SEX AND GENDER EDUCATION IN PRE-HEALTH CURRICULUMS AT THE UNIVERISTY OF ARIZONA

By

RYAN ASHLEY DONOVAN-SCHAGER

_____

A Thesis Submitted to The W.A. Franke Honors College

In Partial Fulfillment of the bachelor's degree
With Honors in

Physiology and Medical Sciences

THE UNIVERSITY OF ARIZONA

M A Y 2 0 2 3

Approved by:

Dr. Alicia Allen
Department of Community and Family Medicine

Abstract

Education regarding sex and gender and their application to course content is not being addressed until nearly the end of professional careers, despite being foundational information. In patient care settings, there is risk when not all of a person's identity and characteristics are considered for decision making. In research settings, past studies have lacked sex and gender diversity which provides inaccurate foundation for future studies. When sex and gender are not included as distinct terms in curriculums, many are in danger of incomplete data and limited health care. This data, collected from self-identified pre-health students at the University of Arizona, will be used to make a recommendation for curriculum improvement. Participants answered a variety of questions regarding their knowledge of sex and gender and their preparedness for future application of the knowledge. The results were analyzed as they related to the aims of the study, comparing for total correctness in addition to drawing correlations between identity and responses.

Acknowledgement

I would like to thank my advisor Dr. Alicia Allen for providing guidance and invaluable feedback to make this project possible, my thesis team: Jessica Ives, Gabriel Tsai, and Adela Diaz for their support, Shivalee Nigam and Kristina Medvescek for their guidance on REDCap usage and survey design, and Nasikah Ahmed for providing additional resources.

Introduction

As our world is evolving and attempting to become more inclusive to communities that have historically been oppressed, a clear lack of education on sex and gender for pre-health students who eventually serve these communities has been revealed. In the scope of healthcare, patients are being left in the hands of providers that have not been given a complete profile of their patient, including a major part of their identity. Sex and gender are two topics that are often underdeveloped and interchanged in school and healthcare settings (Khamisy-Farah & Bragazzi, 2022). More so, any education on defining sex and gender, and application to content, is not being addressed until professional schools, and even then, it lacks relevancy and sensitivity to their previous coursework. Undergraduate pre-health students hoping to enter research or patient facing settings are not being taught foundational information until their education is nearly complete. Without proper education, our society is risking having students in professional schools and those entering the professional healthcare world who are misinformed and naive. In patient facing settings, a patient's health has the potential to be jeopardized when a healthcare provider does not use all information available to aid the experience and diagnosis of a patient. For example, women were more likely to be admitted for intensive care than men despite similarities in age and severity of case (Hamberg, 2008). In research settings, there is a risk that studies are being completed without proper sex and gender recognition, and thus a low reliability rating. This discrepancy derives from the National Institutes of Health not requiring women to be included in sponsored research until 1990. Despite this improvement, current research and treatment plans still reference outdated studies primarily conducted on men. While sex and gender education continues to not be addressed and updated in curriculum across the country,

students, patients, and those impacted by clinical research are left exposed to the dangers of incomplete data collection and limited health care.

Past literature reviews have found that sex and gender are either not addressed or are done so sparingly. In addition, previous literature reviews have produced results showing gender and sex introduced as its own category or hidden entirely instead of being integrated into the material throughout the textbooks provided to students (Dijkstra et al., 2008). The limitations within these literature reviews also do not assess which portions of textbooks are used in curriculum and fail to assess which portions are retained by students. While information is made available in some literature, it is not clear whether students are able to absorb this information in a way that is useful or if it is being taught with the level of sincerity and sensitivity it demands. In one survey sent to medical students nationally, a request was made for more integrated information regarding sex and gender (McGregor & Jenkins, 2019). Finally, we do not know if this amount of information is being translated to patient care and research efforts. Because sex and gender are more modern in their definition, few research efforts have addressed how people retain the information, let alone how college students are learning it in their courses. This topic will serve as an opportunity to explore how pre-health undergraduate students can expand their knowledge and better prepare themselves for careers or graduate school. Through this research, data will be collected to create a recommendation for how to improve learning beyond the current curriculum at the University of Arizona.

The goal of this paper is to gather hands-on data beyond a literature review to support the recommendation for an improved pre-health curriculum at the University of Arizona, with the

hopes of becoming more generalizable in future projects. This paper will use surveys, qualitative results, and quantitative results to support the hypothesis of this topic. We hypothesize that pre-health students surveyed will have either incorrect or incomplete knowledge on the definitions of sex and gender. We also hypothesize that the knowledge students do possess will be reportedly learned from social media or self-search, rather than in the classroom. Using this data will help determine the impact of the gap in knowledge and the opportunity pre-health programs have to improve. As our world is changing and progressing forward, colleges have the obligation to set students up for success, especially when those students are the next generation of research and patient care. Understanding the importance of including the education of sex and gender for pre-health college students on community trust in complete education will create a platform for future research on the lasting impact of improved education.

