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Campus Climate Experiences Associated with Ethnicity in a College of Health Sciences

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Abstract
The demand for various healthcare professionals is expected to increase along with the diversification of patient populations. Job security is promising in the future of healthcare. Still, less than 50% of college students persist through the STEM education necessary for professional degree programs, with higher attrition rates seen with minority students. The problem is the disproportionate ethnic representation in academic programs that precipitates the consequentially low distribution of minorities in clinical practice and higher education. Inadequate representation poses fewer opportunities for an initial sense of similarity for minority students, often needed for motivation during student-to-faculty interactions. The research study measured differences between ethnic minority and non-minority student perceptions of their academic climate through a quasi-experimental quantitative design. The dependent variables included a sense of belonging, academic and interpersonal validation. Likert scale data was collected to analyze total summed scores between participant groups. Question items from the Diverse Learning Environment Survey were extracted and used as the instrument. The participant group consisted of students from a Division II institution enrolled in an anatomy and physiology course. Data analysis consisted of independent t-tests and Mann Whitney-U testing. Statistically significant differences were found in the sense of belongingness between groups, with ethnic minority students scoring significantly lower. This study's findings help inform educators and clinicians about the needs of minority populations in efforts to retain students and diversify the same force that is assumed to be all-inclusive in clinical practice.
Keywords: Academic climate, minority representation in health care education, student retention, mentorship, cultural competence
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1. Introduction

Allied health and medical care professionals such as athletic trainers, physical therapists, and nurses serve a continuously growing and diversifying patient population (Adams et al., 2021; Campbell & Tumin, 2021). While the patient population continues to expand, culturally minority patients may never experience a sense of relatedness with a healthcare provider. The mismatch between the vastly diverse patient population and practicing clinicians directly results from the disproportionate retention and graduation rates of ethnic minority students in health science programs.

National Athletic Training Association (NATA) districts reported less than 20% minority student population in their athletic training programs, which mirrors the ethnic diversity among certified athletic trainers (NATA, 2018). A survey distributed within an American Occupational Therapy Association (AOTA) recognized master's degree program revealed less than 6% student representation in any ethnic minority category (Carr & Collins,

2018). Doctor of Physical Therapy (DPT) programs reported less than 11% of Black and Hispanic representation among the student population (Naidoo et al., 2020). In 2019, The American Association of Colleges of Nursing (AACN) enrollment report revealed that ethnic minority students comprised approximately 34% of students in the baccalaureate and master's programs; however, 80% of registered nurses identified as Non-Hispanic White/Caucasian.

Current literature on ethnic minority experiences in allied health-related programs primarily consists of qualitative and single discipline investigations (Cassidy et al., 2020; Flateland et al., 2019). Researchers explored student experiences across various health science programs by surveying students in required prerequisite STEM (science, technology, engineering, mathematics) courses, which may not be representative of the academic environment in professional practice health science programs, but such coursework is a necessary stepping stone (Nealy & Orgill, 2020; Park et al., 2020). Documented student experiences in classes such as Chemistry or Biology provide insight into the challenges that precipitate high attrition rates among ethnic minority students prior to completing advanced STEM related coursework such as a clinical evaluation course (Lisberg & Woods, 2018).

Motivational theories such as Bandura's (1977) historical theory on self-efficacy and Deci and Ryan's (2012) self-determination theory can be used to understand individual influences on student decisions to persist or depart from an academic program. A myriad of research has long established an unmistakable positive relationship between high motivation levels and academic success (Guzzardo et al., 2021). With motivation as a precise predictor of persistence through academia, researchers have analyzed the individual factors influencing motivation. In addition, previous data suggests a significant difference between Non- Hispanic/White and ethnic minority extrinsic motivators.

Gebre and Taylor (2017) reported that Black and Latino students demonstrated the greatest vulnerability to disruptive kin relationships, negatively influencing motivation levels. Negative influences on motivation related to personal relationships, such as increased responsibilities within family units, financial struggles, and discord with pertinent family members, are seen more commonly among ethnic minority students and may be the hidden determinant of their academic endurance. University administration, academic program directors, and faculty must understand that the classroom climate cannot foster a one size fits all approach. Cultural differences can be broken down into many categories; yet, ethnic representation seems to be a palpable factor in facilitating a culturally responsible environment. Research efforts should be targeted toward examining the current student populations to confirm or refute previously established disparities among ethnic minority students in allied health science programs or related prerequisite coursework.

