2019; Wolverton, 2008). Consequently, athletes in these facilities are often isolated from the general student body (Huml et al., 2014; Rubin & Moses, 2017); this peer environment reinforces student-athletes' reliance on athletic advisors over academic advisors. However, as Comeaux, Bachman, et al. (2017) found, athletic advisors and students' fellow teammates do not provide enough academic support and guidance for student-athletes in STEM. Therefore, given the demanding curriculum, STEM student-athletes should interact and build relationships with academic *and* athletic

advisors and participate in high-impact, on-campus activities (Comeaux, Bachman, et al., 2017).

Methods

This study was framed by a qualitative methodological inquiry via an exploratory case study (Yin, 2014), which provides an opportunity to explore a particular social phenomenon (Zainal, 2007). Specifically, we focused on dual advising of STEM student-athletes. We limited this study to one research site as it would provide strong evidence for reinforcing programs, changing current actions, and/or implementing new services to improve the experiences of student-athletes in STEM. Focusing on one institution helped distinct stakeholders share opinions and provide a better understanding of the strengths and weaknesses of the advising divisions and student-athletes' experiences.

Research Site

The research site is a public doctoral-granting institution with an undergraduate and graduate enrollment of approximately 10,000 and 2,000 students, respectively, at the time of the study. Of this student population, 59% were from minoritized backgrounds and 55% were first-generation students (College Data, 2020). The institution is located in the Southern United States, a region which houses more than 60 degree programs. At the undergraduate level, 49% of students were female and 34% were male. The average classroom size encompassed 20-29 students (College Data, 2020). At the time of the study, the university offered 16 STEM undergraduate degrees in areas such as biology, computer science, engineering, and nursing; the university also offered 12 STEM graduate degrees. The research site sponsored 16 NCAA Division I sports. According to the NCAA's (2019) database, this institution's athletic programs achieved a graduation success rate of 79%, compared to the federal graduation rate of 53% for athletes and 37% of all students at the university.

Participants

Three groups of participants were represented in this study using purposive sampling, which consists of choosing participants who meet certain criteria (Merriam, 1998). In this case, participants were student-athletes majoring in STEM, academic advisors assigned to STEM majors, and athletic advisors. The selection criteria for student-athletes required that participants: (1) be of junior, senior, or 5th-year academic standing, (2) be the recipient of a partial or full athletic scholarship, (3) be a STEM major, and (4) attend the selected research site. The selection criteria for academic advisors stipulated that they: (1) work full-time at the research site, and (2) advise students in STEM. The selection criteria for athletic advisors necessitated that they: (1) work full-time at the research site, and (2) have at least one sport assignment as an athletic advisor. In total, eight student-athletes, seven academic advisors, and three athletic advisors participated in the study. To protect participants' confidentiality, pseudonyms were utilized (see Table 1 for details about all participants).

Data Collection

Data was collected during one-time, semi-structured interviews with the participants. The interview protocol consisted of 15 open-ended questions focusing on the athletes' experiences with dual advising. These questions were developed after reading relevant literature on the topic and discussing with senior athletic advisors and student-athletes the challenges of the profession and the benefits of advising. This information also yielded a set of 14 questions addressing advisors' experiences (see Appendix A and B). Furthermore, demographic sheets and observations regarding the interview settings and participants' non-verbal expressions (Erlandson et al., 1993; Lincoln & Guba, 1985) were employed to triangulate data. Additionally, we used a reflexive journal to document observations and thoughts, logistic changes, and unexpected setbacks throughout the duration of data collection and data analysis (Glesne, 2016). Finally, the information gathered through the demographic sheets helped contextualize the interview data.

Data Analysis

Analyzing data for qualitative inquiry is a continuous, dynamic task that begins with the initial data collection (Erlandson et al., 1993). Thus, the study's researchers utilized inductive analysis, a process that provides explanations for the field data (Lincoln & Guba, 1985). First, interview data were transcribed verbatim. Next, with the use of Dedoose, a web-based application for data analysis utilized by qualitative researchers, data units were identified. The researchers then sought patterns within the data and classified

Table 1. Demographic Profiles of Participants

Student-Athletes

Pseudonym	Sport	Class Standing	Major	Gender	Ethnicity
Haley	Non-Revenue	5th year	Biomedical	Female	White
Catherine	Non-Revenue	5th year	Biomedical	Female	White
Ri	Revenue	5th year	Nursing	Female	African American
Ace	Non-Revenue	Senior	Geology	Male	Black/Hispanic
Alex	Non-Revenue	Junior	Biology	Male	White
George	Revenue	Senior	Environmental S.	Male	African American
Amanda	Non-Revenue	Senior	Biomedical	Female	White
John	Revenue	Senior	Environmental S.	Male	African American

Academic and Athletic Advisors

Pseudonym	Student Caseload	Advising Unit	Full-time at the University	Full-time as Advisor	Gender	Ethnicity
Nyssa	382	Academics	9 months	9 months	Female	Hispanic
Michelle	700	Academics	8 months	0	Female	White
LeeAnn	450	Academics	Less than a year	Less than a year	Female	White
Morgan	600	Academics	More than a year	More than a year	Female	White
Nera	500-700	Academics	17 years	17 years	Female	Hispanic
Penny	400	Academics	8 months	8 months	Female	Hispanic
Harry	600-700	Academics	5 years, 8 months	12 years	Male	Hispanic
Larry	16	Athletics	2 years	2 years	Male	White
Lauren	50	Athletics	1 year	1 year	Female	Hispanic
Monty	70	Athletics	11 years	21 years	Female	White

them under temporal categories based on the study's research questions. After researchers agreed with the classifications, the process of codification took place, which consisted of naming categories and themes and creating a framework to address the study's findings (Glesne, 2016).