Methods

Preliminary interest forms were sent out electronically in the spring of 2023 to self-identifying pre-health students at the University of Arizona during health-related club meetings, health related major class meetings, and on health related major D2L pages. **See Appendix A for Preliminary Interest Form.** Participants were selected from the undergraduate population at the University of Arizona after completing a preliminary interest form determining eligibility. Eligible participants were those who self-identified as a pre-health undergraduate student. The preliminary interest forms were collected using the REDCap system and data containing identifying information was hidden from view. This was done to ensure that the study was blind to the researchers.

Participants were invited to complete the “Sex and Gender Survey” on their own time and devices. **See Appendix B for “Sex and Gender Survey”.** This survey link was sent via email and text, based on selected preference, of the participant who self-identified as a pre-health student in the preliminary interest form. Upon opening the “Sex and Gender Survey” link, participants answered open-ended, multiple-choice, and agree/disagree questions. Only surveys completed in their entirety were reviewed and included in the meta-analysis.

Survey responses were reviewed by the section of survey as they relate to the aims of the study. The first aim was to see how participant responses relate to the definition of sex and the definition of gender. Section 1, containing free response questions, and responses were compared as a whole to analyze the most common words used across all definitions. The second aim was to see if participants could correctly select definitions when provided multiple options. Section 2 contained two multiple choice questions. Responses from this section were compared to an answer key and graded for correctness, as determined by select cross-referenced sources. Scores for each question were collected from all completed surveys to compare correctness. The third aim was to see if participants were up to date on research that indicates the relationship between sex, gender, and health. Section 3, containing agree/disagree statements, consisted of statements related to accuracy. These responses were reviewed for correctness in relation to accuracy and for comparative purposes in relation to opinion. The fourth aim was to determine where students learn information regarding sex and gender. Section 4 contained one multi-select question. Responses from this section were compared across all responses to determine frequency. The fifth aim was to determine if participants felt adequately prepared for the future based on their current knowledge, specifically relating to what they learned from the University of Arizona.

Section 5, containing two yes/no questions, was collected for opinion purposes. These responses were reviewed across all responses as well as being compared to accuracy of previous sections to determine relevance. Section 6 was included for the purpose of the participant to be able to ask questions. This section was assessed by a non-reviewing researcher in case the response contained identifying information or logistical errors. Responses offering a justification, future research questions, or concerns were included to support the post-research discussion. Errors within the form or surveys were corrected once a response was submitted indicating an issue.

Only fully completed surveys were included in the reviews. Incomplete surveys after a 48-hour window were stored separately from completed surveys. Survey responses for Sections 1-5 were reviewed as written with no manipulation. In the case of free responses, words that were misspelled were included in keyword search despite inconsistency. Any other inconsistencies (i.e., a probable accidental misuse of a word) were read as written and counted against the operant definition. This was to prevent researcher bias and assumption from being included in the results.

Section 1 responses were included in a qualitative analysis. Section 2 responses were included in a quantitative analysis to determine percentage correct among all scores. Section 3 responses were included in a quantitative analysis to determine the percentage of participants who were knowledgeable about current research related to sex and gender in education. Section 4 responses were included in a quantitative analysis to determine where participants learned information from by percentage. Section 5 responses were included in a quantitative analysis to determine the percentage of participants who felt similarly. Section 6 responses were not included in qualitative

or quantitative review but were included in the post-study discussion. After reviewing all responses in their entirety, certain information was opened to the researchers to compare the groups. Quantitative data and qualitative data were compared to all responses, in addition to age, year in school, gender, majors, minors, and post-graduation plans. By comparing across groups with information collected from preliminary forms, a stronger correlation was drawn between identity and responses.

Results

A total of 115 participants completed the Preliminary Interest Form, of which 64 completed the Sex and Gender Survey. These figures below are representative of the 5 aims of the study and include the demographics from the preliminary interest form.

Preliminary Interest Form Results

Demographic:	Category (n=64)
Age	18 (13) 19 (13) 20 (9) 21 (15) 22 (13)
Year in School	Freshman (17) Sophomore (12) Junior (14) Senior (20)
Majors	Accounting (1) Applied Humanities (1) * Biochemistry (2) * Biology (2) Business Economics (1) Care, Health, and Society (1) Chemistry (1) Journalism (1)