1.1 Background of the Study

The United States Census Bureau (U.S. Census) identified eight different racial and ethnic diversity groups: White/Caucasian alone, Black/African American alone, American Indian/Alaska Native, Asian alone, Native Hawaiian/Pacific Islander, Some other race alone, Two or more races alone that are not Hispanic, and Hispanic/Latino (United States Census Bureau, 2021). In August 2021, the U.S. Census revealed that the top three racial and ethnic groups in the country consisted of White/Caucasian alone (57.8%), Hispanic/Latino (18.7%), and Black/African American alone (12.2%). Between 2010 and 2020, the Hispanic/Latino population increased by 2.4%; the Black/African American population experienced a 0.1% increase; and the White/Caucasian population decreased by 5.9%. However, the top three concentrated populations in the United States have remained the same between 2010 and 2020.

According to the U.S. Census Bureau (2021), the United States diversity index has increased by 6.2% between 2010 and 2020. The diffusion score has also increased by 3.7%. The diversity index represents the probability of two randomly chosen citizens from different ethnic backgrounds. In contrast, the diffusion score represents the percentage of citizens that do not identify with the most concentrated ethnicities in the country, referred to as the minority population (U.S. Census Bureau, 2021). The increases seen with the census data illustrates the increase in diversity across the U.S. population, which is representative of the average population that healthcare professionals treat. The study sought to understand the evolving needs relevant to the diversification of the patient population that healthcare professionals serve and the student population that educators must mentor.

Public data provided by professional organizations such as the NATA and more specific demographic studies have shown a clear underrepresentation of ethnic minorities among allied health educators and the overall student population (NATA, 2021). Underrepresentation is seen in all non-white/Caucasian populations: African American, Hispanic, Asian/Pacific Islander, Native American, and populations identified as other. Program directors from all ten NATA districts responded to surveys and reported less than 20% of an overall minority student population in their athletic training programs (Warren et al., 2018). The disproportionate representation of students ultimately leads to the same representation in practicing clinicians who serve a diverse patient population. Much focus has been placed on ensuring the cultural competence of clinical educators. However, there is still insufficient data on the factors that influence minority student retention, particularly the environmental influences on the sense of belongingness and feelings of validation within the classroom.

Physical therapy continues to share the same underrepresentation of minority students and practicing clinicians in the athletic training profession. A survey of DPT programs revealed that less than 11% of students identified as Black or Hispanic (Naidoo et al., 2020). Quantitative analysis revealed that minority students had a 4% attrition rate, more than double the 1% identified with the non-minority population. In this study, minority students inferred that a lack of role representation hindered their success. Additionally, minority students and graduates reported a lack of cultural similarity or relatedness that would lead to more social isolation. Research findings such as these have underpinned the need to carefully examine the overall construct of athletic training education and related health science programs. The alum population exemplifies the success rate of each academic healthcare program, and a person's ability to provide culturally competent patient care is directly related to the academic environment fostered for that student. Students not allowed to work in a culturally diverse environment during internships may have more incredible difficulty with cross-cultural care in professional practice (Brooks et al., 2016).

Diehl et al. (2019) utilized the Diverse Learning Environment Survey (DLE) to assess student perceptions of their campus environment. The results of this study disclosed that university climate has the biggest impact on a student's decision to drop out or transfer. The authors also noted in the study conclusions that same race relationships regarding transfer decisions more impacted Black students. When essential information such as this is presented but not significant, it should not be discarded but used as guidance for future studies. Bowman et al. (2015) looked at the environmental factors specific to athletic training student retention. The authors collected self-reported data from program directors to understand the programmatic factors associated with student retention or departure.

Bowman et al. (2015) reported that athletic training programs had an 81% retention rate at the time. The results also revealed significant differences between bachelor's and master's programs. Some of the differences that led to variance in retention rates included the annual enrollment rate, the history of the athletic training program, and the time to the professional phase of the program. These findings suggest that the more rooted a program director is in their program, the more opportunity there is for retention and recruitment (Bowman et al., 2015; Guzzardo et al., 2021; Warren at al., 2018). Low enrollment rates, leading to smaller programs, had higher retention rates, potentially due to the individualization of education. Individualization is a key factor in understanding minority student needs, suggesting that smaller class sizes or institutions may better address cultural differences.

Bowman et al. (2016) examined program directors' perceptions of students' reasons for retention or departure from an athletic training program. Their findings should be carefully interpreted, as it is not student reported; nonetheless, the authors took a unique approach for this study; they sought to gain insight into potential student thought processes via program directors' perceptions. A significant problem could arise if program directors perceive all students as the same regarding their advantage level within the program, specifically in consideration of the underrepresented populations. Results of this study suggested that program directors identified differences in retention between bachelor's and master's level students, but there was no direct mention of additional demographic differences.