The researchers relied on Lincoln and Guba's (1985) techniques to ensure the study's validity. Data were collected via multiple sources to ensure credibility. Purposeful sampling and reflexive journaling were utilized for the applicability of the findings to similar settings. For consistency, researchers used an audit trail. To maintain neutrality regarding the studied topic, researchers engaged in peer debriefing.

Findings

Three themes emerged from the interviews. Participants discussed (1) individualized approaches, (2) support engagement in STEM, and (3) options and flexibility in the curriculum.

Individualized Approach

The information that emerged from our interviews across the three groups of participants highlighted the importance of an individualized advising approach cognizant of each STEM athlete's unique background and needs. Specifically, athletes trusted advisors who understood what it is like to be an NCAA Division I athlete who majors in a rigorous STEM program. For this reason, the majority of athlete participants preferred to seek guidance from athletic rather than academic advisors. Athlete Catherine explained: "I feel like the athletic advisor is doing a better job at helping us. That's because they know more about our sport." Similarly, one athlete, Haley, suggested that academic advisors are most helpful when they are aware of her specific athletic responsibilities and the time constraints that come with class prerequisites and labs. She explained that when meeting with an academic advisor for the first time, it is important to establish

> from the beginning, 'Hey, I'm a student-athlete. This time doesn't work for me, or this course load doesn't work for me,' so that they can get a better idea of the best route for you to take to get that degree. Because it's not like a cookie cutter that will fit everyone.

While many of the academic advisors we interviewed admitted they did not know much about athletics and the NCAA eligibility requirements, they were intentional in getting to know STEM athletes to be able to provide individualized advising. For example, academic advisor Nyssa said she likes "really getting to know them personally, like what their desires are, but also drawing out questions they probably never thought about asking themselves because you are a person, you know?"

Given the large difference in caseloads, athletic advisors described interacting with STEM athletes far more frequently than academic advisors and thus were able to get to know the athletes better. As athletic advisor Monty explained, this was the key to individualized advising of athletes and supporting them for persistence in STEM: "I think that advisors are the gateway to retention. If you can get advisors to engage, to take time, to spend time, to get to know [STEM athletes], then…creating those relationships will go a very long way."

Overall, athletes valued advisors who recognized the difficulty of pursuing a STEM major as an athlete but who also provided encouragement to persist in both pursuits. Athlete Ri stated, "[Academic advisor] made it seem like it was gonna be okay. He made me realize that I'm on my own path and that as long as I finish, it's okay. I'm not on like everyone else's path." In a few instances, athletes encountered academic advisors who were not supportive of them participating in sports, which made them not want to see their advisors anymore. For example, Catherine recounted:

> [Academic advisor] be like, 'you really think you can do that?' It was more they wanted me to pursue a STEM degree, but they didn't want me to be an athlete. It was negative when I went in there. That's why I never went. I felt like I was talking to someone to tell me, 'why are you doing this? You're crazy.'

Despite Catherine's negative experience, for the most part, both academic and athletic advisors described themselves as making the effort to personalize their interactions with student-athletes. Therefore, the individualized advising approach encompassed academic and athletic advisors getting to know STEM athletes, identifying their needs, and then supporting them accordingly. Additionally, advisors validated athletes for pursuing STEM programs while competing in their sports.

Support Engagement in STEM

Athlete participants described time management as the most challenging aspect of juggling athletics and the STEM curriculum. As a result, most participants admitted they did not participate in most of the non-athletic opportunities offered to STEM majors. For example, athlete Catherine stated, "I guess I've missed out on a lot of research opportunities from being an athlete." The lack of engagement led to STEM athletes primarily socializing with their teammates and identifying as athletes despite having a passion and interest in STEM fields. Both athletic and academic advisors were aware of the limited engagement of STEM athletes outside of their sport in comparison to non-athletes given their time constraints. Academic advisor Nyssa explained:

> As a college student, if you're not doing something you're passionate about, like athletics, then you're trying to do career building and so you have a part-time job or even sometimes a full-time job or lots of clubs and organizations that you're a part of.

Academic advisor Michelle added: "I think student-athletes, in general, are somewhat siloed."

As such, advisors stressed the importance of STEM athletes engaging in non-athletic activities that would prepare them for life after graduation and for careers in STEM fields, to "think about the long term," as academic advisor Nera described it. Subsequently, academic and athletic advisors provided some form of STEM mentorship. For example, athletic advisor Larry detailed: "I try to make sure that by the time that they've [STEM athletes] gotten to about their junior year that they've gotten involved with couple things

around campus 'cause I think it's very important for resume building."

Athletic advisors described academic advisors as important collaborators in the effort to engage athletes outside of athletics and prepare them for life after graduation. "They're such a great resource for us because they are experts on these programs and we're not," athletic advisor Lauren said of her colleagues responsible for STEM advising, which included advisors but also STEM faculty members. (Note: At the research site, certain programs, such as computer science and engineering, required students to meet with faculty advisors in addition to academic advisors.) Academic advisor Morgan provided an example of how she and the athletic advisor worked together to mentor one STEM athlete:

> I had one student that was going to go into basketball forever, and then he was thinking about, 'Oh, wait, I'm actually a great student.' He had almost a 4.0, and he was in a Biomed program. He was a star student and, in my opinion, should for sure go to med school because he would just excel at it. . .. But then there was a moment where he realized he was going to graduate and he was like, 'Oh, crap. Now I have to decide basketball or med school?' And so he'd come in a few times with his athletic advisor so that we would all discuss. I really enjoyed those conversations.

