High Schoolers' Perceptions of Artificial Intelligence in Medicine

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ABSTRACT

Artificial Intelligence (AI) is a rising technology with endless benefits and applications especially in the field of medicine. Unfortunately, ethical issues such as accountability, privacy, safety, security, and transparency have created a divide between the public and AI. A key population to understand is high school students as they will be affected more and more as AI continues to be developed. This begs the question: What are American high school students' perceptions of artificial intelligence in medicine? The mixed method approach for this study used a survey aligned with Aggarwal et al. (2021) to gather quantitative results about student opinions on AI. Structure interviews aligned with Amann et al. (2023) were also conducted to find underlying themes between participants' opinions. There were a total of 153 participants in this study. The students had self-reported low levels of understanding of AI as 44.44% disagreed with the statement that they had knowledge of AI technology in medicine while 30.72% were neutral. Additionally, only 23.53% of students trusted AI which contradicted the fact that students have a great amount of exposure to new technologies. There were significant differences in the levels of knowledge and trust in AI that high school students had in this study. A need for education on AI and its use in medicine as well as other sectors may be beneficial in closing the gap between the public and AI.

Introduction

Ever since the invention of technologies like the first digital computer in 1956, or the first smartphone in 1992, innovation has driven the development of advanced technologies to new heights. Many of these innovations are made to address current shortcomings in various sectors of society and these technologies are continuously developed to address new problems and challenges that arise. The new technology of focus is artificial intelligence and it can already be seen in almost every aspect of life. Artificial intelligence or AI, "refers to the ability of computers or machines to creatively solve problems that would normally require human intelligence" (Aggarwal et al, 2021). Though in its early stages, through its different algorithms such as Machine Learning where AI can "automatically learn and improve from experience without explicitly being programmed," AI has the potential to revolutionize and change life as we know it (Aggarwal et al, 2021). Specifically in medicine, AI has been used for more efficient and effective patient diagnosis and medical screening analysis, drug discovery and development, and automating patient logistics (Amisha et al, 2019). As artificial intelligence continues to develop, fictionalized procedures like automated robotic surgeries will soon become a reality which will allow AI to offer patients more effective treatments for any condition they may have. Given these revolutionary benefits, some still lack trust in AI which creates boundaries for implementing this technology effectively. The reasons for these negative feelings toward artificial intelligence have been extensively researched and include several ethical factors: accountability, privacy, safety, security, and transparency (World Health Organization, 2021). Artificial intelligence relies on a vast amount of data in order to operate effectively, but with the rising importance of personal freedoms, people are frightened by the privacy and security of their personal data. This also leads to the public's demands for accountability and transparency from companies that utilize AI in order

to ensure the safe use of artificial intelligence, and that companies do not encroach on personal freedoms in order to optimize AI.

In order to understand how the public feels about AI, research has been conducted into how different groups feel about artificial intelligence technologies in medicine. These groups include patients and physicians because they are in direct contact with these new technologies as well as everyday adults who will eventually be affected by AI. However, the younger generation specifically high schoolers' opinions have not yet been researched even though they will experience the more developed and advanced forms of AI in the future, which is why building trust between this group and AI is especially necessary. Considering this gap and the possible implications of this research begs the question: What are American high school students' perceptions of artificial intelligence in medicine?

Literature Review

Ethics of Artificial Intelligence

An important aspect of this issue is the ethical perspective of artificial intelligence in medicine because ethics provide a foundation for trust, respect, and decision-making (UCSD 2). In accordance with this idea, the World Health Organization (WHO) released guidance on the ethics and governance of artificial intelligence in healthcare based on a thematic analysis of 100 proposals from nations declaring their intentions to develop and implement AI. The WHO found five main principles in common between many of the proposals: accountability, privacy, safety, security, and transparency (World Health Organization, 2021). The WHO found that accountability ensures that companies using or developing AI tools are liable for any complications that occur through the process of working with artificial intelligence. Additionally, companies who look to maximize the effectiveness of their AI tools will need large amounts of data in order to thoroughly create algorithms that can accurately make decisions leading to a threat of personal data. This privacy issue leads to the next principles of safety and security especially in medicine because of the direct effects these technologies have on a patient's well-being. The final principle discussed is the need for transparency in order for organizations to monitor groups using or developing AI in order to ensure problems like privacy encroachment and other dangerous implications are prevented. These findings were supported by the research of Jie Zhang and Zong-Ming Zhang from the Nanjing University of Chinese Medicine as they conducted research through a multi-disciplinary literature review where they searched for ethical issues concerning the design of artificial intelligence technology as well as its application. Their key finding for ethical issues with AI design was algorithmic bias which is when the data used to train machine learning includes human-induced bias like inaccurate categorization of data in order to favor certain populations, or data-induced biases if the data contains skewed ethnic, racial, or socioeconomic content (Zhang & Zhang, 2023). As a result, they implicated that in order to counteract algorithmic bias, the quality of data should be checked in order to guarantee accurate and effective AI (Zhang & Zhang, 2023). In addition to these two papers, Emma Frost and her team from the University of Wollongong, Australia looked through a social lens at the ethical issues of artificial intelligence in medicine as they conducted a scoping review on various aspects of AI and ethics. They found similar results as the past two papers except they introduced two new ethical ideas: power and ethical governance. Ethical governance is when institutions of power utilize their power by trying to create positive change and maintain equality (Frost et al, 2022). In connection with Jie Zhang and Zong-Ming Zhang's key finding on algorithmic bias and the need for quality data, Frost and her team found that the ethical issue of power, specifically the distribution of power to marginalized groups may also be a cause for minorities to not trust AI as they do not want the current state of healthcare discrimination to be bolstered by this new technology (Frost et al, 2022). Additionally, the researchers found that ethical governance is necessary to improve the opinions of the public on AI as governments, companies, and other organizations who look to regulate, research, develop, or implement AI must have the proper intentions in mind

when working with artificial intelligence in order to develop trust between them and the public (Frost et al, 2022). This idea is similar to the idea of accountability that has been implicated by all three papers as people tend to trust those who take responsibility for their actions whether they are beneficial or harmful. Ultimately, these three papers help provide a framework for the ethical ideas and issues that have formed a trust gap between the public and artificial intelligence technologies in medicine.