Student Retention

Student retention is at the core of any successful academic program, as course curriculum can only be carried out when student enrollment is maintained. College campus functioning is largely dependent upon the student population, and low enrollment rates have shown to be a precursor for issues such as retrenchment within university departments and, in extreme cases, permanent closures. With the student population as a vital factor in the strength of an academic program, research has been conducted to assess internal and external factors that influence student retention and attrition, particularly in STEM courses leading to professional allied health academic programs (Lisberg & Woods, 2018;). According to pre-pandemic data, student retention within any STEM curriculum rests under 50 percent, with an average six-year completion of STEM-related programs under 30 percent for minority students (Lisberg & Woods, 2018). The common occurrence of student attrition in required prerequisite science and math courses directly impacts the uneven distribution of ethnic minorities entering and completing professional practice allied health academic programs. When compared to ethnic minority classmates, non-minority students in level one biology and chemistry courses, on average, were 10 percent more likely to pass the classes. Students that perceive overwhelming difficulty in entry-level or precursor courses may be deterred from continuation in the program due to low interpersonal and academic validation early on (Guzzardo et al., 2021). Suppose a discrepancy in STEM education success already exists dependent on ethnicity through natural trending. In that case, the percentage of underrepresented populations will consequently be low in the professional practice of allied health programs.

Previous research aligned internal factors with personal influences such as financial resources, feelings of inclusion, and individual intellectual capabilities. External factors are more related to the university, such as the academic program's good standing, grade point average, faculty influences, facilities available, and the overall

campus climate (Bowman et al., 2015). The data collection timing of the proposed study holds significance in the opportunity to identify attrition markers that the current pandemic has inflamed possibly**.** At-risk students, such as those in underrepresented minority groups with historical inequities, may experience even lower retention rates with the added external factor of a global health concern that has impacted all aspects of life, such as financial stability and physical and mental health.

Minority Representation in Health Sciences

Deci and Ryan's self-determination theory of motivation (2012) outlines a clear need for relatedness in the academic environment, which often has been assessed in the form of same-race student-to-faculty relationships. Minority representation among university faculty can directly influence student perceptions of the campus climate. Cherng and Halpin (2016) argued that not only ethnic minority students reported more positive expectancies with minority faculty, but students identified as non-minority white did as well. While these authors surveyed students from the secondary school population, pedagogical principles are evident in undergraduate university programs (Guzzardo et al., 2021). Adolescents and college students experience a significant need for mentorship to achieve academic success, but a problem lies in the demographic distribution of educators, particularly in allied health sciences. Whether student to faculty same race relationships is possible or not, consideration must be given to the well-established differences in college experiences between minority and non-minority white students (Day et al., 2021). Research including self-reported data from practicing clinicians within various allied health disciplines has mirrored the studies on minority student experiences within allied health programs (Carr & Collins, 2018).

Athletic Training established a national organization in 1950 and has since faced a lack of diversity among practicing clinicians, like other allied health professions. Program directors from all ten NATA districts reported a less than 20% minority student population in their athletic training programs (Warren et al., 2018). The inadequate representation is present in all non-white/Caucasian populations: African American, Hispanic/Latino, Asian/Pacific Islander, Native American, and populations identified as other (Warren et al., 2018). A survey of DPT programs in 2018 reported that less than 11% of students enrolled identified as Black or Hispanic. Similar findings are seen in demographic data representing graduate and undergraduate nursing programs (Tabi, 2016).

Ingersol et al. (2019) conducted a vital and extensive review that scrutinized the overall hiring and retention of minority teachers. Moreover, these authors underlined the mismatch between educators and minority students in settings other than higher education, particularly as the United States population continues to diversify. Comparable to Hilts et al. (2018), who suggested the need for perceived relatedness as informed by the self-determination theory, this systematic review deemed cultural synchronicity a necessary psychological component for minority students to be motivated in the classroom. While there has been significant growth in underrepresented minorities holding teaching positions, the distribution is still considerably unmatched by the student population. This phenomenon is increasingly evident in professions where minorities have historically high attrition rates, such as in the biomedical and physical sciences (Lisberg & Woods, 2018).

Minority teacher turnover rates were analyzed using regression analysis to compare teacher retention rates based on school characteristics (Ingersol et al., 2019). The turnover rate included all individuals who did not teach at the same institution for more than one school year. This review showed a drastic increase in minority teachers that doubled from 1987 to 2012. Albeit these findings demonstrate a positive shift towards adequate representation and equality efforts in education, the ethnic minority student population has propelled past this. Kelly et al. (2017) described that recruiting ethnic minority educators and students is no longer the problem; it is now retention and attrition risks. The most significant growth has been seen among Hispanic/Latino teachers, with the slowest growth and retention apparent among Black and Native American educators.

Carr and Collins (2018) reported a maximum of 6% representation of any ethnic minority category in American Occupational Therapy Association-recognized occupational therapy master's degree programs. For this study, ethnic minorities included those identified as Black/African American, Hispanic/Latino, American Indian, and Alaskan natives. These authors sought to examine the lack of minority representation in occupational and physical therapy programs, although they only surveyed one population in the data collection procedures. The results of this study placed much focus on the limited knowledge underrepresented minority students had about the occupational therapy profession. Literature review within this study revealed that most students who persisted in the occupational and physical therapy programs had a sense of relatability to and prior knowledge of the profession. Examples include family in the profession and exposure in the high school curriculum to such professions. Lack of knowledge leads to uncertainty, which is not beneficial in critical decisions about personal education and future goals.