	Medicine (1) Molecular Biology (3) ** Neuroscience (6) Nursing (1) Nutritional Sciences (2) Pharmacy (1) Physiology (40) Psychological Sciences (1) Public Health (3) * Rehabilitation Studies and Services (1) Spanish (4) ****
Minors	Health- related Thematic (2) Biochemistry (13) Psychology (4) Spanish (7) Special Education (1) Health and Human Values (2) Biology (1) Bioscience (1) Business administration (2) Classics (2) Pharmacology (1) EMS (1) German (2) Mathematics (1) Music (1) Nutritional Sciences (1) Physiology (1) Public Health (2) Prelaw (1) Public Relation (1) Pharmaceutical Science (1) Sports Nutrition (2)
Post Grad Plans	Grad School (6) Med/Nursing/PA/PT (32) Research (0) Gap Year before pursuing above options (20) Other (6) Dental School (1) Healthcare Industry related field (med device sale) (2) Will graduate with a degree in nursing (1) Pharmacy School (1)

Table 1. The data in this results section is reflective of those who completed both surveys in their entirety (n=64) The demographics show that data was collected from a variety of students at the

*University of Arizona. This collection samples students in several different majors, minors, ages, and post-graduation plans. Due to lack of generalizability for all pre-health students, it is expected that further studies would produce different results beyond just looking at the University of Arizona. * Number of students who provided this answer as a double major*

Sex and Gender Survey Results

Section 1

The results that follow display the responses shared by the 64 participants who completed the survey in its entirety. Partial responses were not included in the final analysis.

Most common words associated with Gender	"Social construct" "identity" "spectrum" "individual"
Most common words associated with Sex	"Birth" "chromosome" "biological feature" "genitalia" "assigned"

Table 2. Most students were able to create their own definition. All responses were entered into a third-party word cloud generator, the most commonly used words were recorded. Words that were not specifically related to the definition (and, to, the, etc.) were not included in this display. The words to the right are the most commonly used words across the definitions to describe Gender and Sex.

Section 2

Multi-select options: Gender	% Correct
"Gender is subjective variable associated with the self-expression of one's identity with contributing factors from society, culture, and political experiences"	**59.4%%**
"Gender is a variable that uses the biological component of genetics and phenotypes to indicate the expression used in society"	31.3%%
"Gender is a biological variable associated with genetic components and phenotype expressions."	9.4%

Table 3a. Correctness is determined by Khamisy-Farah in "Gender Bias in Medicine." The bolded answer is the most correct answer of the options shown and the percentages are the frequency an answer was chosen by the participants who completed the survey.

Multi-select options: Sex	% Correct

“Sex is a biological variable associated with genetic components and phenotype expressions”	**75.0%**
“Sex is a variable that uses the biological component of genetics and phenotypes to indicate the expression used in society”	23.4%
“Sex is subjective variable associated with the self-expression of one’s identity with contributing factors from society, culture, and political experiences”	1.6%

Table 3b. Correctness is determined by Khamisy-Farah in “Gender Bias in Medicine.” The bolded answer is the most correct answer of the options shown and the percentages are the frequency an answer was chosen by the participants who completed the survey.

Section 3

Participants were asked to select strongly agree, agree, disagree, strongly disagree for the following statements. These statements were provided to test whether the participants were up to date on current research regarding the relationship between sex, gender, and health. The pie graphs below show the percentage selected for each phrase.

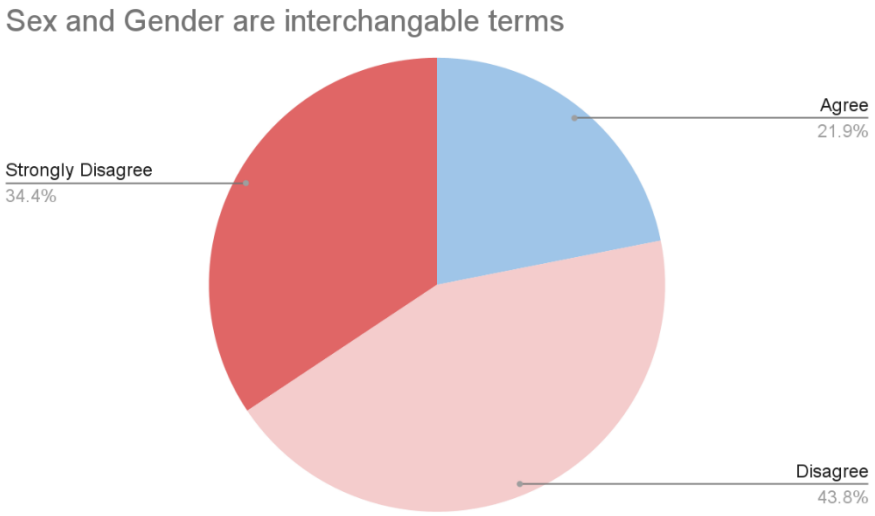

Figure 1a.