Perceptions of Artificial Intelligence in Medicine

In order to understand the disconnect between people and AI, much research has been conducted to deduce different populations' perceptions of artificial intelligence technologies in medicine. Quirine van der Zander and her research team at the Maastricht University Medical Center in the Netherlands looked at the perspectives of patients and physicians and justified this research because both groups must have the knowledge and willingness to use and trust AI technologies in order for AI to be effective (van der Zander et al, 2022). In order to conduct their research they developed two questionnaires, the first was made for the patients and the questions focused on the patient's willingness to have procedures using AI and their trust in the technology, while the second was tailored towards the physicians and looked to find the knowledge of physicians on AI, their trust in the technology, and their willingness to use it. All questions besides the demographics questions were asked on a five-point Likert scale and the survey was then distributed to two different hospitals in the Netherlands. Some significant findings that the researchers found for the patient population were that a majority of patients were not anxious about the use and implementation of AI in healthcare and that many believed that AI would increase the quality of care (van der Zander et al, 2022). These positive attitudes were further emphasized in the subgroup who reported that they were familiar with artificial intelligence as significant correlational data showed that this subgroup preferred AI use from their physicians, were optimistic of a five-year time for implementation of AI in healthcare, believed that AI would increase the quality of care, and only a few participants in this subgroup were anxious about AI in medicine (van der Zander et al, 2022). Some significant findings among the physician population were that a majority of physicians were willing to use AI and also believed that it would improve the quality of care. When comparing the two groups the researchers found that physicians had more positive views on AI and it was evident in the significant difference in the belief that AI would improve the quality of care between physicians and patients (van der Zander et al, 2022). In short, van der Zander found that both patients and physicians had positive perceptions of artificial intelligence in medicine, although physicians had a more positive view (van der Zander et al, 2022). From this, the researchers concluded that this may be due to increased knowledge and familiarity with AI (van der Zander et al, 2022). Another study on the perceptions of medical professionals on artificial intelligence was conducted by Imtiyaz Ansari and his research team from the School of Medical and Allied Sciences at the University of Goenka in Delhi, India. The researchers utilized a Google Forms survey in order to gather data on the knowledge of physicians on AI, the impact they believe AI will have on medicine, and the overall perceptions the participants have of artificial intelligence. The questions were structured using a yes, no, or maybe response, and the survey was distributed to multiple hospitals which included 268 participants. Similar to the findings of van der Zander, et al, the researchers found that a majority of participants knew about AI and believed that it would benefit the quality of care in medicine (Ansari et al, 2023). However, the researchers also found that physicians had concerns over job security as the participants were almost equally split between the three response options (Ansari et al, 2023). This contrasts with the findings of van der Zander as she found that most physicians in her study had positive attitudes toward AI (van der Zander et al, 2022). A study conducted by Ravi Aggarwal and his team from the Imperial College in London looked at the perceptions of patients on AI in medicine. The researchers created a survey with questions posed using a five-point Likert scale. The survey was distributed to a teaching hospital in London using a sample of 408 respondents. The researchers found that patients had a lack of knowledge of AI as nearly half reported having little to no knowledge of AI or machine learning (Aggarwal et al, 2021). This contrasts the findings of

van der Zander and Ansari as they both found that physicians and patients had sufficient knowledge of AI in medicine (Ansari et al, 2023; van der Zander et al, 2022). Other significant findings were found within the subpopulations as males had more self-reported knowledge of AI than females and white participants reported significantly more trust in AI than other ethnicities (Aggarwal et al, 2021). Based on these findings, Aggarwal implicated the need for education programs to teach the public about the benefits of AI to help build and strengthen trust in the new technology (Aggarwal et al, 2021). When looking at the perceptions of the public, Shuqing Gao and his research team from Beijing Normal University analyzed social media posts that included keywords related to AI and medicine. They then manually inspected all identified posts, excluded invalid posts, and were left with 2315 posts to use for thematic analysis. The researchers had two key findings, the first was an idea expressed by a majority of people with negative attitudes towards AI was that AI posed a threat to the job security of healthcare professionals (Gao et al, 2020). The next finding was that the other large portion of negative attitudes were not aimed toward the technology itself, but instead, at the companies and organizations that develop and use AI (Gao et al, 2020). This connects to an ethical issue that Frost identified as ethical governance an issue that needs to be overcome in order to increase the trust between the public and AI (Frost et al, 2022). A limitation identified by the researchers is that their population was younger than they intended and they reasoned that this is because younger people are more prone to use social media and know about newer technologies leading to a potentially over-optimistic representation of their data (Gao et al, 2020). Another study conducted by Julia Amann and her team from the Department of Health and Technology in Zurich, Switzerland utilized structured interviews with scenarios to gather data on attitudes towards AI in medicine. They interviewed 34 patients and found that the patients were very enthusiastic about the possibilities of AI as it would help resolve problems they have experienced like inaccurate diagnoses and poor data management (Amann et al, 2023). However, a majority of patients were not very knowledgeable about AI leading to a limitation in the research being that the attitudes of the participants toward AI were not justified by their existing knowledge, but instead by imaginary details of AI (Amann et al, 2023).

Research Gap

Based on this body of past research on the ethical issues and perceptions of artificial intelligence in medicine it is evident that there is a gap in the research that pertains to the specific populations that have been researched. There have been studies conducted on the perceptions of patients, healthcare professionals, and adults, but no research has been made on the perceptions of high schoolers on AI in medicine. Research on the younger generation is necessary to learn if there is a need for education on AI as the foundational source Aggarwal suggested. This study looks to find the attitudes knowledge, and any concerns that high school students have regarding artificial intelligence in medicine.

Hypotheses

After establishing the gap in the literature the researcher was able to create three hypotheses that were supported by their foundational sources:

1. A majority of high school students will trust artificial intelligence in medicine
    Several foundational sources including van der Zander and Aggarwal found that a majority of their populations trusted artificial intelligence (Aggarwal et al, 2021; van der Zander et al, 2022). Considering that the researcher is conducting similar research they predict that similar results will be found in their sample population of high schoolers.
2. A majority of high school students will be knowledgeable about artificial intelligence when applied to medicine

High schoolers, like many of the younger generation, are far more exposed to new technology, so the researcher believes that high schoolers will have more knowledge of AI. This prediction is related to the limitation identified by Gao as he believed that their findings were slightly inflated due to the younger generation's optimism toward AI (Gao et al, 2020).

3. A majority of high school students will believe that artificial intelligence will be beneficial for medicine

All foundational papers on the perceptions of AI were in agreement that artificial intelligence would be beneficial for medicine whether it was with the potential to maximize patient-physician interaction or more accurate procedures. As a result, the researcher believes that they will find similar results.

Methods

The aim of this study is to find the perceptions of American high schoolers on artificial intelligence in medicine. This study utilizes a mixed method and most closely aligns with Aggarwal, Farag, Martin, Ashrafian, and Darzi's (2021) study where the researchers developed and distributed a questionnaire in order to find patient perceptions of artificial intelligence and healthcare data. Additionally, this study closely aligns with the foundational work of Amann, Vayena, Ormond, Frey, Madai, and Blasimme's (2023) study which used academic interviews to find the expectations and attitudes toward medical AI of stroke patients and physicians. The gap that the researcher looked to address by utilizing this mixed method was the perceptions of high school students as past research looked at other groups including physicians, patients, and the general public.