Overall, STEM athletes benefited from working with academic and athletic advisors who challenged them to engage outside of the athletic "silo" and explore career options beyond their sports. Thus, in some capacity, advisors from both units served as important mentors in the STEM pipeline. However, athletes largely preferred the familiar territory of the athletic community, where they engaged with non-STEM major teammates and athletic advisors rather than academic and faculty mentors who were difficult to reach due to limited availability. Athlete Ace explained that "it's hard to get appointments" with academic advisors "'cause you have to do it in advance." However, academic advisors felt that STEM student-athletes did not need their services as much as regular students since they had a larger support network. Academic advisor Nyssa stated, "They have a whole team working with them, validating them every step of the way." As such, academic advisors in STEM often took on the secondary role when advising and mentoring athletes. "Most of the time [athletic advisors] do the job for me," academic advisor Harry explained. "Nothing gets missed, basically. Whatever I missed, the athlete advisor will pick up," academic advisor Nyssa added.

Options and Flexibility in the Curriculum

One of the largest needs when advising STEM athletes pertained to dealing with curricular logistics. Therefore, "the biggest challenge is their schedule. A lot of non-athlete students don't have that. They work, but they can tell their job. With athletics, you can't really do that because your sport is set at a certain time," academic advisor LeeAnn shared. Athletic advisor Monty added that STEM athletes need to have options, including:

> options with their majors, options with their career goals. . . Because I think the more options that students have, the better equipped they are for life after college instead of being pigeon-holed into, 'This is what you have to do and this is where you have to go.'

Unfortunately, as identified by most participants, finding classes and laboratories that do not conflict with practice times served as the main challenge for STEM athletes and limited their options. Academic advisor Penny summarized:

> When it comes to their training and their schedules for the sport, and versus like for math and the other sciences, there's not a lot of courses that are offered. So having to find those times match with their training is kind of hard for them.

Athlete John agreed with the advisors' accounts, describing his experience as follows:

> I didn't have the most options in choosing my classes throughout college. I didn't have as much of a choice just because of the major that I was in. But [laughs], when I did have an option, I didn't always feel like it was my decision that I was to make even if it was possible [to choose classes]. I would like to have a little more hands-on approach to choosing my classes rather than the

> academic advisor and athletic advisor almost doing the entirety of it.

Based on the interviews, the limited options in curricular offerings often delayed STEM athletes' graduation. This happened to Catherine, who wished her advisors would have provided her with a four-year plan: "I feel like that would help a lot, because I would not still be here, I would be graduating." Athlete Haley agreed, adding that "knowing the timing of when classes are offered, so that when you're trying to think four years ahead, you can kind of build a plan" should be part of advising STEM athletes.

Though STEM athletes sought flexibility and accommodations, they sometimes ran into roadblocks due to a lack of understanding. Athletic advisor Larry explained:

> One of the toughest things is finding somebody sometimes that understands that there's a big time commitment on athletes and is willing to work with them. Not everybody has always been so willing to do that. Some of them say, 'This is, this is the way it is. You gotta figure it out.'

While the academic advisors said they try to be accommodating, they had to follow the university's policies. "We, as advisors, can only do so much. We kinda follow the rules. It's the deans that make a difference within the programs," Nyssa explained. This narrative illustrates that the advising of athletes in STEM takes place within the existing university rules and procedures which may limit athletes' options.

Thus, to meet STEM athletes' advising needs, a coordinated effort between different departments and university leaders was necessary to provide STEM athletes with the desired curricular options and flexibility so they could graduate on time while meeting NCAA athletic eligibility requirements. Such efforts required substantial cross-departmental communication. Unfortunately, while STEM-knowledgeable, academic advisors felt unfamiliar with the athletic side of advising (e.g., practice times). Academic advisor LeeAnn shared: "I don't know how their system works… I don't know how they go about communicating with their students... I wish there was more communication with those advisors." As academic advisor Harry noted, an occasional in-person meeting with athletic advisors was desired: "I wouldn't mind a meeting of the minds, you know, beginning and end of the semester."

Limitations

The study focused on the experiences of a small subset of the college student population of student-athletes in STEM at a single institution. While the study used purposive sampling, it did not include explicit screening for participants of revenue/non-revenue sports or of particular races/ethnicities.

Discussion

This study identified several advising needs for STEM athletes. One of those needs was individualized advising. As Terenzini and Reason (2005) highlighted in their model of college influences on student learning and persistence, students do not arrive at college as blank slates. Rather, they come in with certain precollege characteristics and experiences, which then influence their subsequent college experiences (Terenzini & Reason, 2005). While athletes are often grouped and studied as a homogenous category (Comeaux & Harrison, 2011), they differ vastly in their backgrounds. Therefore, advisors should recognize and appreciate athletes' differences. Such an approach meets the goals of student affairs practice, which values individual differences (Manning et al., 2014). As this study highlighted, STEM athletes benefited when their advisors took the time to get to know them so they could provide them with the right type of support based on their individual needs, which included suggesting more engagement in STEM-related activities and developing their understanding of curricular logistics.

In general, athlete participants preferred athletic advisors over academic advisors because they were familiar with the challenges stemming from the dual roles of athletes and students—not surprising, given that many athletic advisors are former athletes (Rubin, 2017). Similarly, other studies reported on athletes' preference for and a higher level of interaction with athletic advisors over academic advisors (e.g., Rubin & Moreno-Paredo, 2018; Rubin & Lewis, 2020; Stokowski et al., 2020). Overall, STEM athletes perceived athletic advisors to be accessible, knowledgeable, and relatable. In contrast, student-athletes wished academic advisors were more aware of their challenges so they could better relate to them as individuals. Given the lack of familiarity, some academic advisors have unfavorable perceptions of

student-athletes, which can negatively influence the advising experience (Stokowski et al., 2016, 2020). Negative perceptions can develop into stereotypes of "dumb jocks" (Simons et al., 2007; Wininger & White, 2015) that may discourage athletes from pursuing STEM (Comeaux, Griffin, et al., 2017; Mark & Alexander, 2019; Stokowski et al., 2016). To learn about student-athletes, it is important that academic advisors interact with them, especially considering the benefits of positive advising experiences, such as heightened persistence (Lotkowski et al., 2004; Stokowski et al., 2016).

