Leveraging Conversational AI for Adolescent Medical Financial Education

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Submitted: 31 January 2025, Revised: 26 March 2025, Accepted: 21 April 2025, Published: 22 May 2025

Abstract. Medical financial literacy is essential to make smart decisions in healthcare settings and prevent unanticipated financial hardships. Existing literature has shown that young adults often struggle to understand information associated with health insurance and the financial planning necessary for health-related costs. AI-driven chatbots are emerging as educational tools that have the potential to address this issue. This exploratory study examined an AI chatbot aimed at enhancing medical financial literacy among high school students. Participants engaged with the chatbot's responses to medical financial questions while also rating the clarity, ease of use, trustworthiness, and educational value of the chatbot engagement. Our experiment results supported that the chatbot increased students' understanding of the financial aspect of healthcare - 76.9 percent of students reported a high degree of understanding, 80.8 percent rated the chatbot's responses as clear, and 73.1 percent reported they would recommend it to a peer. The responses indicated that students found the chatbot helpful, but suggested that interactive features be added and/or real-world finance features be incorporated into the chatbot.

Keywords. Conversational AI, Medical financial literacy, Young adults, Chatbot, exploratory study.
Poster, DOI: https://doi.org/10.59490/dgo.2025.1020

1. Introduction

Medical financial literacy refers to the ability to understand and manage healthcare-related finances. Achieving medical financial literacy allows a person to make informed healthcare decisions and avoid unexpected financial burdens. Although important, many do not know much about health insurance before an emergency or treatment. Most patients reported learning about health insurance through trial and error during treatment (Waters et al., 2022). These gaps in medical financial literacy may have caused people to be unprepared to navigate the intricacy of healthcare costs. According to the Kaiser Family Foundation (KFF)'s 2023 report, AIAN and Hispanic US citizens under 65 have high uninsured rates at 18.7 percent and 17.9 percent. This is double their white counterparts at 6.5 percent.

Medical financial literacy education is one of the solutions to alleviate such financial burden. Financial literacy among young people today is increasingly important as finances become more complex. The financial landscape is evolving, showing the need for the early introduction of financial education so that the youth today can make informed financial decisions. Many states have recognized this need by incorporating financial literacy courses into their curriculum, showing the importance of giving students resources that better equip them for the future (Mancone et al., 2024). Most 18-year-olds are held financially responsible for their healthcare (Cruz et al., 2024). Many graduating high school students are likely to be unaware of the unexpected financial costs in the American healthcare system. Several studies have underscored the misunderstandings and obstacles that young adults face in navigating the costs associated with the healthcare system (Cruz et al.,

2024; Mancone et al., 2024; Waters et al., 2022). For example, studies depict that adolescent and young adult cancer survivors tend to have difficulty comprehending health insurance, which makes them more vulnerable to financial risk (Vaca Lopez et al., 2023; Waters et al., 2022).

One solution to this problem is AI. AI is a useful educational tool, and studies support the idea that chatbots can enhance understanding of complex topics (Cruz et al., 2024; Nur Azlina Mohamed Mokmin, 2021; Reshawn Ramjattan, 2022). Chatbot technology has been successful in increasing the ease of use of educational software in healthcare (Nur Azlina Mohamed Mokmin, 2021; Reshawn Ramjattan, 2022). By extending the argument to the digital native generation, an AI chatbot would be effective in helping high schoolers further comprehend medical finances. Another study further supports the idea that chatbots can be a useful tool in health literacy. The overall assessment showed that the developed chatbot has significant potential to be used as a bridge to increase health literacy among students and young adults (Nur Azlina Mohamed Mokmin, 2021).