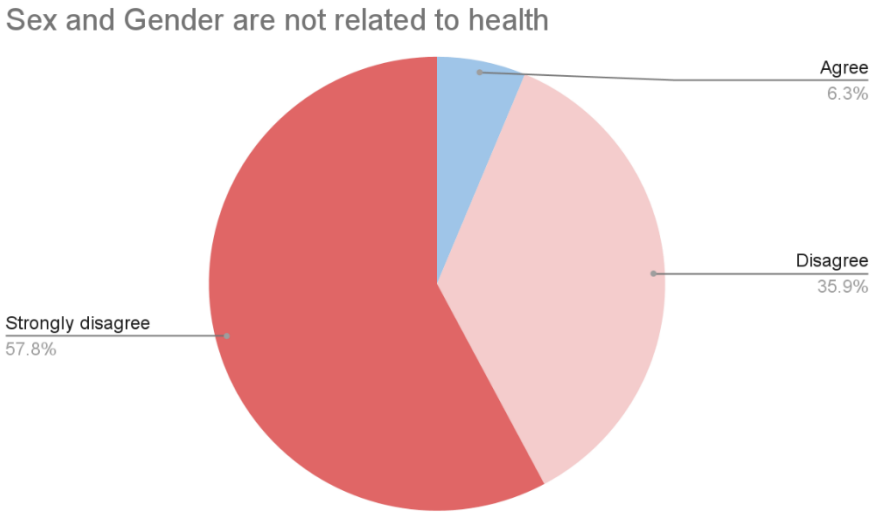

Figure 1b.

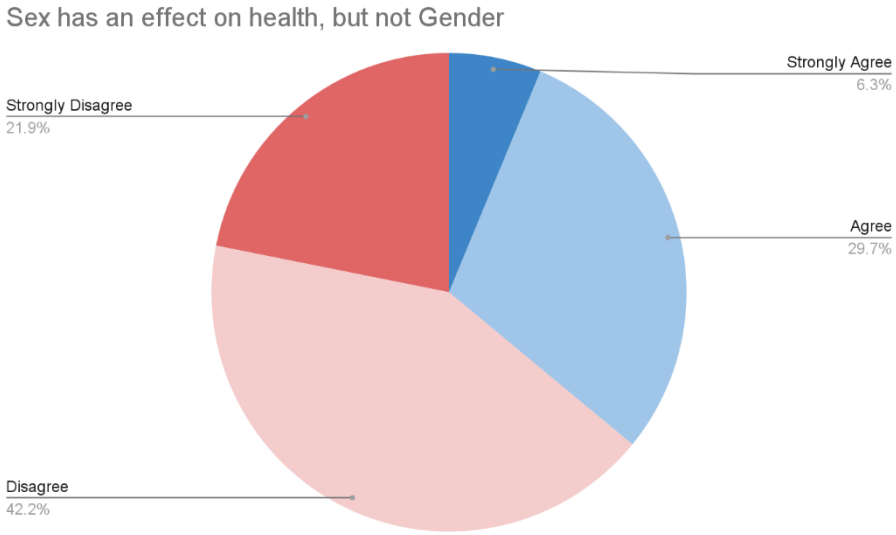

Figure 1c.

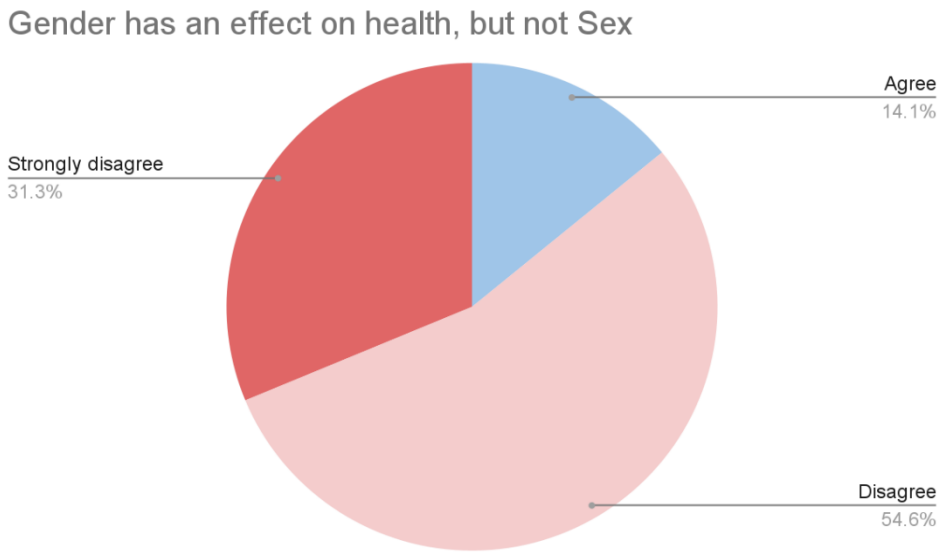

Figure 1d.
The answers above are not graded for correctness but rather to collect confidence level and to evaluate if the participant is up to date on research regarding the terms and their relationship to health. The percentage is reflective of the participants who answered correctly.