It is well-established that the advisor-student relationship is essential to the success of advising (e.g., Cuseo, 2005; Ferris et al., 2011; Folsom, 2008; Gravel, 2012; Hughey, 2011; Levin & Hussey, 2007; Schaffling, 2018; Vianden, 2016). In this study, athletic advisors played a more prominent role in the experiences of STEM student-athletes than academic advisors given the athletic advisor's ability to form stronger relationships with athletes. This finding contradicts Huml et al. (2014), who found that athletes preferred academic and faculty advisors over athletic advisors for academic advising. This study also refutes Comeaux, Bachman, et al.'s (2017) findings that STEM athletes did not receive adequate support and guidance from athletic departments. In our study, the university's advising structure contributed to the limited interactions between athletes and academic advisors who counseled large caseloads of students, a common challenge for academic advisors working with undergraduate and graduate students (Khalil & Williamson, 2014; Schlosser et al., 2003). Rubin and Lewis (2020) found that the physical separation of the two advising centers likely played a role in the level of interaction STEM athletes had with their academic and athletic advisors, which matches our findings.

In general, STEM athlete participants appeared segregated within the athletic community despite athletic advisors asking them to engage in STEM opportunities and build relationships with academic and faculty advisors whom they considered STEM experts. This finding is consistent with a body of research that describes athletes as highly isolated from the rest of the campus community (e.g., Adler & Adler, 1991; Huml et al., 2014; Mark & Alexander, 2019; NCAA, 2016; Rubin & Moses, 2017). In particular, as noted by Huml et al. (2014), athlete-only academic centers isolate athletes and hinder their ability to connect with faculty members. Additionally, as reported by Stokowski et al. (2020), athletic advisors on some campuses intentionally bypass academic advisors and do not consult them for guidance. However, at this institution, STEM athletes were encouraged and provided opportunities to engage with academic advisors and the campus community. Yet, athlete participants chose to interact with athletic advisors rather than academic advisors. Overall, both advising groups tried to encourage athletes to pursue STEM engagement and career development, a favorable practice according to several scholars who recommend that career and academic advising should be integrated (Gordon, 2006; Hughey & Hughey, 2009; McCalla-Wriggins, 2009; Streufert, 2019). Notably, academic advisors recognized that STEM athletes had an extensive support network of athletic advisors and other staff members and thus assumed a secondary role.

Our findings also suggested that STEM athletes need options and flexibility in the curriculum to persist in STEM. This was consistent with the findings of Emekalam (2019), who reported that the lack of accommodations for STEM athletes is a contributing factor for them changing majors to non-STEM fields. Overall, unlike in other fields, STEM students must enroll in many classes with laboratory requirements that often conflict with athletic schedules; this trend contributes to the low representation of athletes in STEM (Emekalam, 2019; Stapley & Bieber, 2017). In our study, academic advisors identified STEM student-athletes as having limited class options and needing to meet NCAA requirements. However, their knowledge was predominantly surface-level. Similar to Stokowski et al.'s (2016) and Rubin and Lewis' (2020) findings, academic advisors lacked knowledge regarding NCAA requirements, practice times, and other areas of the student-athlete experience. Non-athletes on campus are often unfamiliar with the work responsibilities of athletic advisors, who fulfill many job roles and often go above and beyond those duties (Rubin & Lewis, 2020; Rubin & Moreno-Pardo, 2018; Vaughn & Smith, 2018). At the research site, this lack of knowledge resulted in academic advisors employing a cookie-cutter advising approach and overrelying on athletic advisors to make decisions.

To relate the theoretical framework (Terenzini & Reason, 2005) to the study's findings, the institution's internal structures and practices resulted in departmental silos (Birnbaum, 1988) that affected the experiences of athletes in STEM. Specifically, athletic and academic advisors abided by the existing policies at the institution and within their departments, which contributed to scheduling

conflicts between STEM curriculum and athletic practices and thus limited athletes' class options. Additionally, the institution's peer environment further contributed to the experiences of STEM athletes. Specifically, athletes preferred to stay within the company of their teammates and athletic staff members, which did not allow for academic advisors to get to know the athletes and their needs. Therefore, the combination of the organizational context with the peer environment influenced STEM athletes' development as students in STEM but also their persistence with their programs of study.

In conclusion, coordinated and intentional opportunities for communication within every institution's organizational context and peer environment (Terenzini & Reason, 2005) are warranted to bridge the gap between academic and athletic advisors to support STEM athletes. Even though balancing STEM and athletic requirements is laborious (Emekalam, 2019; Stapley & Bieber, 2017), it is doable for student-athletes to excel in STEM (Comeaux, Bachman, et al., 2017; Neale et al., 2012).

Implications for Practice

The findings of this study have significant implications for practice. First, academic advisors should have access to education and training to become familiar with the student-athlete experience. NCAA Division I athletes benefit from dual advising as each unit is designed to fulfill certain needs. While athletic advisors oversee certification of athletic eligibility of STEM student-athletes, academic advisors are important collaborators in this effort. As this case and study depicted, academic advisors knew of the existence of NCAA rules but lacked a nuanced understanding of their impact on athletes' academic careers. Understanding the basic requirements that limit athletes' flexibility in terms of major and course choices will enable academic advisors to provide individualized advising to STEM athletes. This training should also highlight research about student-athlete experiences, which will allow academic advisors to understand and build relationships with athletes. Outside organizations, such as the NACADA: The Global Community for Academic Advising, offer online workshops, courses, and other resources pertaining to student-athlete advising.