This study aims to address the existing gap in knowledge regarding the potential of AI chatbots to improve medical financial literacy, thereby contributing to the use of digital technologies to tackle a significant societal issue. This study evaluates the effectiveness of an AI chatbot in enhancing high school students' understanding of medical financial concepts. The chatbot was designed to tailor responses based on the user's location and grade level, ensuring relevance. As a team of student researchers, we identified five commonly asked questions related to medical financial literacy as five prompts for the AI chatbot. We invited high school students (N=26) to review the chatbot-generated responses to these prompts. Participants were shown prompts to answer and the chatbot's responses. Students then completed a survey that assessed various aspects of the chatbot's performance, including understandability, clarity, ease of use, reliability, and the knowledge gained (Naamati-Schneider, 2024). This process allowed us to assess students' perceptions of the chatbot's educational value and identify areas for improvement.

This study demonstrates how an AI-based chatbot can effectively improve high school students' medical financial literacy by providing clear, accessible, and relevant information regarding healthcare costs, highlighting AI's ability to simplify complex ideas for young learners.

2. Literature Review

Improving medical financial literacy requires new tools, with AI-powered chatbots emerging as a viable solution. They provide real-time explanations that simplify complex insurance concepts. Studies have found that adolescent and young adult cancer survivors lack understanding of insurance coverage, leaving them at greater risk of financial hardship (Waters et al., 2022). Another study finds students largely unaware of key insurance concepts like out-of-pocket costs and coverage limits (Cruz et al., 2024). These findings suggest conventional education methods are insufficient, underscoring the need for alternatives like AI-driven learning.

AI chatbots are increasingly used in education for personalized, interactive learning. Evidence shows chatbots improve student engagement and comprehension in healthcare topics (Vaca Lopez et al., 2023). They simulate real financial scenarios, enabling active learning over passive consumption. One study showed chatbots improved understanding of complex topics via immediate, personalized feedback (Naamati-Schneider, 2024). This is proof of the incorporation of chatbots in medical financial literacy education. Their effectiveness depends on providing accurate, trustworthy, and engaging content. Users find chatbots helpful for healthcare learning, though trust depends on transparency and accuracy (Vaca Lopez et al., 2023). Another study established that interventions using chatbots enhanced financial and health literacy, and individuals indicated that they were more confident in making fully informed decisions following AI-supported tools (Mancone et al., 2024). Some limitations remain, though, including the lack of personalization and interactive engagement elements, potentially impacting long-term retention and user trust (Reshawn Ramjattan, 2022). This paper aims to incorporate user feedback to enhance learning outcomes and promote increased participation.

3. Methodology

3.1. Medical Financial Literacy Chatbot

The AI chatbot, developed using the Dify platform (see Figure 1), is designed to educate high school students transitioning to college about medical financial literacy. Tailored to their grade level, it delivers clear, engaging

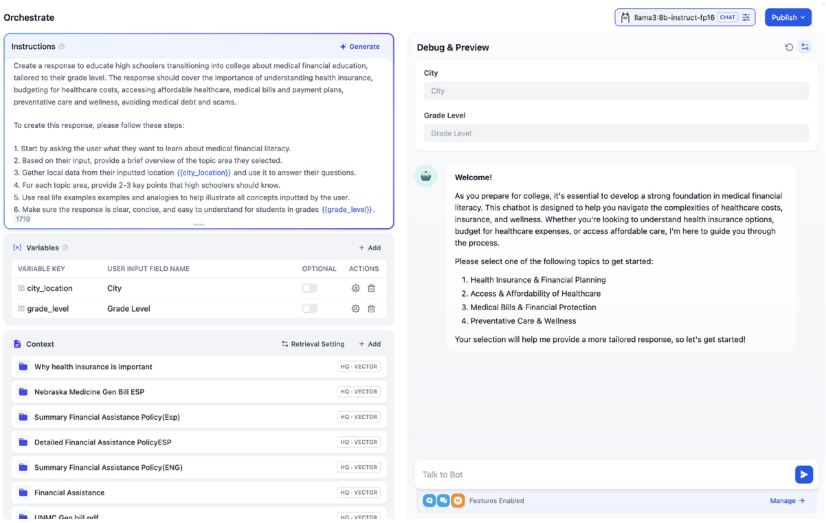

Fig. 1 – System Design for AI Chatbot.

responses on topics such as health insurance, budgeting for healthcare, accessing affordable care, managing medical bills, and avoiding debt or scams. The chatbot uses a structured approach: users choose a topic, receive an overview, and get localized answers based on their city. Real-life examples aid understanding, while a vectorized knowledge base with resources like Nebraska Medicine bills and student insurance guides ensures accurate, location-specific insights. Hosted on Dify's open-source framework, the chatbot combines ease of deployment with robust LLM-driven (llama3:8b-instruct-fp16) capabilities, making it an effective educational tool for young adults navigating healthcare finances.