Campus Environment and Motivation

Previous research has established significant relationships between environmental factors such as social support satisfaction and the rate of perceived stress and depression in allied health students (Crutcher et al., 2018). Negative correlations have also been reported, which signify an inverse relationship between depression and stress in

students when perceived social support is high. Social support and mentorship are imperative for the development of future healthcare professionals. Recent graduates of athletic training programs who did not experience a significant mentor relationship reported more difficulty transitioning to practice than those who felt connected to a mentor (Mazerolle et al., 2015).

Universal principles are taught in various health science classrooms pertaining to patient centered care. Examples include how allied health students are taught to frame non leading questions when discussing injury or illness with a patient, properly inform patients of all evaluation procedures, and be aware of cultural differences. Universal patient care principles can be applied in the health science teacher to student interactions to enhance teacher credibility. Singh et al. (2018) discussed the value of compassion cross culturally, deeming compassion as a universally accepted virtue. While the definition may vary for different cultures and ethnic groups, there should be an apparent effort towards compassion in professional academic and patient care relationships to enhance student or patient motivation. Increased motivation leads to better academic performance and greater retention rates among college students (Schunk et al., 2014). Highly motivated students are more likely to be satisfied with their campus environment, leading to higher retention and graduation rates.

University administration and faculty direct efforts towards facilitation of the best campus climate and resources, yet at risk students may still enroll with psychologically engraved hesitancy to external support resources. Hence, the practice of compassion is complex and may need to be individualized based on student identity influences on motivation, as motivation is essential to complete any task. Gebre and Taylor (2017) sought to understand the impact of family relationships on minority student adjustment and persistence in undergraduate programs. These authors did not survey students in allied health science programs; nonetheless, the results of this study are advantageous to the body of research on minority student motivation in college, which can be generalized to any major. The psychological lens applied in this study aligned with theories on self-efficacy, which deems self-confidence as a necessary means of task accomplishment, overall relating to program retention and degree completion (Schunk et al., 2014). Family relationships, including extended family, were noted to have a great deal of influence on minority student self-confidence that fundamentally affects motivation. Black and Latino students demonstrated the greatest vulnerability to disruptive or highly demanding family relationships, negatively influencing motivation levels (Gebre & Taylor, 2017).

Negative influences on motivation related to personal relationships, such as increased responsibilities within family units, financial struggles, and discord with pertinent family members, may directly alter feelings of self-confidence. According to Bandura's (1977) historical theory on self- efficacy, coupled with Deci and Ryans (2012) self-determination theory, intrinsic confidence and competence are vital components for successful learning experiences (Schunk et al., 2014). With these theories as a guiding framework, Gebre and Taylor (2017) employed self- confidence measurements as a mediator between the role family plays in intrinsic motivation and academic success. Extrinsic factors were also pertinent as the discussion included analysis of kin relationships and comfortability with seeking out and making use of campus resources. These authors were attentive to the many confounding variables and limitations that could present with trying to measure family influence on college success directly. Numerous questionnaire tools were implemented during data collection to measure factors individually. Family support, perceived stress, and perceived adaptation to college were all measured with separate instrumentation. Likert scale data was collected and statistically analyzed for correlations between college adjustment, self- confidence, and kin relationships. The results of this study support the notion that psychological well-being is impacted by family relationships. University programs may exhaust options on diversity and inclusion efforts but may need to spotlight faculty attention on enhancing confidence in the classroom to maintain student motivation.

Purpose of the Study and Research Questions

The purpose of this quasi-experimental study was to measure statistically significant differences in campus climate experiences between non-minority and ethnic minority students. The disproportionate representation of ethnic minorities in health science academic programs leads to the same skewed demographic distribution in practicing clinicians who serve a diverse patient population. The research focused on differences between student ethnicity in terms of sense of belonging, academic validation, and interpersonal validation. Health science programs discussed in this study include athletic training, nursing, occupational therapy, and physical therapy programs. Participants were enrolled in a health science program, with some accredited, to link student experiences to the skewed representation of practicing clinicians in athletic training, nursing, and physical therapy fields.

The research questions for this study are directly aligned with the independent and dependent variables. Each question is designed to measure the extent to which a phenomenon exists between underrepresented ethnic minorities and non-minority students in a College of Health Sciences. Three independent research questions were developed to assess each dependent variable; sense of belongingness, academic validation, and interpersonal validation. Likert scale data was collected:

RQ1. Is there a significant difference between student ethnicity, minority versus non-minority, and sense of belongingness in undergraduate health science programs?