Population

The population of this study consists of students who attend Calabasas High School (CHS). CHS is a large, high-performing Co-ed public high school in a suburban setting with 2,000 students ranging from grades 9th to 12th with diverse ethnic backgrounds allowing this study to have a variety of representation. The student body's ethnic breakdown is comprised of 78.5% White/Caucasian students, 5.5% Asian students, 5% Black/African American students, and 9% Hispanic/Latino students. Additionally, the general income level is high-income and only 10.6% of the student population utilizes the Free-Reduced Lunch program. For this study, there were 153 participants, ranging from grades 9th to 12th with 55.56% of participants being male and 42.48% being female. The ethnic breakdown of the participants is 4.58% African American, 13.07% Asian, 71.24% Caucasian, 10.46% Latino/Hispanic, 0.65% Native American, 3.27% Native Hawaiian/Pacific Islander, and 15.03% identified with other ethnicities. This sample is relatively similar to the general population of CHS and the ethnicities of participants are similar to those found by Aggarwal as the minority populations for his study were 11.03% African American and 13.73% Asian while there was a larger difference in Caucasian participants as 56.13% of Aggarwal's participants identified as Caucasian while 71.24% of participants in this study identified as Caucasian.

Instruments

The survey was made on Google Forms and was separated into three parts: demographics in order to gather data on the background of participants, opinions on artificial intelligence and machine learning to learn general opinions on AI technologies, and the last section on the opinions on artificial intelligence in medicine to see how participants felt about AI when applied to medicine. All questions besides the demographics questions were proposed on a five-point Likert scale asking participants how strongly they agreed or disagreed with a

given statement. A majority of questions were aligned with the questions asked by Aggarwal in his study on the perceptions of patients on AI (Aggarwal et al, 2021). The use of a survey would allow the researcher to gather quantitative data on the perceptions of students making it possible to find statistically significant results and draw conclusions from this research.

Question	Response Style	Source
Demographics		
1. What is your gender?	Multiple Choice; Male, Female, Prefer not to say, Other	Self-Defined
2. Please specify your ethnicity.	Checkboxes; Caucasian, African-American, Latino or Hispanic, Asian, Native American, Native Hawaiian Pacific Islander, Other	Self-Defined
3. What is your age?	Multiple Choice; 13, 14, 15, 16, 17, 18	Self-Defined
4. What grade are you in?	Multiple Choice; 9th Grade, 10th Grade, 11th Grade, 12th Grade	Self-Defined
Opinions on Artificial Intelligence (AI) and Machine Learning (ML)		
5. I am very familiar with artificial intelligence.	Likert Scale; 1 (Strongly Disagree) - 2 (Disagree) - 3 (Neutral) - 4 (Agree) - 5 (Strongly Agree)	Aggarwal
6. I am very familiar with machine learning.	Likert Scale; 1 (Strongly Disagree) - 2 (Disagree) - 3 (Neutral) - 4 (Agree) - 5 (Strongly Agree)	Aggarwal
7. Artificial Intelligence has a positive representation in the media.	Likert Scale; 1 (Strongly Disagree) - 2 (Disagree) - 3 (Neutral) - 4 (Agree) - 5 (Strongly Agree)	Aggarwal
8. Artificial Intelligence is necessary to improve society.	Likert Scale; 1 (Strongly Disagree) - 2 (Disagree) - 3 (Neutral) - 4 (Agree) - 5 (Strongly Agree)	Aggarwal
9. I trust artificial intelligence.	Likert Scale; 1 (Strongly Disagree) - 2 (Disagree) - 3 (Neutral) - 4 (Agree) - 5 (Strongly Agree)	Aggarwal
Opinions on Artificial Intelligence in Medicine		
10. I am very familiar with artificial intelligence and machine learning technology in medicine.	Likert Scale; 1 (Strongly Disagree) - 2 (Disagree) - 3 (Neutral) - 4 (Agree) - 5 (Strongly Agree)	Aggarwal
11. I trust artificial intelligence technologies being used in medicine.	Likert Scale; 1 (Strongly Disagree) - 2 (Disagree) - 3 (Neutral) - 4 (Agree) - 5 (Strongly Agree)	Aggarwal
12. Artificial intelligence technologies in medicine do not	Likert Scale; 1 (Strongly Disagree) - 2 (Disagree) - 3 (Neutral) - 4	Aggarwal

jeopardize the privacy and safety of patients' data.	(Agree) - 5 (Strongly Agree)	
13. I trust the healthcare industry to safely manage personal data in order to ethically develop artificial intelligence.	Likert Scale; 1 (Strongly Disagree) - 2 (Disagree) - 3 (Neutral) - 4 (Agree) - 5 (Strongly Agree)	Aggarwal
14. Artificial intelligence should be used to increase physician-patient interaction.	Likert Scale; 1 (Strongly Disagree) - 2 (Disagree) - 3 (Neutral) - 4 (Agree) - 5 (Strongly Agree)	Self-Defined
15. I would feel comfortable with medical procedures involving artificial intelligence. (screening analysis, automated diagnoses, surgeries)	Likert Scale; 1 (Strongly Disagree) - 2 (Disagree) - 3 (Neutral) - 4 (Agree) - 5 (Strongly Agree)	Aggarwal, Self-Defined
16. Healthcare professionals and artificial intelligence technology can work together to improve patient care.	Likert Scale; 1 (Strongly Disagree) - 2 (Disagree) - 3 (Neutral) - 4 (Agree) - 5 (Strongly Agree)	Aggarwal, Self-Defined
17. The potential benefits of artificial intelligence technologies in medicine outweigh the risks.	Likert Scale; 1 (Strongly Disagree) - 2 (Disagree) - 3 (Neutral) - 4 (Agree) - 5 (Strongly Agree)	Self-Defined

Figure 1. Student Survey

The interview asked questions aligned with those of Amann as well as some of the ethical challenges the WHO outlined. The interview had a structured format and did not offer room for a follow-up discussion to ensure that all responses were equal in significance. The use of structured interviews was necessary in order for the researcher to gain insight into the reasons behind decisions made while participants responded to the survey.

Questions	Source
Do you see applications of artificial in your daily life?	Amann
What applications of AI do you know of in medicine?	Amann
Do you think that AI creates a privacy concern and what steps can be taken to limit this issue?	Amann, WHO
Do you trust artificial intelligence technologies in medicine and would you be willing to have AI-related procedures? Why or why not?	Amann, WHO

What steps can be taken to increase the public's trust in artificial intelligence?	WHO

Figure 2. Student Interview

Implementation

Before distribution, the survey and interview were reviewed and approved by an Institutional Review Board and all participants signed an informed consent letter before being able to complete the survey. The survey was then emailed out to all English teachers at CHS because English is a required subject for all students at the high school no matter their grade level. This would ensure that all students had an opportunity to respond and that there were no sampling biases. Upon receiving the survey, the English teachers then posted the link to the survey on their preferred websites and students were able to voluntarily take the survey during the two-week response period. After completing the survey, participants were given the option of opting to participate in follow-up interviews. If the student was interested in participating in the interviews then they were emailed to find out a date for the interview which would take place online through the meeting platform Zoom.