3.2. Study Design

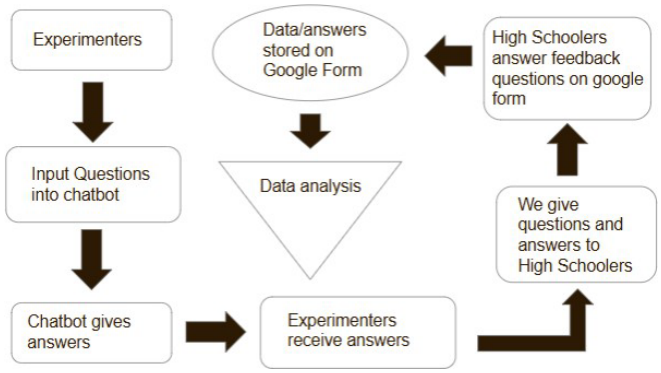

Fig. 2 – The participant-driven data collection process using the chatbot.

This study employed a survey-based, cross-sectional design to evaluate the effectiveness of a conversational AI chatbot in enhancing medical financial literacy among high school students. Due to the school's AI usage policy, students were not permitted to interact directly with the chatbot on campus. To address this limitation, we identified the five most frequently asked questions related to medical financial literacy and obtained responses from the AI chatbot. These responses were then shared with the high school students using Google Slides to collect quantitative data on their understanding, trust, and perceived educational value. Figure 2 illustrates the participant-driven data collection process using the chatbot. 26 high school participants were asked to go step by step through the provided answers to ensure exposure to the content covered by the chatbot. Afterward, the participants took a feedback survey on Google Forms via QR code. The feedback survey consisted of quantitative Likert-scale questions regarding the interpretation of clarity, perceived usefulness, and areas for improvement in the chatbot's learning content for grades 9-12, who participated in our experiment. We showed them 5 commonly asked prompts directed to the chatbot, that addressed concepts about health insurance that are most relevant to young adults, copays, deductibles, private vs public insurance, and handling unaffordable medical bills, which were answered by the chatbot (e.g. Figure 3). The experiment has been approved by the high school supervisor to protect the students' well-being and privacy. No identifiable data was shared outside of the high school research team.

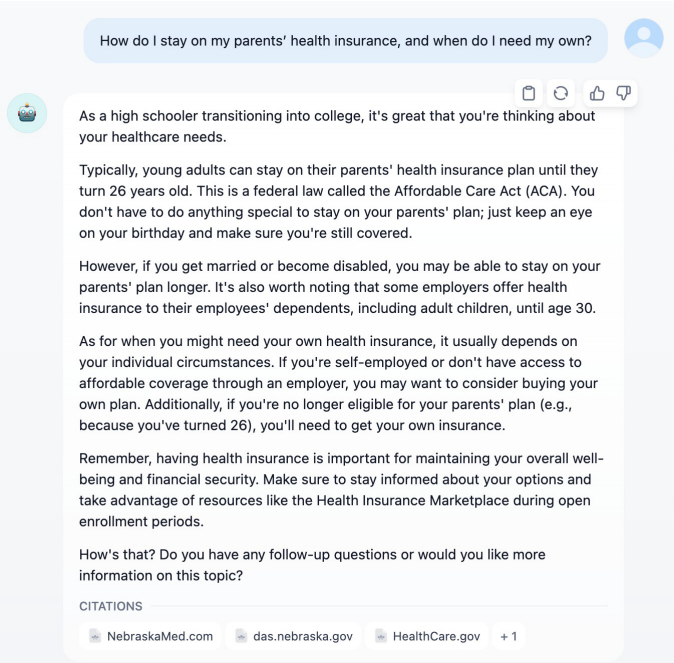

Fig. 3 – AI chatbot explains how to stay on parents' health insurance and when to get your own, with clear guidance.