RQ2. Is there a significant difference between student ethnicity, minority versus non-minority, and academic validation in undergraduate health science programs?

RQ3. Is there a significant difference between student ethnicity, minority versus non-minority, and interpersonal validation in undergraduate health science programs?

Null Hypotheses

H_{01}. There is no significant difference between student ethnicity, minority versus non-minority, and sense of belongingness in undergraduate health science programs.

H_{02}. There is no significant difference between student ethnicity, minority versus non-minority, and academic validation in undergraduate health science programs.

H_{03}. There is no significant difference between student ethnicity, minority versus non-minority, and interpersonal validation in undergraduate health science programs.

2. Methodology and Sample

The research study followed a quasi-experimental design to test for statistically significant differences between ethnic minority students identified as Black, Hispanic/Latino, Native American/Alaska Native, Middle Eastern, or Native Hawaiian/Other Pacific Islander, and non-minority students' perceptions of their academic climate factors. Climate factors included assessments of a sense of belongingness and academic and interpersonal validation. The participants were placed in one of two nominal categories, including a minority and non-minority group.

Using a convenience sample, the investigators sought to obtain 126 study participants, as determined by a-priori sample size testing. The number of participants needed was calculated based on publicly available enrollment and admissions data for the sample institution. Fall 2021 data showed that 844 students were enrolled in a program within the College of Health Sciences. To align with the study purpose, only health science students enrolled in programs that could potentially lead to practice as allied health care professionals were included, leaving a total target population of approximately 419 students. A-priori testing was done using a two-tailed calculation using G*Power Analysis 3.1 with a medium effect size of .5, power set at .80, and alpha set at 0.05.

The independent variable, ethnicity, was measured as a nominal variable with two categories: minority versus nonminority. Participants identified as Non-Hispanic/White and Asian were placed in one nominal category to represent the majority ethnicity seen among the student population in health science programs. Participants identified as Black, Hispanic/Latino, Native American/Alaska Native, Asian, Middle Eastern, or Native Hawaiian/Other Pacific Islander were placed in the second nominal category representing the minority student population seen in health science programs. The dependent variables of interest, sense of belonging, academic validation, and interpersonal validation were measured as ordinal data points utilizing a 5-point Likert scale.

3. Data Analysis and Results

A total of 136 survey responses were recorded for this study. Participant demographics were assessed using descriptive statistics. Ethnicity was coded into nominal variables to analyze as the independent variable based on non-minority (n = 91) or ethnic minority (n = 45) identification. Upon data collection completion, the participant distribution was examined, which resulted in the identification of unequal group sizes. The recognition of unequal group sizes is consistent with literature that highlights the underrepresentation of ethnic minorities in STEM and health science education (Warren et al., 2018). Several demographic characteristics were collected for this study to maintain consistency with the original survey; however, they were not used in the data analysis procedures. Table 1 provides expanded detail on participant demographic information.

Table 1

Table 1. Demographic Characteristics of Participants

Participant Characteristics	*n*	%
Enrollment Status		
Full-time	130	95.59
Part-time	6	4.41
Gender		
Male	55	40.44
Female	81	59.56
Ethnicity		
White or Caucasian – Non Hispanic	92	67.65
Black or African American	20	14.71
Hispanic or Latino/a/x	22	16.18
Asian or Asian American	5	3.68
American Indian or Alaska Native	1	.74
Native Hawaiian or other Pacific Islander	1	.74
Middle Eastern	1	.74
Other	3	2.21

Note. $N = 136$

Research Question/Null Hypothesis 1: Sense of Belongingness

RQ1. Is there a significant difference between student ethnicity, minority versus non-minority, and sense of belongingness in undergraduate health science programs?

The minimum summed total score for this variable ranged from 3 to a maximum of 15. Sense of belongingness total sum scores were not evenly distributed for either ethnicity category, as analyzed by Shapiro Wilk's test ($p < .05$). However, the assumption of homogeneity of variances was assessed and proven adequate by Levene's test ($p = .895$). An independent-samples *t*-test was run to determine if statistically significant differences existed between non-minority and ethnic minority students' sense of belongingness within a health science program. For research question 1, the null hypothesis was rejected. Data analysis revealed statistically significant differences between non-minority ($M = 11.77$, $SD = 2.44$) and ethnic minority ($M = 10.71$, $SD = 2.53$) students' sense of belongingness total sum scores, CI [.168, 1.948], $t(134) = 2.351$, $p = .020$.

Due to the violation of the normal distribution assumption, non-parametric testing was conducted utilizing the Mann-Whitney U-test. The results of the non-parametric analysis proved similar to the parametric results and also rejected the null hypothesis for research question 1. Sense of belongingness total sum scores were significantly different between non-minority students (mean rank = 73.31) and ethnic minority students (mean rank = 58.78), $U = 1610$, $p = .040$, $d = .43$. All statistical analysis results for RQ1 are presented in Table 2.