Second, all advisors from academic and athletic advising departments should meet at least once every semester. As found in this study, most communication between academic and athletic advisors happened via email or phone and concerned individual student-athletes. However, these advising units rarely interacted in person or conducted meetings in which all academic and athletic advisors met to discuss ways of proactively supporting the needs of student-athletes in STEM. Meetings of the minds, as one participant put it, will enable advisors to harmonize the current processes of advising STEM student-athletes.

Finally, academic and athletics advisors should periodically review the time conflicts between STEM classes and athletic practices and look for possible solutions. A regular and recurring review of the conflicts between class times and athletic practice times should be implemented as part of the aforementioned meetings of academic advisors with athletic advisors. In general, information related to class and athletic practice schedules should flow between both units to better serve and advise student-athletes in STEM. If these issues are not considered, possible negative outcomes include student-athletes avoiding STEM majors or experiencing low grades or delayed graduation.

Future Research

This exploratory study is among the first to examine the experiences of NCAA Division I student-athletes in STEM through dual advising. Institutions in other divisions should conduct similar studies to determine if our findings can translate to their environments or if differences exist due to the divisional standing. Furthermore, examinations of communication patterns between academic and athletic advisors are warranted. Studies that disaggregate experiences of athletes by revenue and non-revenue sports, race/ethnicity, and/or gender will be important given the existing disparities in STEM degree attainment for these populations (NCAA, 2020).

Conclusion

Data-driven practices and cross-campus collaborations proliferate the recent literature on the student-athlete support services profession (e.g., Comeaux, 2018; Navarro et al., 2020). This study expanded on this call by exploring STEM student-athletes' experiences with dual advising. The findings elucidate the importance of academic and athletic advisors providing individualized advising, supporting engagement in STEM, and supplying options and flexibility in the curriculum to meet the needs of STEM athletes. To do so,

communication between academic and athletic advisors is necessary. Managing the dual responsibilities of NCAA Division I athletics and rigorous STEM requirements is an arduous task that ultimately benefits student-athletes. Neither advising department can support STEM athletes to success alone; it takes a cross-campus collaborative effort. Cliché as it may sound, teamwork makes the dream work.

References

Adler, P. A., & Adler, P. (1991). *Backboards & blackboards: College athletics and role engulfment*. Columbia University Press. https://doi.org/10.7312/adle90436

Bass, J. B., Schaeperkoetter, C. C., & Bunds, K. S. (2015). The "front porch": Examining the increasing interconnection of university and athletic department funding. *AEHE Higher Education Report*, *41*(5), 1–103. https://doi.org/10.1002/aehe.20023

Birnbaum, R. (1988). *How colleges work: The cybernetics of academic organization and leadership*. Jossey-Bass.

Coakley, J. (2014). *Sports and society: Issues and controversies* (11th ed.). McGraw-Hill.

College Data. (2020). *Overview-academics*. https://www.collegedata.com/en/

Comeaux, E. (2018). Collaboration between academics and athletic department professionals: The career transition scorecard as an instructive model. In D. Van Rheenen & J. M. DeOrnellas (Eds.), *Envisioning scholar-practitioner collaborations: Communities of practice in education and sport* (pp. 59–71). Information Age Publishing, Inc.

Comeaux, E., Bachman, T., Burton, R. M., & Aliyeva, A. (2017). Undergraduate experiences of Division I athlete science, technology, engineering, and mathematics (STEM) graduates. *Journal of Science Education and Technology*, *26*(1), 24–32. https://doi.org/10.1007/s10956-016-9648-y

Comeaux, E., Griffin, W., Bachman, P., & Porter, J. (2017). NCAA Division I athlete STEM graduates: Stereotypes, microaggressions, race, and gender. *Journal of Intercollegiate Sport*, *10*(1), 44–66. https://doi.org/10.1123/jis.2016-0021

Comeaux, E., & Harrison, C. K. (2011). A conceptual model of academic success for student-athletes. *Educational Researcher*, *40*(5), 235–245. https://doi.org/10.3102/0013189X11415260

Cuseo, J. (2005). *Assessment of academic advisors and academic advising programs*. NACADA Clearinghouse. https://www.nacada.ksu.edu/Portals/0/CandIGDivision/documents/assessment%20of%20advising%20resources/Cuseo_Marymount1.pdf

Drake, J. K. (2011). The role of academic advising in student retention and persistence. *About Campus*, *16*(3), 8–12. https://doi.org/10.1002/abc.20062

Emekalam, A. (2019). Reducing attrition from STEM disciplines: Understanding the student-athlete's perspective. *Peer Review*, *21*(1/2), 34–37. https://www.aacu.org/peerreview/2019/winter-spring/Emekalam

Erlandson, D. A., Harris, E. L., Skipper, B. L., & Allen, S. D. (1993). *Doing naturalistic inquiry: A guide to methods*. SAGE Publications.

Ferris, S., Johnson, C., Lovitz, A., Stroud, S., & Rudisille. (2011). Assuming the role: The successful advisor-student relationship. *The Bulletin*, *79*(5), 35–45. https://www.ccri.edu/osl/pdfs/resources/successful-advisor-student-relationship.pdf

Fioriello, P. (2010). *Understanding the basics of STEM education*. Critical Issues in Education. https://drpfconsults.com/understanding-the-basics-of-stem-education/

Folsom, P. (2008). Tools and resources for advisors. In V. N. Gordon, W. R. Habley, T. J. Grites, & Associates (Eds.), *Academic advising: A comprehensive handbook* (2nd ed., pp. 323–341). Jossey-Bass.