Sample Selection

The sample used for this research was a simple random sample as all students at CHS were given an equal opportunity to participate in this study as the survey was sent out to all English classes as previously mentioned. The researcher chose to use a simple random sample in order to eliminate the chances of sampling bias playing a role in this study's results.

Data Analysis

All responses obtained from the survey were automatically recorded on a Google Sheets spreadsheet where the researcher was able to form sub-spreadsheets in order to break down the data and run various statistical tests. The tests used include average and standard deviation for histogram construction, statistical hypothesis tests (t-tests) for subpopulations, and Pearson correlation coefficient tests to see the relationship between different questions and their responses. The researcher justified the use of these tests because of their foundational source Aggarwal used the same tests to analyze his data (Aggarwal et al, 2021). For the interviews, the researcher was planning on conducting a thematic analysis in order to analyze the interview data and find the patterns between the responses. This is a multi-step strategy that Amann used to analyze their qualitative data and works by first reviewing the transcripts or recordings of the interviews, then identifying common themes through the use of word clouds, and finally contextualizing and drawing conclusions based on the identified themes. Unfortunately, the researcher was unable to gather interview data because of a lack of participation in the follow-up interviews.

Findings & Analysis

The researcher looked to find the perceptions high schoolers had on artificial intelligence in medicine as this specific population created a gap in past research on perceptions of AI. In order to conduct this study, the researcher developed a mixed method utilizing a survey and structured interview. The quantitative data gathered

through the survey created three categories of analysis: Likert findings, subpopulation findings, and correlational findings. Unfortunately, due to a lack of participation in the structured interviews, no qualitative data could be collected.

Likert Findings

This first section is dedicated to the general population of participants and mean responses to specific questions. As seen in Figure 1, questions were asked on a five-point Likert scale in order to aid in the statistical analysis of the survey data.
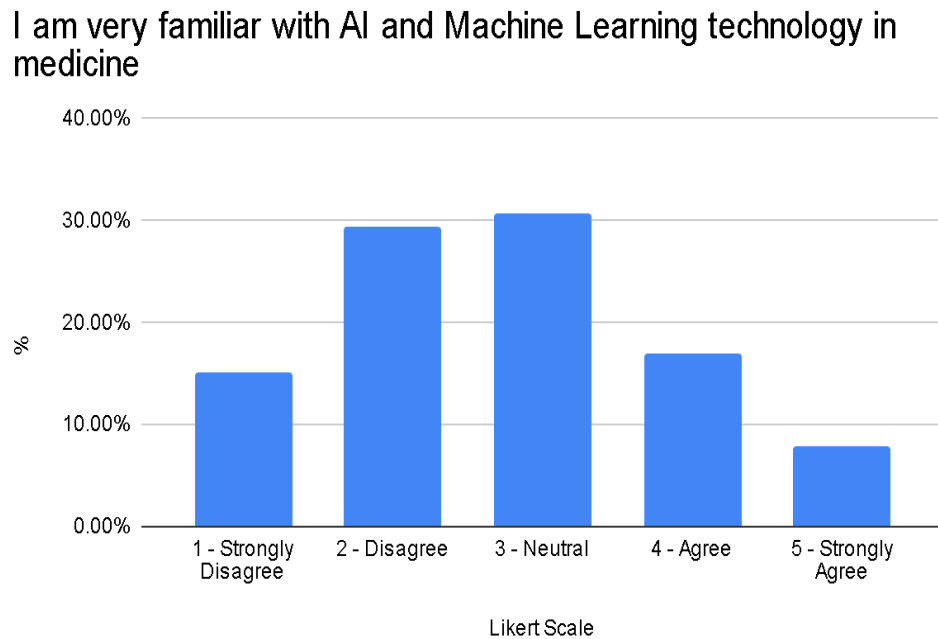
Figure 3. (Question 6)

When asked about their familiarity with artificial intelligence, Figure 3 shows a significant amount of participants were not familiar with AI or machine learning when applied to medicine as 44.44% disagreed or strongly disagreed with the statement while 30.72% were neutral. This shows that high schoolers in this study were not knowledgeable about AI technology in medicine and disproves the researcher's second hypothesis, which relates to the findings of Aggarwal as he found that 43.3% of patients were unfamiliar with AI in medicine (Aggarwal et al, 2021). This is concerning considering that students and patients will be directly affected by artificial intelligence as it becomes more prevalent in medicine, so their lack of knowledge may cause them to fear the new technology.
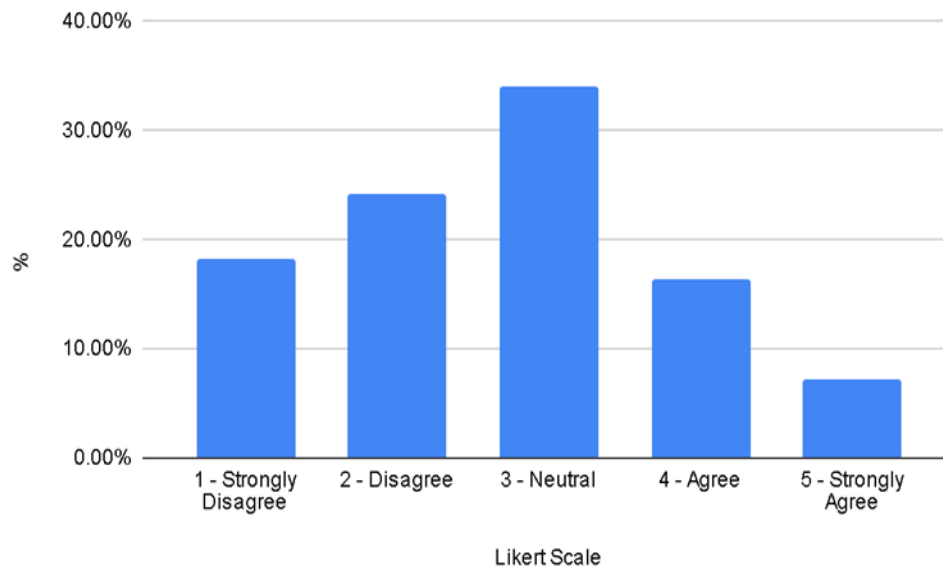
I trust artificial intelligence

Figure 4. (Question 5)

When looking at the self-reported trust that students have in artificial intelligence Figure 4 shows results in accordance with the concerns of the last finding, trust in artificial intelligence is fairly low. Only 23.53% of students trusted artificial intelligence which contrasts the findings of Quirine van der Zander as she found that 81.3% of physicians and 64.9% of patients trusted artificial intelligence (van der Zander et al, 2022). This shows a large disparity in trust between the two adult populations in comparison with the younger high school population. This was surprising to the researcher considering the high exposure students have to new technology and disproved their first hypothesis as a majority of students did not trust AI.