Section 4

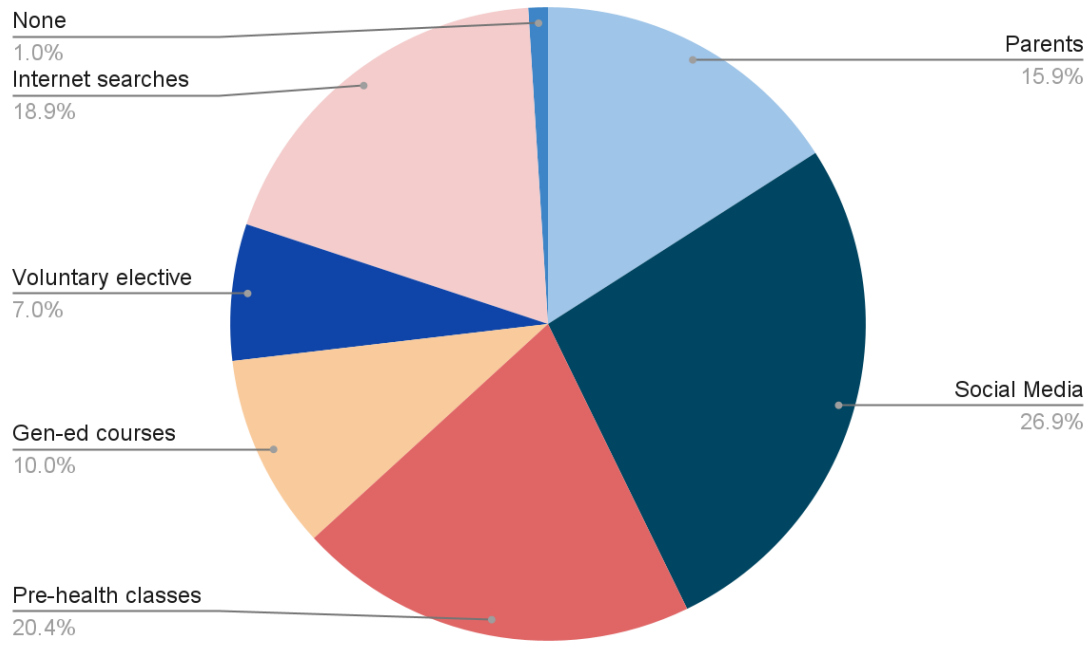

Figure 2. This pie chart shows what settings students reported learning information regarding sex and gender from. Participants were able to select multiple options.

Section 5

Personal	% answering yes
“Do you feel adequately prepared to enter the health community with your knowledge of gender, sex, and their impact on health”	Yes, Absolutely (20.3%) Yes, Somewhat (53.1%) No, Not Really (23.4%) No, Definitely Not (3.1%)
“Do you feel that the undergraduate program you are enrolled in has adequately prepared you to enter the health community with your knowledge of gender, sex, and their impact on health”	Yes, Absolutely (14.1%) Yes, Somewhat (43.8%) No, Not Really (34.4%) No, Definitely Not (7.8%)

Table 5. This bar graph shows the data for results regarding participants' opinions on whether they felt they were prepared.

The results above are directly pulled from the sections of the test that the participants answered during their survey. Further analysis was done to compare the demographics of the 64 participants to the results from the Sex and Gender Survey and is shown below.

Further Analysis

Correctness (Post Grad Plans)

	Grad School	Professional School	Gap Year
Gender	50%	53.1%	75%
Sex	50%	78.1%	70%

Table 3c. A report was created to show how the percentage correct for selecting gender and sex related to the future professions that participants were interested in.

Correctness (PSIO Majors)

Table 3d. Participants who selected PSIO as their major took up the largest percentage of the sample. A report was created to show how PSIO majors performed on the percentage correct for selecting gender and sex.

Correctness (Grade Level)

	Freshman	Sophomore	Junior	Senior
Gender	47%	58.3%	53.3%	75%
Sex	70.6%	83.3%	80%	70%

Table 3e. A report was created to show how the percentage correct for selecting gender and sex related to the grade level of the participants.

Discussion

Section 1 results show that when asked to create their own definitions, students were able to create a definition that used keywords. However, there were many outliers that were not included in the results section because they did not contribute to the most commonly used words. Some of these outliers include participant responses that provided information for terms that were not being collected. For instance, a participant who provided their own gender identity instead of a definition would be considered an outlier. Another instance of an outlier could be providing the wrong definition for the term, because it was not in the majority of responses it was not included in the most commonly used words. In Section 6, a few participants mentioned that while they knew their definitions and answers would be considered incorrect, it was what they believed and answered accordingly. This could be an explanation for a few of the outliers that were present. Based on the results displayed, it is shown that participants were able to use words that are associated with the definition provided by Khamisy-Farah in “Gender Bias in Medicine.” These free response questions are able to tell us more about how participants think about the terms

themselves. While multiple choice questions are important for quantitative data, these responses tell us that many participants are able to use keywords.