Fountain, J. J., & Finley, P. S. (2009). Academic majors of upperclassmen football players in the Atlantic Coast Conference: An analysis of academic clustering comparing White and minority players. *Journal of Issues in Intercollegiate Athletics*, *2,* 1–13. https://pdfs.semanticscholar.org/a4e6/3996f2ed14f602c1b6106fa93690fb915c4c.pdf

Friedman, L. (2008). Crossing the great divide: Bridging the gap between campus academic advisors and athletic academic-support personnel. In A. Leslie-Toogood & E. Gill (Eds.), *Advising student-athletes: A collaborative approach to success* (Monograph No. 18, pp. 49–57). National Academic Advising Association.

Glesne, C. (2016). *Becoming a qualitative researcher: An introduction* (5th ed.). Pearson.

Gordon, V. N. (2006). *Career advising: An academic advisor's guide*. Jossey-Bass.

Grandy, J., Lough, N., & Miller, C. (2016) Improving student-athlete academic success: Evaluation of learning support tools utilized by academic advisors for athletics. *Journal for the Study of Sports and Athletes in Education*, *10*(3), 199–217. https://doi.org/10.1080/19357397.2016.1258967

Gravel, C. A. (2012). Student-advisor interaction in undergraduate online degree programs: A factor in student retention. *NACADA Journal*, *32*(2), 56–67. https://doi.org/10.12930/0271-9517-32.2.56

Gurney, G., & Southall, R. M. (2013, February 14). *NCAA reform gone wrong*. Inside Higher Ed. https://www.insidehighered.com/views/2013/02/14/ncaa-academic-reform-has-hurt-higher-eds-integrity-essay

Hazzaa, R. N., Sonkeng, K., & Yoh, T. (2018). Antecedents and consequences of student-athletes' contentment with academic services. *Journal of Intercollegiate Sport*, *11*(1), 65–81. https://doi.org/10.1123/jis.2017-0041

Hossain, M., & Robinson, M. G. (2012). How to motivate US students to pursue STEM (science, technology, engineering and mathematics) careers. *US-China Education Review A*, *4*(1), 442–451. http://files.eric.ed.gov/fulltext/ED533548.pdf

Hughey, J. K. (2011). Strategies to enhance interpersonal relations in academic advising. *NACADA Journal, 31*(2), 22–32. https://doi.org/10.12930/0271-9517-31.2.22

Hughey, K. F., & Hughey, J. K. (2009). Foundations of career advising. In K. F. Hughey, D. Burton Nelson, J. K. Damminger, B. McCalla-Wriggins, & Associates (Eds.), *The handbook of career advising* (pp. 1–18). Jossey-Bass.

Huml, M. R., Hancock, M. G., & Bergman, M. J. (2014). Additional support or extravagant cost? Student-athletes' perceptions on athletic academic centers. *Journal of Issues in Intercollegiate Athletics, 7*, 410–430. https://ir.library.louisville.edu/faculty/141/

Kelly, M. L. (2009). Advising the college student-athlete: Issues and strategies. *The Mentor: An Academic Advising Journal*, 11(2009). https://dus.psu.edu/mentor/old/articles/090513mk.htm

Khalil, A., & Williamson, J. (2014). Role of academic advising in the success of engineering students. *Universal Journal of Education Research*, *2*(1), 73–79. https://files.eric.ed.gov/fulltext/EJ1053985.pdf

Kuh, G. D. (1997). The student learning agenda: Implications for academic advisors. *NACADA Journal*, *17*(2), 7–12. https://doi.org/10.12930/0271-9517-17.2.7

Kuh, G. D. (2006). Thinking DEEPly about academic advising and student engagement. *Academic Advising Today*, *36*(2). https://www.nacada.ksu.edu/Resources/Academic-Advising-Today/View-Articles/Thinking-DEEPly-about-Academic-Advising-and-Student-Engagement.aspx

Kuh, G. D., Kinzie, J., Schuh, J. H., Whitt, E. J., & Associates. (2010). *Student success in college: Creating conditions that matter*. Jossey-Bass.

Kuhn, T. L. (2008). Historical foundations of academic advising. In V. N. Gordon, W. R. Habley, T. J. Grites, & Associates (Eds.), *Academic advising: A comprehensive handbook* (2nd ed., pp. 3–16). Jossey-Bass.

Levin, J., & Hussey, R. B. (2007). Improving advising in the sciences: Analysis of the educational environments of science- and math-related majors. *Journal of College Science Teaching*, *36*(6), 28–35.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry.* SAGE Publications.

Lotkowski, V. A., Robbins, S. B., & Noeth, R. J. (2004). *The role of academic and non-academic factors in improving college retention: ACT policy report*. American College Testing. https://files.eric.ed.gov/fulltext/ED485476.pdf

Manning, K., Kinzie, J., & Schuh, J. H. (2014). *One size does not fit all: Traditional and innovative models of student affairs practice*. Routledge.

Mark, S. L., & Alexander, O. (2019). A critical race case study exploration of two Black male student-athletes' STEM career development. *Journal for the Study of Sports and Athletes in Education*, *13*(2), 116–145. https://doi.org/10.1080/19357397.2019.1633508

McCalla-Wriggins, B. (2009). *Integrating career and academic advising: Mastering the challenge*. NACADA Clearinghouse. https://nacada.ksu.edu/Resources/Clearinghouse/View-Articles/Integrating-career-and-academic-advising.aspx

Merriam, S. B. (1998). *Qualitative research and case study applications in education*. Jossey-Bass.