Artificial intelligence technologies in medicine do not jeopordize the privacy and safety of patient data.
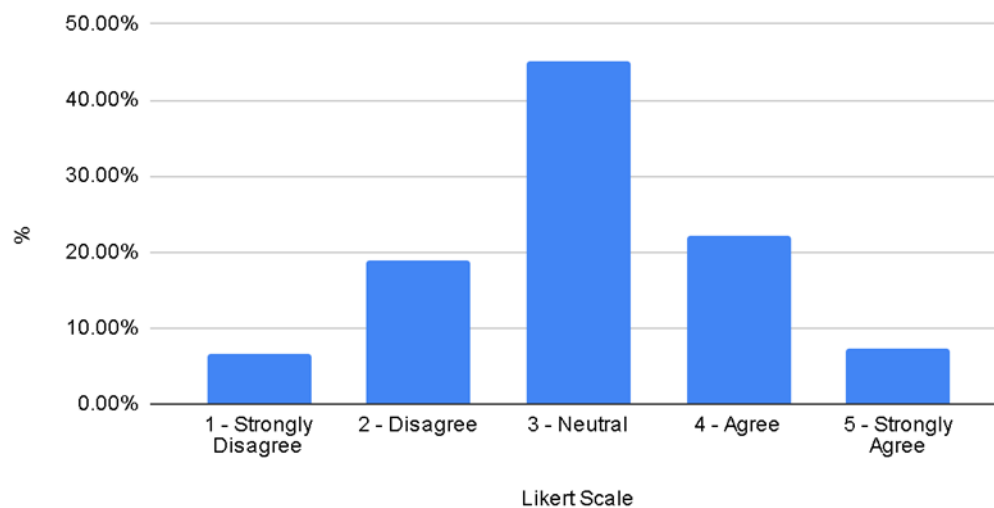
Figure 5. (Question 8)

When looking at the opinions students had towards the privacy and safety of patient data, the results appear in the shape of a bell curve as 45.10% of students were neutral towards this statement. Comparing those who agree or disagree, there were slightly more students who agree with this statement as 29.41% agree or strongly agree while the remaining 25.49% disagree or strongly disagree with this statement. This slightly contrasts Aggarwal's findings as his respondents were far more sure of their position as 56.2% supported or strongly supported the use of patient data to enhance AI (Aggarwal et al, 2021). The neutrality found may be connected to unfamiliarity with AI found in Figure 3 as students may not know enough about AI to have a stronger opinion.

The potential benefits of artificial intelligence in medicine outweigh the risks
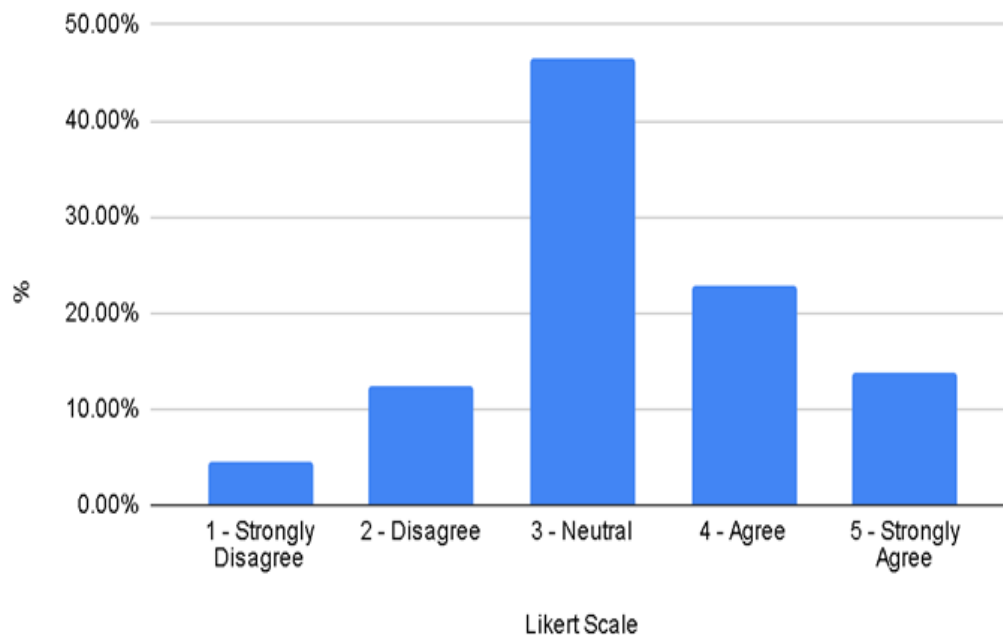
Figure 6. (Question 13)

After responding to all the questions in the survey, a final question was asked to find the general outlook participants had on AI and see if they thought AI had more benefits or risks for medicine. As seen in Figure 6, students' opinions of the statement were generally split with a similar bell curve distribution as seen in Figure 5 with the majority of students, 46.41%, expressing neutrality while the second largest population of responses, 36.60%, were in agreeance with the statement. These findings partially confirm the researcher's third hypothesis as more students believed in the benefits of AI, however, the results were far closer than expected, especially in comparison to past studies. For example, Aggarwal found that 45.9% of patients believed AI was more beneficial and 22.7% believed the benefits and risks were equal (Aggarwal et al, 2021).

Subpopulation Findings

This section aims to find any significant differences in the responses between the gender, grade, and ethnic subpopulations of this study. This data was analyzed using two-tailed t-tests for independent means, and only