Section 2 results provide an insight to how well participants can choose a correct answer relating to these definitions. (Table 3a and 3b) It can be seen that across the whole there is improvement needed in order to improve accuracy amongst the pre-health students at the University of Arizona. When asked to select correctly for Gender, many participants chose the option that included using a biological component in order to determine how expression in society could be conducted. Based on research we know that it is important to define gender as a term that is based on identity and expression and not to include a biological component. We also decided to view the results in terms of post-graduation plans. (Table 3c) We saw that those who stated they were planning to take a gap year were the most correct in their selection of the correct definition for Gender. On the other hand, those who are planning to attend professional schools- medical school, dental school, nursing, etc.- were the most correct in their selection of the correct definition for Sex. Students who selected Physiology (PSIO) as their major were the most common in this research study, thus we decided to analyze their responses specifically. (Table 3d) Students in the PSIO major did 10% better on their selection for Gender than the total average response but performed equally on their selection for Sex. Finally, we did an analysis on whether grade level affected the response accuracy. (Table 3e) For these results we saw that those who identified as Seniors were the most correct when selecting for Gender, but Sophomores were the most correct when selecting for Sex. This difference is important because it could suggest that something could be contributing to the increase in knowledge regarding gender but the decrease regarding sex. Further studies need to be conducted to determine if there is a societal contribution to this change over time or if it is directly related to course material.

Section 3 results provide an insight to how up to date participants are on the information regarding the relationship between sex, gender, and health. For the first statement, Figure 1a, students were asked to select strongly agree, agree, disagree, or strongly disagree on whether they thought sex and gender were interchangeable terms. Based on the definitions and their applications in clinical and research settings, we know that the terms cannot be interchangeable because of their different uses. However, 21.9% of students selected that they agree with the statement. For the next statement, Figure 1b, students were asked to rate how they agreed with sex and gender not being related to health. Several studies are available for sex being an important factor when diagnosing certain ailments, like a heart attack, but gender is also important when it comes to discussing health disparities. Based on these studies we would expect to see a complete disagreement with the statement, and beyond the 6.3% who marked agree, the rest of the participants marked disagree or strongly disagree in accordance with our expectations. When asked to mark their level of agreement for if only one of the terms affected health, Figure 1c and Figure 1d, a stronger percentage said that sex was the only factor for health but not gender. For all of these results the majority is in the agree or disagree stage, not the strongly agree or strongly disagree leaving room for doubt. It can be expected that a curriculum change could be made to help students feel more confident in their choices regardless of the answer. This section particularly can be construed as controversial because people tend to feel that their answer should include personal beliefs. While the answers were compared against current research, we did not feel that they should be deemed as correct or incorrect due to the sensitive nature of the topic. However, having this section reveals a larger issue at hand than the multiple-choice selection. Pre-health students are often expected to answer questions based on knowledge of the topic not their true understanding, so the agree/disagree statements allow us to see their

application of the terms to health-related issues. While we know that not every student is able to correctly answer for gender and sex definitions, more are not familiar with how sex and gender have a prominent impact on our health. This suggests that an improved curriculum should be integrated and be more application based rather than just definitions. While knowing the definition is important, it does not always transfer properly to how it can be used in a career setting. Namely this could prove to be a problem in research and clinical settings where knowing a definition does not automatically mean that study designs are sensitive to the terms discussed and it does not mean that the diagnosis of a patient will be accurate.

Section 4 results show the settings that participants have learned about sex and gender. (Figure 2) The pie chart displays all of the options that were available to students, but it can also be broken into two sections: environments related to school and environments outside of school. We can see that Internet Searches, None, Parents, and Social Media (environments outside of school) greatly overtake Voluntary Electives, Gen-Ed Courses, and Pre-Health classes (environments related to school). In an age where misinformation is widely available in environments outside of school, it makes the inaccuracies from Section 2 and the lack of confidence in Section 3 more clear. It is possible that the information students have been exposed to has been miscommunicated from the various platforms and is not allowing students to access information that will help them apply these terms to their content and future profession. Pre-health programs have an opportunity, and a responsibility, to provide updated information that allows for these difficult conversations to be addressed. By leaving students to explore these topics on their own, schools enable students to avoid these topics and potentially avoid any situations where these topics arise. This is dangerous because of how Sex and Gender appear in healthcare settings consistently.

Section 5 results display how prepared participants feel about entering the health community. (Table 5) The purpose of this section was to separate their knowledge from their comfort level discussing these topics. While we know that participants did not do well in their accuracy in Section 2, we see that many participants feel comfortable entering with the knowledge they have. This is important because it shows that participants are unaware of their lack of understanding. When looking at the second question regarding if their undergraduate program is what helped them feel prepared, the answer trend shifts towards disagree and strongly disagree. This is consistent with the results from Section 4 showing that the majority of the information has come from outside of school. While this section is truly subjective it is important to note the shift from preparedness to where the preparedness feelings come from. By improving the curriculum to include these topics we can improve the overall level of preparedness feelings for participants.