Museus, S. D., & Ravello, J. N. (2010). Characteristics of academic advising that

contribute to racial and ethnic minority student success at predominantly White institutions. *NACADA Journal*, *30*(1), 47–58.

NACADA: The Global Community for Academic Advising. (2006). *Concept of academic advising*. https://www.nacada.ksu.edu/Resources/Pillars/Concept.aspx

National Academy of Sciences, National Academy of Engineering, & Institute of Medicine. (2011). *Expanding underrepresented minority participation: America's science and technology talent at the crossroads*. The National Academies Press.

National Collegiate Athletic Association. (2016). *Results from the 2015 GOALS study of the student-athlete experience*. https://www.ncaa.org/sites/default/files/GOALS_convention_slidebank_jan2016_public.pdf

National Collegiate Athletic Association. (2018). *NCAA recruiting facts*. https://collegiatewaterpolo.org/wp-content/uploads/2020/07/NCAARecruiting-Fact-Sheet-WEB.pdf

National Collegiate Athletic Association. (2019). *Graduation Success Rate*. https://web3.ncaa.org/aprsearch/gsrsearch

National Collegiate Athletic Association. (2020). *Division I diploma dashboard*. http://www.ncaa.org/about/resources/research/division-i-diploma-dashboard

National Science Foundation. (2016). *Science and engineering indicators 2016*. https://www.nsf.gov/statistics/2016/nsb20161/#/

National Science Foundation. (2018). *2018 science & engineering indicators*. https://www.nsf.gov/statistics/2018/nsb20181/assets/nsb20181.pdf

Navarro, K. M., Rubin, L. M., & Mamerow, G. (2020). *Implementing student-athlete programming: A guide for supporting college athletes*. Routledge.

Neale, A., Grant, O., & Sachdev, M. (2012). *The road to success for STEM student-athletes* [Conference presentation]. 2012 American Society for Engineering Education Annual Conference and Exposition, San Antonio, TX, United States. https://peer.asee.org/22093

Ortega, G. (2020). *Understanding experiences, engagement, and persistence for Latina/o student-athletes* [Unpublished doctoral dissertation]. University of Houston.

Otto, M. G., Martinez, J. M., & Barnhill, C. R. (2019). How the perception of athletic academic services affects the overall college experience of freshmen student-athletes. *Journal of Athlete Development and Experience*, *1*(1), 40–52. https://doi.org/10.25035/jade.01.01.05

Paule, A. L., & Gilson, T. A. (2010). Current collegiate experiences of big-time, non-revenue, NCAA athletes. *Journal of Intercollegiate Sport*, *3*(2), 333–347. https://doi.org/10.1123/jis.3.2.333

Reisinger, S. H. (2016). *Using a revised theory of student departure to understand student athlete persistence* (Publication No. 10143077) [Doctoral dissertation, The University of Iowa]. ProQuest Dissertations Publishing.

Rubin, L. M. (2017). Who are athletic advisors? State of the profession. *NACADA Journal*, *37*(1), 37–50. https://doi.org/10.12930/NACADA-15-046

Rubin, L. M., & Lewis, W. A. (2020). Collaboration between athletic and campus advisors: Ensuring college athletes' success. *Journal of Issues in Intercollegiate Athletics*, 91–124. http://csri-jiia.org/wp-content/uploads/2020/09/SI_2020_01_05.pdf

Rubin, L. M., & Moreno-Pardo, M. D. (2018). Burnout among student-athlete services professionals. *Journal of Higher Education Athletics & Innovation*, *1*(3) 1–24. https://doi.org/10.15763/issn.2376-5267.2018.1.3.1-25

Rubin, L. M., & Moses, R. A. (2017). Athletic subculture within student-athlete academic centers. *Sociology of Sport Journal*, *34*(4), 317–328. https://doi.org/10.1123/ssj.2016-0138

Schaffling, S. (2018). Common factors: A metamodel of academic advising. *Academic Advising Today*, *41*(3). https://nacada.ksu.edu/Resources/Academic-Advising-Today/View-Articles/Common-Factors-A-Meta-Model-of-Academic-Advising.aspx

Schlosser, L. Z., Knox, S., Moskovitz, A. R., & Hill, C. E. (2003). A qualitative examination of graduate advising relationships: The advisee perspective. *Journal of Counseling Psychology*, *50*(2), 178–188. https://doi.org/10.1037/0022-0167.50.2.178

Schneider, R. G., Ross, S. R., & Fisher, M. (2010). Academic clustering and major selection of intercollegiate student-athletes. *College Student Journal, 44*(1), 64–70. https://eric.ed.gov/?id=EJ917200

Self, C. (2008). Advising delivery: Professional advisers, counselors, and other staff. In V. N. Gordon, W. R. Habley, T. J. Grites, & Associates (Eds.), *Academic advising: A*

comprehensive handbook (2nd ed., pp. 267–278). Jossey-Bass.

Simons, H. D., Bosworth, C., Fujita, S., & Jensen, M. (2007). The athlete stigma in higher education. *College Student Journal*, *41*(2), 251–273. https://eric.ed.gov/?id=EJ777933

Stapley, J. C., & Bieber, T. J. (2017, November 29). Appropriate advising for student-athletes: It takes a village. *Academic Advising Today*, *40*(4). https://www.nacada.ksu.edu/Resources/Academic-Advising-Today/View-Articles/Appropriate-Advising-for-Student-Athletes-It-Takes-a-Village.aspx

Steele, G. E., & McDonald, M. L. (2000). Advising students in transition. In V.N. Gordan & W.R. Habley (Eds.), *Academic advising: A comprehensive handbook* (1st ed., pp. 144–61). Jossey-Bass.