the subpopulation data for gender provided significant differences between female and male responses to questions.
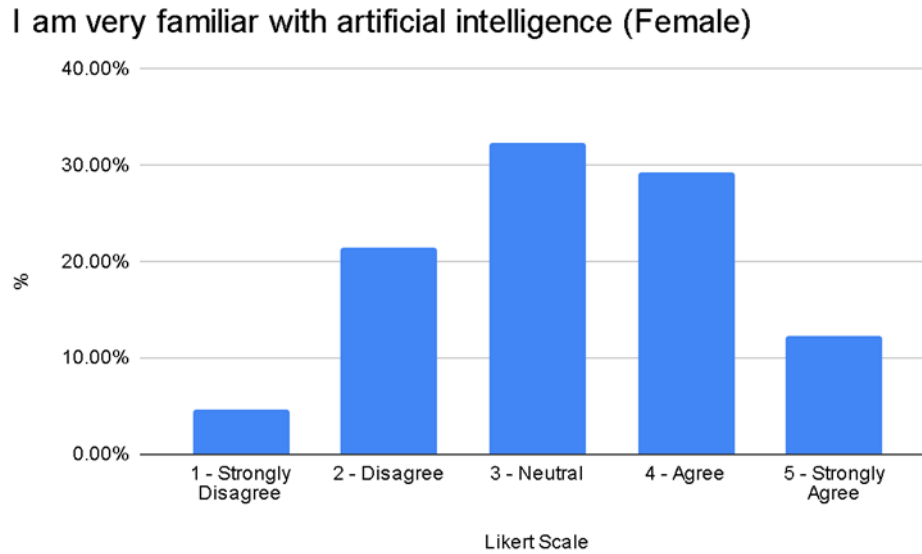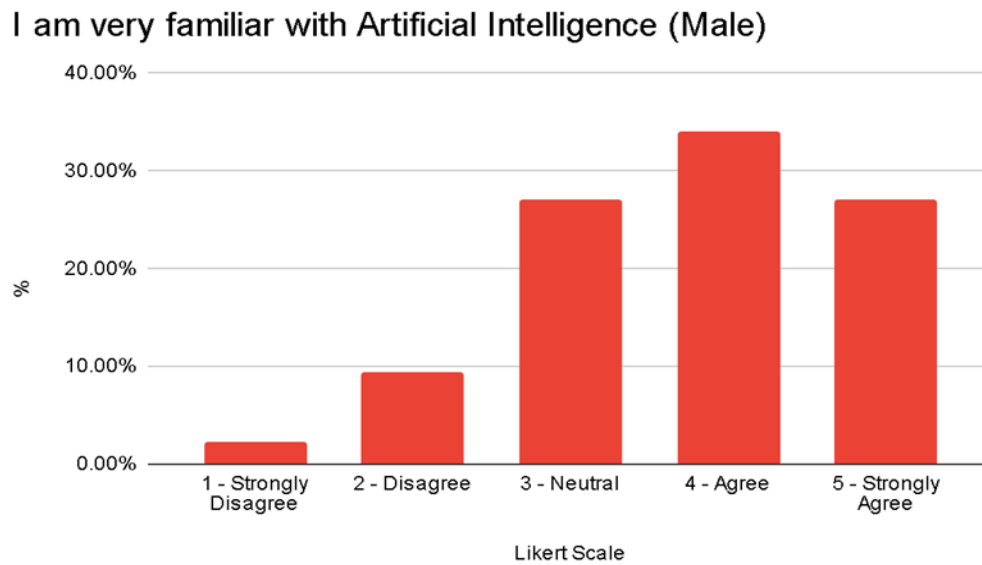

Figure 7. (Question 1)

Figure 8. (Question 1)

T-test for Gender (Question 1)	
t-value	-2.9441
p-value	.001881*

> *Indicates finding is significant

Figure 9. (t-test for Question 1)

When looking at the female responses compared to male responses when students were asked whether they were familiar with artificial intelligence there was a significant difference in the results. As seen in Figure 9 there was a t-value of -2.9441 and a significant p-value of 0.001881 as Figures 7 and 8 show that males were more familiar than females with 61.18% of males agreeing or strongly agreeing with the statement compared to only 41.54% of females. This finding connects to a similar key finding of Aggarwal as he found that more males were familiar with AI and machine learning in medicine than females (Aggarwal et al, 2021). This finding may implicate a possible lack of confidence from females as scores are self-reported and the need for empowerment towards this new technology may be necessary to ensure equality.
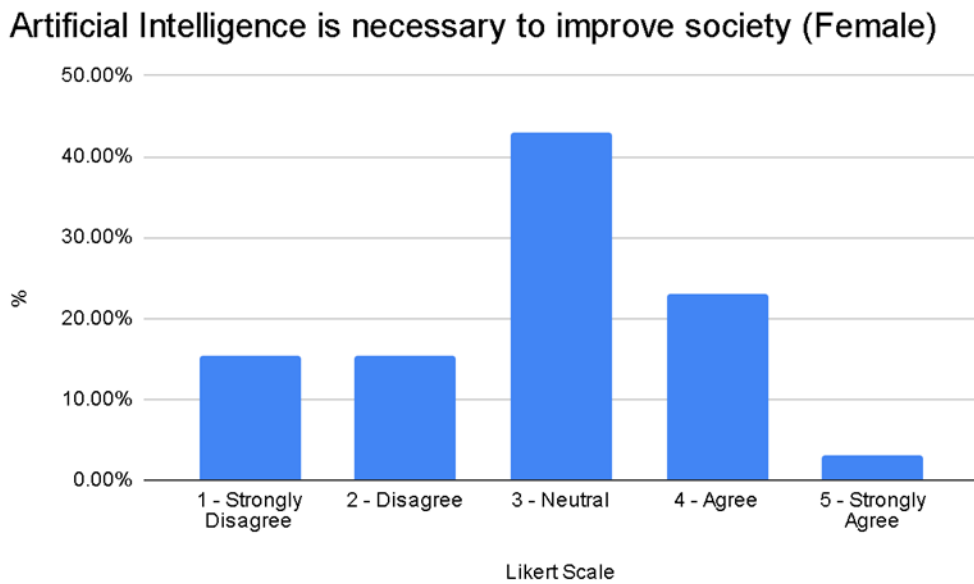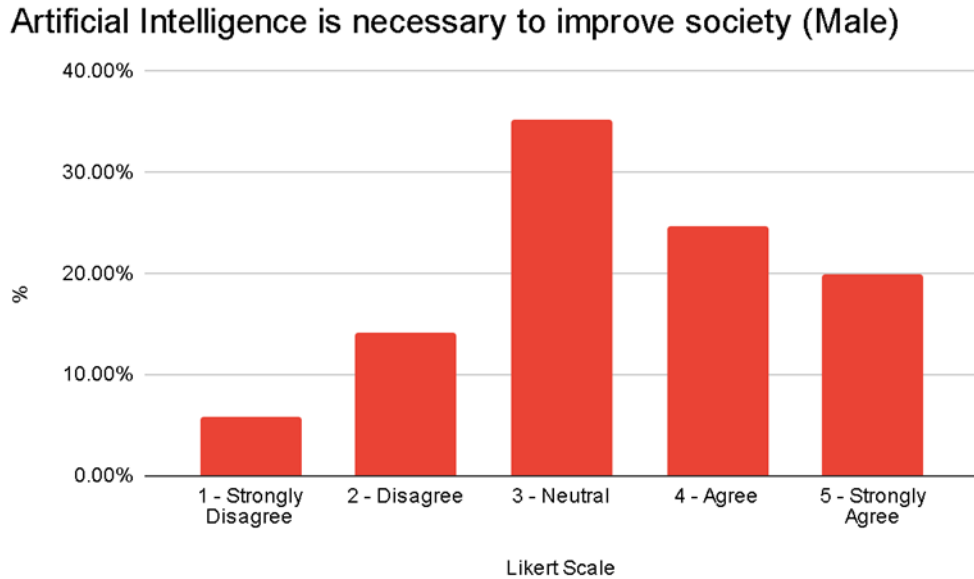

Figure 10. (Question 4)

Figure 11. (Question 4)

T-test for Gender (Question 4)	
t-value	-3.0736
p-value	.001259*
*Indicates finding is significant	

Figure 12. (t-test for Question 4)