Connection to Literature

Comparing these results to the literature that is available in the health community, these results could raise some issues for students' future interactions regarding barriers to health, conscientious objection, and clinical pharmacology settings. For individuals who do not self-identify as being on the gender binary scale, health care can be difficult or uncomfortable to access. (Safer et al., 2016) This is reflected in research studies that have been conducted to show that medical students have felt uncomfortable providing hormone treatment. In this case the discomfort was felt on both ends. The results from this research study are consistent with the findings from Dr. Safer et al, where people may not agree with gender and sex's role in health and may not always feel prepared with that knowledge. Furthermore, the results showed a lack of application of the knowledge, which is consistent with the literature in that situations in clinical

practice are not an appropriate time to *begin* conversations but instead a time to show experience in such conversations. In addition, several countries allow conscientious objections from health care providers to allow for religious protection. (Card, 2012) Beyond refusing care, this protection often includes refusal of discussing information, meaning that information that is uncomfortable for the provider does not have to be discussed or mentioned at all to a patient. This leads to a new question: are patients who are not given all of the information by providers truly giving informed consent. In order to prevent this situation, these topics should be brought up with the health care information that is being taught so future providers have ample time to learn how to communicate these difficult topics. Undergraduate programs that hold an interdisciplinary standard provide a safe environment to ask questions and discuss application of the knowledge learned. Providers have a responsibility to not cause harm to patients but by withholding information, thus not obtaining informed consent, is there harm being done? Finally, there are clinical research trials regarding transgender individuals and their levels of expression in enzyme and transporter proteins. (Cirrincione, 2021) In this paper, CYP1A2 is used as one example which is responsible for transporting drugs like caffeine. This enzyme is lower in females, is lower in pregnant individuals, and certain drugs, like estrogen replacement therapy or oral contraceptives, can inhibit the enzyme. Based on this research we see how sex is an essential factor in determining proper dosage, prescription, and hormone conversation. All of these scenarios are related to health and the healthcare professions that many will enter beyond their undergraduate programs. By updating pre-health curricula to update with specific examples of how sex and gender conversations will appear in future healthcare conversations, students may feel more prepared and be more accurate in their answers.

<u>Strengths/Limitations</u>

This study was important in order to collect demographic information with the responses. Past research typically only collected from medial students in the same year, but this methodology allows for data to be collected from a variety of students, especially undergraduates. Because of this design it also allows us to see data from many majors. In addition, most other studies have been conducted by analyzing textbooks and course content rather than surveying people to get a first-person perspective. This allows the students to make comments and ask questions at the end of the survey. For example, there was one response that felt that this study was not important because Physiology was not Gender Studies and should not become it. This provides insight into how that individual may not understand the connection between identity and health. Although it created controversy, it allows the researchers to get a better idea of the demographic of the sample. This setup also allows us to see where the disconnect in accuracy is at its root. By asking about settings of learning and the agree/disagree statements we can see how participants are able to connect their knowledge and where the knowledge or lack of is coming from.

Our sample was small for the amount of pre-health students at the University of Arizona. The survey was available for 2 weeks, which may not have provided time for all of the students who were interested. This could affect the results as the trend could be drastically different if more students were involved. In addition, this small sample size consisted of mostly PSIO majors. If more majors had been included, it could have changed the results. Survey results could be inaccurate as participants could have randomly selected or shared answers with those around them. It is assumed with a larger sample size that this would lower the amount of outlier responses. Individuals could have taken the survey twice although it is not expected that this occurred due to there being no compensation nor required participation. Finally, many

participants did not complete the survey in its entirety, which led to almost half of the started surveys not being included in the results.

Future Research

These results show that there is a gap in knowledge, application, comfort, and preparedness when discussing Sex and Gender with pre-health students at the University of Arizona. In order to address this gap, content regarding these terms needs to be integrated into the course content that is already taught to pre-health students. By working with professors and course coordinators, modules can be created to address specific topics and their applicability to current course structure. Future research can be done to expand on where the gap in knowledge is stemming from. Future research can also increase reliability for the results by increasing the sample size and expanding to gather more support from each major that is responding. Finally, further research can be conducted to update the content and gather more clinical studies to establish student and participant knowledge as information develops.