Table 2. Sense of Belongingness Independent Samples t-test Results

Dependent Variable	Non-minority		URM minority		*t*	*p*	Cohen's d	Mann-Whitney U Sig.
	M	SD	M	SD				
Sense of Belongingness	11.77	2.44	10.71	2.53	2.35	.020	.428	.040

Statistical analysis results for RQ1 rejected the null hypothesis was rejected and the alternative was retained.

Research Question/Null Hypothesis 2: Academic Validation

RQ2. Is there a significant difference between student ethnicity, minority versus non-minority, and academic validation in undergraduate health science programs?

The minimum summed total score for this variable ranged from 6 to 30. Academic validation total sum scores were not evenly distributed for the non-minority group ($p < .05$) but were evenly distributed for the ethnic minority group ($p = .247$) as analyzed by Shapiro Wilk's test. The assumption of homogeneity of variances was assessed and proven adequate by Levene's test ($p = .133$). Academic validation total sum scores were not evenly distributed for either ethnicity category, as analyzed by Shapiro Wilk's test ($p < .05$). They violated the assumption of homogeneity of the variances shown through Levene's test for equality of variances ($p = .035$). An independent-samples t-test was run to determine if statistically significant differences exist between non-minority and ethnic minority students' academic validation within a health science program. For research question 2, the null hypothesis was retained. Data analysis revealed no statistically significant differences between non-minority ($M = 23.59$, $SD = 3.97$) and ethnic minority ($M = 22.42$, $SD = 4.75$) students' academic validation total sum scores, CI [.356, 2.699], $t(134) = 1.516$, $p = .132$.

Due to the violation of the normal distribution and homogeneity of the variances assumption, non-parametric testing was also run utilizing the Mann-Whitney U-test. The results of the non-parametric analysis proved similar to the parametric results and retained the null hypothesis for research question 2. No significant differences existed in academic validation total sum scores between non-minority (mean rank = 72.06) and ethnic minority students (mean rank = 61.30), $U = 1723.5$, $p = .132$. All statistical analysis results for research question 2 are presented in Table 3.

Table 3. Academic Validation Samples T-test Results

Dependent Variable	Non-minority		URM minority		*t*	*p*	Cohen's d	Mann-Whitney U Sig.
	M	SD	M	SD				
Academic Validation	23.59	3.97	22.42	4.75	1.516	.132	.276	.132

Statistical analysis results for RQ2 failed to reject the null hypothesis and rejected the alternative hypothesis. Following the rejection of the alternative hypothesis, post hoc testing was conducted to determine the power of the statistical testing procedures. Unequal group sizes have been identified as a study limitation and a potential influence on weakening the power of a statistical test. G*Power Analysis 3.1 software was used to run a two tailed post hoc test that measured low statistical power (.31).

Research Question/Null Hypothesis 3: Interpersonal Validation

RQ3. Is there a significant difference between student ethnicity, minority versus non-minority, and interpersonal validation in undergraduate health science programs?

The minimum summed total score for this variable ranged from 5 to 25. Interpersonal validation total sum scores were not evenly distributed for either ethnicity category, as analyzed by Shapiro Wilk's test ($p < .05$), and violated the assumption of homogeneity of the variances shown through Levene's test for equality of variances ($p = .035$). An independent-samples t-test was run to determine if statistically significant differences exist between non-minority and ethnic minority students' interpersonal validation within a health science program. For research question 3, the null hypothesis was retained. Data analysis revealed no statistically significant differences between non-minority ($M = 20.32$, SD 3.48) and ethnic minority ($M = 19.11$, SD 4.46) students' interpersonal validation total sum scores, CI [.305, 2.720], $t(134) = 1.592$, $p = .116$.

Due to the violation of the normal distribution and homogeneity of the variances assumption, non-parametric testing was also run utilizing the Mann-Whitney U-test. The results of the non-parametric analysis proved similar to the parametric results and retained the null hypothesis for research question 3. No significant differences existed in the interpersonal validation total sum scores between non-minority (mean rank = 71.84) and ethnic minority students (mean rank = 61.76), $U = 1744$, $p = .158$. All statistical analysis results for research question 3 are presented in Table 4.

Table 4. Interpersonal Validation Independent Samples T-test Results

Dependent Variable	Non-minority		URM minority		*t*	*p*	Cohen's d	Mann-Whitney U Sig.
	M	SD	M	SD				
Interpersonal Validation	20.32	3.48	19.11	4.46	1.592	.116	.315	.158

Statistical analysis results for RQ3 failed to reject the null hypothesis and rejected the alternative hypothesis. Upon rejection of the alternative hypothesis, post hoc testing was conducted to determine the power of the statistical testing procedures. Unequal group sizes have been identified as a study limitation and a potential influence on weakening the power of a statistical test. G*Power Analysis 3.1 software was used to run a two-tailed post hoc test that measured low statistical power (.39), confirming the abnormal distribution's impact.