Stokowski, S., Rode, C. R., & Hardin, R. (2016). Academic advisors' perceptions of student-athletes at NCAA Division-I institutions. *The Journal of Sport*, *5*(1), 64–92. https://doi.org/10.21038/sprt.2016.0514

Stokowski, S., Rubin, L. M., Rode, C. R., Fridley, A., & Shkorupeieva, S. (2020). Separate kingdoms: Academic advisers' perceptions of college athletes and athletic departments. *The Mentor: Innovative Scholarship on Academic Advising*, *22*(2020), 16–32. https://doi.org/10.26209/mj2261353

Streufert, B. (2019). Career advising: A call for universal integration and curriculum. *Academic Advising Today*, *42*(2). https://nacada.ksu.edu/Resources/Academic-Advising-Today/View-Articles/Career-Advising-A-Call-for-Universal-Integration-and-Curriculum.aspx

Terenzini, P. T., & Reason, R. D. (2005, November). *Parsing the first year of college: A conceptual framework for studying college impact* [Conference presentation]. Association for the Study of Higher Education 2005 Conference, Philadelphia, PA, United States.

Tinto, V. (2006). Research and practice of student retention: What's next? *Journal of College Student Retention: Research, Theory & Practice*, *8*(1), 1–19. https://doi.org/10.2190/4YNU-4TMB-22DJ-AN4W

Tucker, C. (2017, October 10). *Keeping a global competitive advantage with STEM education*. Atlantic Council. https://www.atlanticcouncil.org/blogs/futuresource/keeping-a-global-competitive-advantage-with-stem-education

U.S. Department of Education, & White House Initiative on Educational Excellence for Hispanics. (2011). *Winning the future: Improving education for the Latino community.* https://www2.ed.gov/about/inits/list/hispanic-initiative/winning-the-future-improving-education-latino-community.pdf

Vaughn, A., & Smith, J. (2018). Advising student-athletes: Understanding job preparation, roles, and challenges of the athletic academic advisor. *The Sport Journal*. https://thesportjournal.org/article/advising-student-athletes-understanding-job-preparation-roles-and-challenges-of-the-athletic-academic-advisor/

Vianden, J. (2016). Ties that bind: Academic advisors as agents of student relationship management. *NACADA Journal*, *36*(1), 19–29. https://doi.org/10.12930/NACADA-15-026a

Wininger, S. R., & White, T. A. (2015). An examination of the dumb jock stereotype in collegiate student-athletes: A comparison of student versus student-athlete perceptions. *Journal for the Study of Sports and Athletes in Education*, *9*(2), 75–85. https://doi.org/10.1179/1935739715Z.00000000036

Wolverton, B. (2008, September 5). *Rise in fancy academic centers for athletes raises questions of fairness*. The Chronicle of Higher Education. http://www.chronicle.com/article/Rise-in-Fancy-Academic-Centers/13493/

Yin, R. K. (2014). *Case study research: Design and methods* (5th ed.). SAGE Publications.

Zainal, Z. (2007). Case study as a research method. *Jurnal Kemanusiaan*, *5*(1), 1–6. https://www.researchgate.net/publication/41822817_Case_study_as_a_research_method

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Appendix A. Interview Protocol: Student-Athletes

1. Why did you decide to pursue a STEM major?
2. Share with me what it is like to be a student-athlete majoring in STEM.
3. What have been your major challenges as a student-athlete?
4. What have been your major challenges as a STEM student?
5. What, if any, support services have you utilized on-campus that help you succeed as a STEM student-athlete?
6. What are the top three reasons (people, things, etc.) to which you attribute your success and persistence to STEM degree?
7. For what reasons, if any, do you typically reach out to your academic advisor? Can you describe a typical meeting with your academic advisor?
8. For what reason, if any, do you typically reach out to your athletic advisor? Can you describe a typical meeting with your athletic advisor?
9. In general, do you feel supported or discouraged by your athletic advisor from pursuing a STEM degree? Why or why not?
10. Do you feel supported or discouraged by your academic advisor from pursuing a STEM degree? Why or why not?
11. Do you feel supported or discouraged by your coaches from pursuing a STEM degree? Why or why not?
12. Do you feel supported or discouraged by your professors from pursuing a STEM degree? Why or why not?
13. What pieces of advice would you give to other NCAA Division I student-athletes who want to major in STEM while in college?
14. What could you suggest to improve the overall advising you receive at this university?
15. Is there anything that I didn't ask, that you would like to share with me about your experiences as a STEM student-athlete?

Appendix B. Interview protocol: Advisors

1. Can you tell me about your daily job duties as an academic/athletic advisor?
2. What is your advising philosophy?
3. What has it been like working with student-athletes majoring in STEM?
4. From your experience working with student-athletes majoring in STEM, what are some of the biggest challenges they face on their path to graduation?
5. How do the challenges differ, if at all, from regular students not participating in athletics?
6. In your advising capacity, in what ways, if any, do you or your department try to alleviate some of these challenges placed on STEM student-athletes that you just described?
7. From your experience working with student-athletes majoring in STEM, what are some of the strategies that successful student-athletes in STEM programs utilize?
8. Can you describe a typical advising meeting with a student (non-athlete)?
9. Can you describe a typical advising meeting with a student-athlete majoring in STEM?
10. In what ways, if any, do you interact with academic/athletic advisors when advising STEM student-athletes?
11. How would you describe these interactions with academic/athletic advisors?
12. What are some of the challenges, if any, that you encounter in your interactions with academic/athletic advisors?
13. Can you describe the ideal working relationship with academic/athletic advisors you would like to have?
14. Is there anything I haven't asked you, that you'd like me to know about your role as an academic/athletic advisor who works with STEM students?