References

1. Card R. F. (2012). Is there no alternative? Conscientious objection by medical students. Journal of medical ethics, 38(10), 602–604. https://doi.org/10.1136/medethics-2011-100190
2. Cirrincione, L.R., Huang, K. J. (2021) Sex and Gender Differences in Clinical Pharmacology: Implications for Transgender Medicine. Clinical Pharmacology & Therapeutics, 110 (4), 897-908. https://doi.org/10.1002/cpt.2234
3. Dijkstra, A.F., Verdonk, P., & Lagro-Janssen, A.L.M. (2008). Gender bias in medical textbooks: examples from coronary heart disease, depression, alcohol abuse and pharmacology. Medical Education, 42, 1021-1028. https://dx.doi.org/10.1111/j.1365-2923.2008.03150.x
4. Hamberg, K. (2008). Gender bias in medicine. Women's Health, 4(3), 237-243. http://dx.doi.org/10.2217/17455057.4.3.237
5. Khamisy-Farah, R., & Bragazzi, N.L. (2022). How to Integrate Sex and Gender Medicine into Medical and Allied Health Profession Undergraduate, Graduate, and Post-Graduate Education: Insights from a Rapid Systematic Literature Review and a Thematic Meta-Synthesis. Journal of Personalized Medicine. 12, 612. https://doi.org/10.3390/jpm12040612
6. Matthew, D. B. (2008). Race, Religion, and Informed Consent – Lessons from Social Science. Journal of Law, Medicine and Ethics, 36(1) 150-173.
7. McGregor, A. J., & Jenkins, M. (2019). Integration of Sex and Gender into Health Professions Education. Journal of Women's Health, 28(12), 1727. https://dx.doi.org/10.1089/jwh.2019.8117

8. Safer, J. D., Coleman, E., Feldman, J., Garofalo, R., Hembree, W., Radix, A., & Sevelius, J. (2016). Barriers to healthcare for transgender individuals. Current opinion in endocrinology, diabetes, and obesity, 23(2), 168–171. https://doi.org/10.1097/MED.000000000000

Appendix A

Preliminary Interest Form

1. Age
    a. Dropdown selection
        i. Year in School (based on Graduation)
1. Freshman
2. Sophomore
3. Junior
4. Senior
2. Gender
    a. Free Response
3. Major 1
    a. Free Response
4. Major 2 (if applicable)
    a. Free Response
5. Minor(s) (if applicable)
    a. Free Response
6. Would you consider yourself on a pre-health track?
    a. Yes
    b. No
7. What are your plans after graduation?
    a. Graduate School
    b. Med School/Nursing School/Physician Assistant School/Physical Training School
    c. Research
    d. Gap year(s) with the intent to pursue option A, B, or C
    e. None of the above
        i. Free Response
8. Is your end goal to be in a healthcare profession?
    a. Yes
    b. No
    c. Unsure

Appendix B

Sex and Gender Survey

Section 1:

1. Define gender in your own words
2. Define sex in your own words

*Arrow to next page with message that participants will not be able to go back

Sections 2:

1. Which of the following statements regarding gender do you feel is most correct
    a. **Gender is subjective variable associated with the self-expression of one's identity with contributing factors from society, culture, and political experiences (Khamisy-Farah)**
    b. Gender is a variable that uses the biological component of genetics and phenotypes to indicate the expression used in society.
    c. Gender is a biological variable associated with genetic components and phenotype expressions.
2. Which of the following statements regarding sex do you feel is most correct
    a. **Sex is a biological variable associated with genetic components and phenotype expressions. (Khamisy-Farah)**
    b. Sex is a variable that uses the biological component of genetics and phenotypes to indicate the expression used in society.
    c. Sex is subjective variable associated with the self-expression of one's identity with contributing factors from society, culture, and political experiences.

*Arrow to next page with message that participants will not be able to go back

Section 3:

1. Sex and gender are interchangeable terms.
    a. Strongly Agree
    b. Agree
    c. Disagree
    d. Strongly Disagree
2. Sex and gender are not related to health.
    a. Strongly Agree
    b. Agree
    c. Disagree
    d. Strongly Disagree
3. Sex has an effect on health, but not gender.
    a. Strongly Agree
    b. Agree
    c. Disagree
    d. Strongly Disagree
4. Gender has an effect on health, but not sex.
    a. Strongly Agree
    b. Agree
    c. Disagree

d. Strongly Disagree

*Arrow to next page with message that participants will not be able to go back

Section 4:

1. In which setting have you learned about sex and gender
    1. Select all that apply
        1. Parents
        2. Social Media
        3. Pre-Health Classes
        4. Gen-ed Courses
        5. Voluntary Elective Courses
        6. Internet Searches
        7. None
        8. Other
            1. Free Response

*Arrow to next page with message that participants will not be able to go back

Section 5:

1. Do you feel adequately prepared to enter the health community with your knowledge of gender, sex, and their impact on health?
    a. Yes, absolutely
    b. Yes, somewhat
    c. No, not really
    d. No, definitely not
2. Do you feel that the undergraduate program you are enrolled in has adequately prepared you to enter the health community with your knowledge of gender, sex, and their impact on health?
    a. Yes, absolutely
    b. Yes, somewhat
    c. No, not really
    d. No, definitely not

*Arrow to next page with message that participants will not be able to go back

Section 6:

12. Comments, questions, concerns