Evaluation of the Findings

The results of this study indicate that a crucial component of Deci and Ryan's (2012) self-determination theory of motivation is significantly lower in the ethnic minority student population enrolled in health science programs. The SDT deems relatability, a sense of belongingness, as an integral motivational component in the student to faculty experience. According to the statistical test results of this study, URM students experienced a significantly lower sense of belonging than non-minority students. These findings are consistent with previous literature regarding URM nursing students needing extra effort to receive acknowledgment from faculty members (Diehl et al., 2019). Silver Wolf et al. (2017) supported the need for a sense of belongingness early in a student's undergraduate career to decrease attrition risk.

The statistical findings for academic and interpersonal validation were not significant, but notably, lower scores were presented by the ethnic minority student group. Lisberg and Woods (2018) previously reported student retention data estimating that retention within any STEM curriculum rests under 50 percent, with an average six-year completion of STEM related programs under 30 percent for minority students. The findings of this study

support the need for equal experiences between non-minority and ethnic minority students with academic and interpersonal validation within prerequisite health science coursework such as biology and chemistry based courses. Diehl et al. (2019) previously employed the DLE survey to assess the campus environment. Consistent with the purpose of this study, university and classroom climate has been shown to significantly impact students' decisions on program continuation, transfer, or dropout (Diehl et al., 2019). A thorough discussion comparing and contrasting the findings of this study with the available body of published literature will be in chapter five.

4. Conclusions

The problem addressed by this study was the disproportionate representation of ethnic minorities in professional allied health and medical science academic programs that leads to the same skewed demographic distribution among practicing clinicians that serve a diverse patient population. The purpose of this quasi-experimental study was to measure for statistically significant differences in campus climate experiences among the disproportionate representation of ethnic minorities in health science academic programs.

The research study aimed to strengthen the available body of literature by sampling a large student population from multiple health science majors. Limitations of the study included: unequal group sizes, convenience sampling, and a shortened survey length. Future research should seek to increase the sample size by including multiple universities, which would evade a convenience sampling method. One might also consider sampling from more than one type of course, such as sampling a biology and chemistry course simultaneously, to help decrease the potential influence of convenience sampling.

Future research should use the original Diverse Learning Environments (DLE) survey when time permits to increase the length and potential data points that add validity to each variable. Future research should also involve the use of the DLE instrument to survey the entire student population at a single institution, as it was designed to do so. Many resources are provided to assist with the mass distribution of the original DLE survey so that the university administration can make individualized plans based on the institutional results. Lastly, researchers aiming to answer questions relative to the sense of belongingness, academic validation, and interpersonal validation may consider a mixed methods study design. A mixed methods study design would allow participants to elaborate on significant experiences documented on the DLE.

Cultural synchronicity is often not possible for young minority students in a College of health sciences, so faculty and administrators must consider strategies to facilitate a sense of community for all. As demonstrated in previous research, competence in cultural differences does not always generate confidence in engaging individuals outside of personal cultural familiarities (Grove & Mansell, 2020). Future professional development opportunities should pivot towards helping faculty, and administrators develop comfort with cultural competence by breaking barriers through effective and compassionate communication. A simple conversation and acknowledgment of presence early in their academic career may be the initial anchor to the foundational sense of belongingness all students need, especially those from underrepresented populations.

References

Adams, W., Terranova, A., & Belval, L. (2021). Addressing diversity, equity, and inclusion in athletic training: Shifting the focus to athletic training education. *Journal of Athletic Training, 56*(2), 129-133.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review 84*(2), 191-215. https://doi.org/10.1037/0033-295X.84.2.191

Bowman, T., Hertel, J., Mazerolle, S., Dodge, T., & Wathington, H. (2016). Program directors' perceptions of professional bachelor's athletic training student decisions to persist and depart. *Athletic Training Education Journal*, *11*(1),45-53.

Bowman, T., Hertel, J., & Wathington, H. (2015). Programmatic factors associated with undergraduate athletic training student retention and attrition decisions. *Athletic Training Education Journal*, *10*(1), 5-17. https://doi.org/10.4085/10015

Brooks, K., Rougas, S., & George, P. (2016). When race matters on the wards: Talking about racial health disparities and racism in the clinical setting. *MedEdPORTAL*, *12*, 10523. https://doi.org/10.15766/mep_2374-8265.10523

Campbell, K., & Tumin, D. (2021). Mission matters: Association between a medical school's mission and minority student representation. *PLOS One, 16*(2). https://doi.org/10.1371/journal.pone.0247154

Carr, C. & Collins, P. (2018). Exposure to, knowledge of, and interest in occupational therapy and physical therapy as career options. *The Open Journal of Occupational Therapy, 6*(2), 12.