In question four when students were asked about the impact they believed AI would have on society, there was a significant difference between females and males as Figure 12 shows a t-value of -3.0736 and a significant p-value of 0.001259. Male responses to this question were skewed right with 44.71% reporting that they agree or strongly agree with the statements while females were more neutral with only 26.15% recording the same response. This finding reveals that females had a far more pessimistic expectation of AI's possible benefits which may result in a lack of trust in the technology.
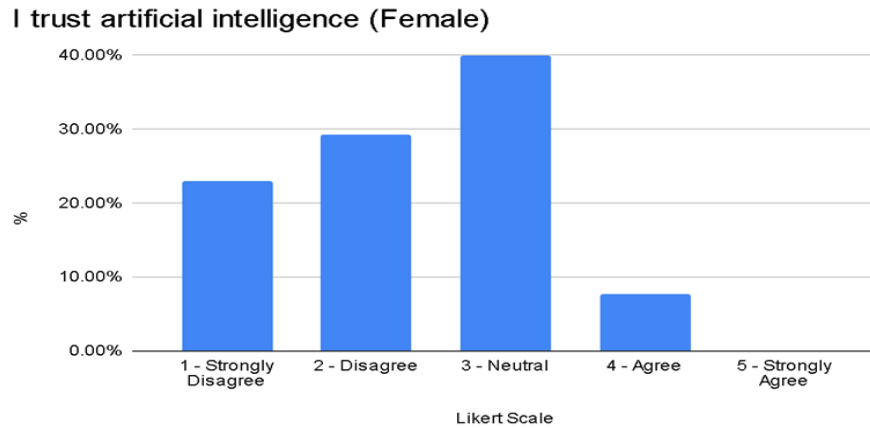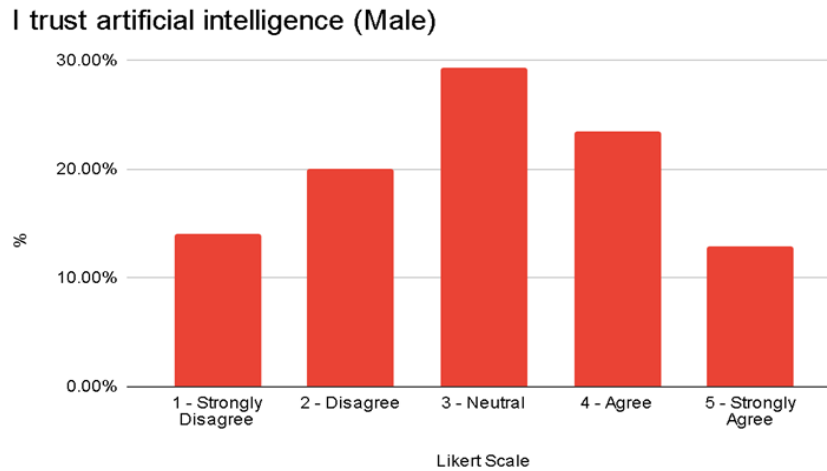
Figure 13. (Question 5)

Figure 14. (Question 5)

T-test for Gender (Question 5)	
t-value	-3.7567
p-value	.00124*
*Indicates finding is significant	

Figure 15. (t-test for Question 5)

       In accordance with the conclusion from the last findings, there was a significant difference between the trust in AI that males had when compared to females. As seen in Figure 15 there was a t-value of -3.7567 and a significant p-value of 0.00124 as 36.47% of males trusted AI while only 7.69% of females did. This finding contrasts that of van der Zander, as she found that there was close to equal trust in AI from both genders

(van der Zander et al, 2022). This furthers the need for a form of empowerment for females to increase their opinions on AI as all responses were self-reported.

Correlational Findings

This last section looks to find any significant correlations between specific questions in order to identify any patterns or trends in the data. Pearson Correlation Coefficient tests were conducted to identify any correlations in the data.
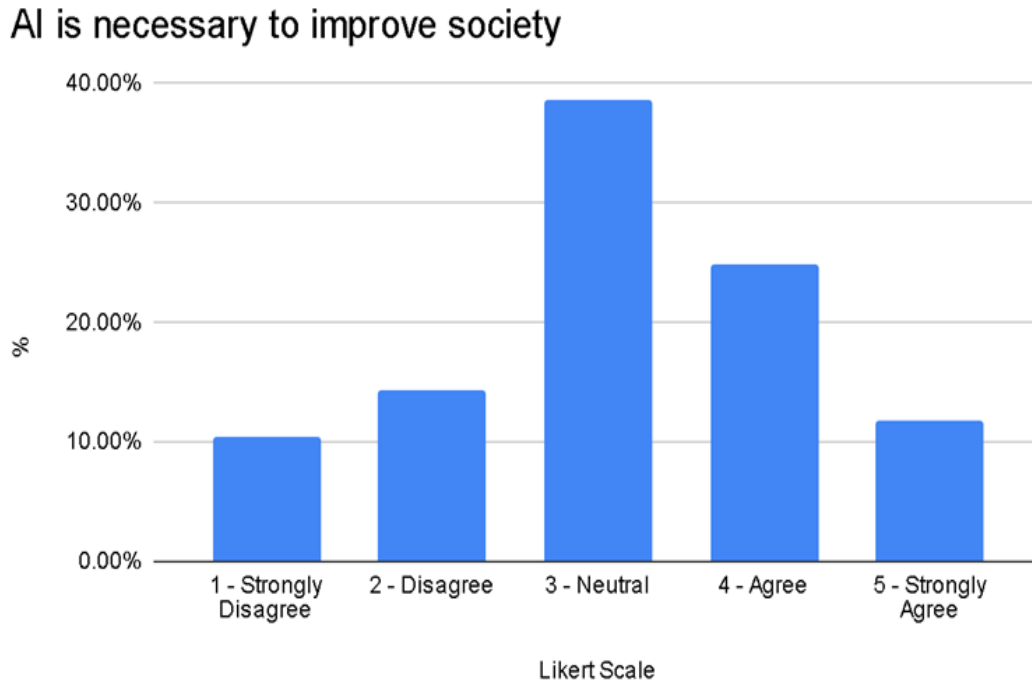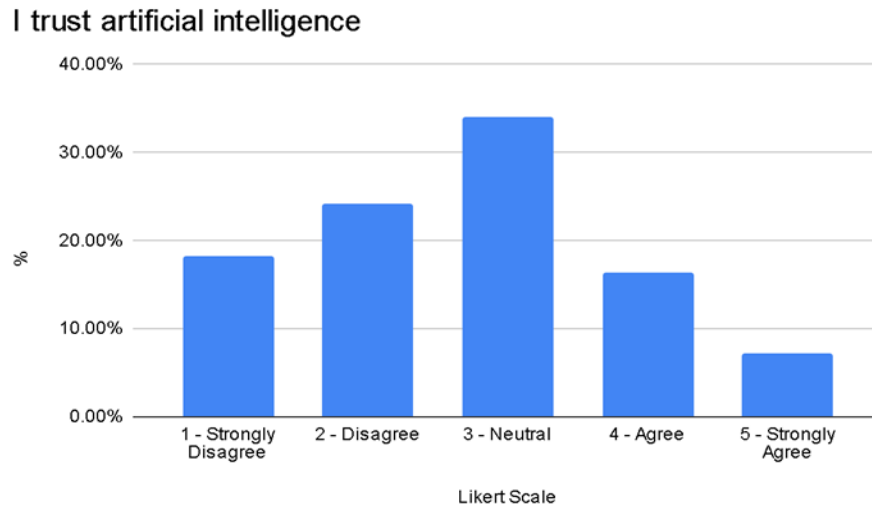