Cassidy, E., Norris, M., & Williams, A. (2020). What does it take to graduate? A qualitative exploration of the perceptions of successful physiotherapy graduates from one university in the UK. *Physiotherapy Theory and Practice, 36*(2), 316-332.

Cherng, H. & Halpin, P. (2016). The importance of minority teachers: Student perceptions of minority versus white teachers. *Educational Researcher, 45*(7), 407-420.

Day, C., MacKenzie, S., Issac, L., Sanchez, A., Jones, C., & Rizzone, K. (2021). Racial and ethnic diversity of athletic trainers of the National Collegiate Athletic Association: A retrospective study. *Journal of Athletic Training.* https://doi.org/10.4085/1062-6050-0741.20

Deci, E., & Ryan, R. (2012). *Motivation, personality, and development within embedded social contexts: An overview of self-determination theory*. Oxford University Press.

Diehl, D., Houseworth, J., & Grier-Reed, T. (2019). Examining the variable relationship between race and considerations of campus withdrawal. *College Student Journal*, *53*(4), 417-429.

Flateland, S., Pryce-Miller, M., Skisland, A., Tonsberg, A., & Soderhamn, U. (2019). Exploring the experiences of being an ethnic minority student within undergraduate nurse education: A qualitative study. *BMC Nursing, 18*(1), 63.

Gebre, A., & Taylor, R. (2016). Association of poor kin relations, college adjustment and psychological well-being among African American undergraduates. *Journal of Child and Family Studies, 26*(1), 217-224.

Grove, D., & Mansell, J. (2020) Cultural competence: Where are we as athletic training educators? *Athletic Training Education Journal*, *15*(1), 49-54. https://doi.org/10.4085/150119041

Guzzardo, M., Khosla, N., Adams, A., Bussmann, J., Engelman, A., Ingraham, N., & Taylor, S. (2021). "The ones that care make all the difference": Perspectives on student-faculty relationships. *Innovative Higher Education, 46*(1), 41-58.

Hilts, A., Part, R., & Bernacki, M. (2018). The roles of social influences on student competence, relatedness, achievement, and retention in STEM. *Science Education, 102*(4), 744-770.

Ingersoll, R., May, H., & Collins, G. (2019). Recruitment, employment, retention and the minority teacher shortage. *Education Policy Analysis Archives, 27*, 37.

Kelly, B., Gayles, J., & Williams, C. (2017). Recruitment without retention: A critical case of black faculty unrest. *The Journal of Negro Education, 86*(3), 305-317.

Lisberg, A., & Woods, B. (2018). Mentorship, mindset, and learning strategies: An integrative approach to increasing underrepresented minority student retention in a STEM undergraduate program. *Journal of STEM Education, 19*(3), 14-20.

Naidoo, K., Yuhaniak, H., & Abel, Y. (2020). An ecological systems approach to exploring facilitators and barriers to success for minority students enrolled in a Doctor of Physical Therapy program. *Health Professions Education*, *6*(3), 394-405.

National Athletic Trainers' Association. (2018). Professional development center overview. https://www.nata.org/career-education/education/online-ceu-opportunities/professional-development-center

Nealy, S., & Orgill, M. (2020). Postsecondary underrepresented minority STEM students' perceptions of their science identity. *The Journal of Negro Education, 88*(3), 249-268.

Park, J., Kim, Y., Salazar, C., & Hayes, S. (2020). Student–faculty interaction and discrimination from faculty in STEM: The link with retention. *Research in Higher Education, 61*(3), 330-356.

Schunk, D. H., Meece, J. R., & Pintrich, P. R. (2014). *Motivation in education: theory, research and application* (4th ed.). Pearson Education.

Silver Wolf, D., Perkins, J., Butler-Barnes, S., & Walker, T. (2017). Social belonging and college retention: Results from a quasi-experimental pilot study. *Journal of College Student Development, 58*(5), 777-782.

Singh, P., King-Shier, K., & Sinclair, S. (2018). The colours and contours of compassion: A systematic review of the perspectives of compassion among ethnically diverse patients and healthcare providers. *PLOS One, 13*(5). https://doi.org/10.1371/journal.pone.0197261

Tabi, M. (2016). Helping minority students from rural and disadvantaged backgrounds succeed in nursing: A nursing workforce diversity project. *Online Journal of Rural Nursing and Health Care, 16*(1), 59-75.

Warren, K., Shingles, R., Cappaert, T., & Mills-Wisneski, S. (2018). Minority enrollment and retention in athletic training programs. *Athletic Training Education Journal*, *13*(1), 81.