Figure 16. (Question 4)

I trust artificial intelligence

Figure 17. (Question 5)

Correlation Test (Question 4&5)	
r-value	.5611
p-value	<.00001*
*Indicates finding is significant	

Figure 18. (Correlation for Questions 4&5)

In this finding, questions four and five had a slight positive correlation with an r-value of .5611 and a significant p-value of less than 0.00001. This finding shows that people who have a positive outlook on the benefits of AI may be more likely to trust AI. This finding supports an implication from Aggarwal's research as he concluded that education on AI and its benefits may help improve the trust the public has in the novel technology (Aggarwal et al, 2021).
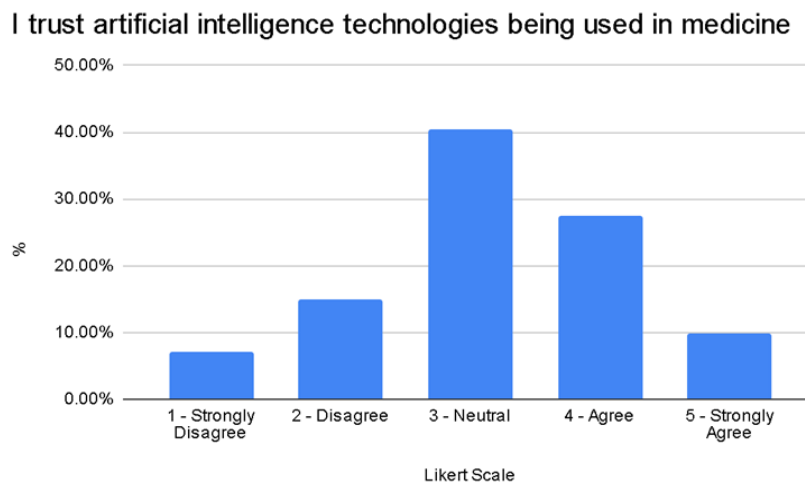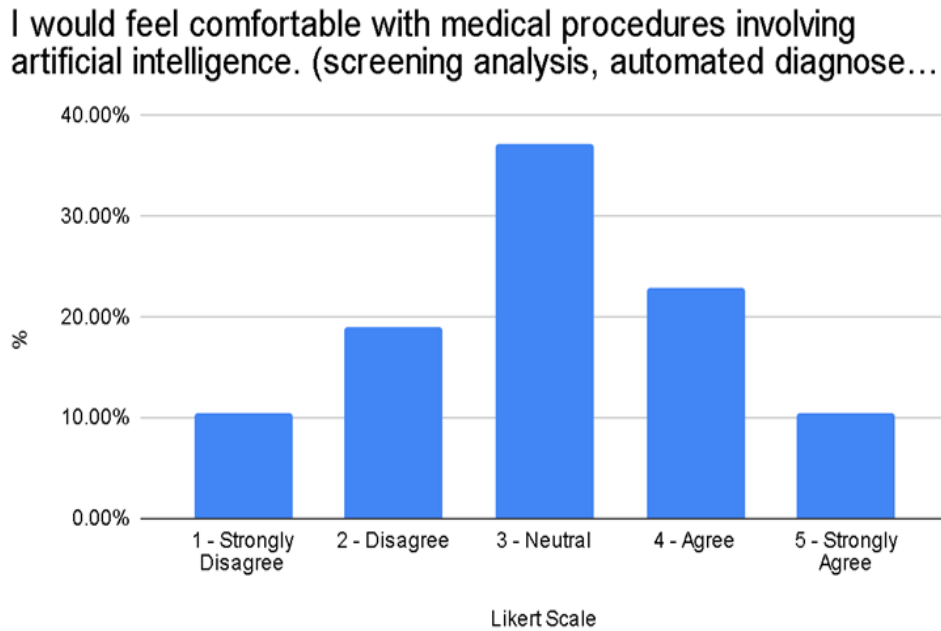
I trust artificial intelligence technologies being used in medicine

Figure 19. (Question 7)

I would feel comfortable with medical procedures involving artificial intelligence. (screening analysis, automated diagnose…

Figure 20. (Question 11)

Correlation Test(Question 7&11)	
r-value	.6191
p-value	<.00001*
*Indicates finding is significant	

Figure 21. (Correlation for Question 7&11)

This finding has a moderate positive correlation with an r-value of .6191 and a significant p-value of less than 0.00001 as seen in Figure 21. This finding shows that participants who trust artificial intelligence were more likely to be comfortable with procedures that utilize AI. This furthers the need for organizations and corporations to strengthen the trust the public has in AI as it may increase the confidence patients have in AI procedures. This is even more necessary considering this study's population is the younger generation as AI will be relied on far more in the future and it is important for patients to not be hesitant towards any potentially life-saving procedures.

Discussion

Hypotheses

After analyzing their data, the researcher found that their first and second hypotheses were disproven as high schoolers in this study generally distrusted AI and were not very familiar with the technology. However, the third hypothesis was partially proven as students believed in the benefits of AI, just not to the extent the researcher expected or past studies found.

Limitations

After conducting this research, it was evident to the researcher that there were two limitations to the results of this study: the lack of participation in interviews and the lack of resources to conduct this study. This study utilized a mixed method through the use of a survey and interview in order to gather both qualitative and quantitative data on high schoolers' perceptions of AI. Unfortunately, there was a lack of participation in the interviews so no qualitative data could be collected. The second limitation is due to the lack of resources the researcher had which resulted in this research only spanning one high school. This may result in findings that are not representative of the general population.

Implications

The results of this study presented implications that exceed its limitations as the findings in accordance with foundational source Ravi Aggarwal, et al, implicate the need for education for the public on the topic of artificial intelligence as well as its benefits. This may help curb some of the unfamiliarity, pessimism, and distrust participants had toward AI in this study. Additionally, a separate female empowerment program may be necessary to increase the confidence females have in artificial intelligence. Additional research that should be conducted should look to find the reasons for participants' opinions and the gender gap in trust as well as to help propose solutions through the use of a method utilizing interviews. This will ensure that qualitative data will have been gathered and analyzed in order to fill a new gap in the current academic literature.

Acknowledgments

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