4. Findings

We generated these findings from our research on the perceived learning of medical finances through an AI-powered chatbot. (see Table 1).

Tab. 1 – Participant responses categorized by pre-existing knowledge, learning outcomes, perceived accuracy, and overall impact of the medical finance chatbot.

Categories	Questions	Mean of Likert Scale (1-5)	Percentage over 3 on Likert Scale (1-5)
Pre-Existing Knowledge & Familiarity	2. On a scale of 1-5, how familiar are you with medical financial concepts (e.g., insurance, medical billing, healthcare costs)?	2.35 ±0.94	7.7%
	5. Before seeing the chatbot's responses, how would you rate your understanding of medical financial concepts?	2.58 ±1.17	19.2%
Learning & Comprehension	3. On a scale of 1-5, to what extent did you learn from the chatbot?	3.81 ±1.23	73.1%
	4. On a scale of 1-5, how clear and understandable were the explanations?	4 ±1.06	80.8%
	6. After seeing the chatbot's responses, how would you rate your understanding of the medical financial concepts in the questions?	3.61 ±0.94	65.3%
Appropriateness & Accuracy	7. On a scale of 1-5, was the chatbot's explanation appropriate for your grade level?	4 ±1.26	69.2%
	8. Did you feel confident that the chatbot was providing accurate and reliable information?	4.12 ±1.14	80.8%
Impact & Recommendation	9. Do you feel more prepared to handle medical financial situations after using the chatbot?	3.54 ±1.20	61.5%
	10. Would you recommend this chatbot to other students?	3.96 ±1.22	73.1%

First, our chatbot was perceived as a valuable educational resource in educating about healthcare expenses. We used a Likert scale for this, and we found that 80.8 percent of students scored clarity as 4 or 5, and 69.2 percent of students scored the explanation as being appropriate for their grade level as a 4 or 5 as well. This indicates that the chatbot effectively simplified topics like insurance, deductibles, and medical billing. That being said, some participants did suggest that interactive features (quizzes or real-world finance scenarios) would further enhance engagement. Second, our data suggested that the chatbot significantly improved high school students' comprehension of medical financial concepts. Still using the Likert scale, we found that before engaging with the chatbot, 50 percent of students rated their understanding as low (1-2). After interacting with the chatbot, 76.9 percent of students rated their understanding high (4-5). This shows that students learned from the chatbot and that the chatbot's ability to simplify complex concepts into easy explanations is remarkable. Some students did note that topics such as insurance comparisons and handling unaffordable medical bills needed further explanation. Furthermore, 80.0 percent of students ranked their confidence in accurate responses as high on the Likert scale (4-5). 73.1 percent of students said that they would recommend it to their peers. These results show that students found the chatbot credible and useful as a learning tool. User feedback highlighted the accurate responses, but one way we could improve is by improving conciseness and adding real-life examples. Overall, these findings demonstrate that AI-powered chatbots can serve as effective tools for improving medical financial literacy among high school students. By enhancing clarity, comprehension, and trust, such tools have the potential to bridge knowledge gaps and empower young individuals with essential healthcare financial knowledge.

5. Conclusion

Our findings show that our AI chatbot can be an effective educational tool for improving medical financial literacy among high school students. The chatbot was successful in enhancing perceived educational value, comprehension, and fostering confidence. Our exploratory research and experiment demonstrate the potential of AI educational tools to bridge the gap between youth and complex medical and financial concepts. The study faces limitations due to its sample size, which may not be generalizable to all high school demographics. Our data collection relies on self-reporting, which introduces potential biases into the responses obtained from participants. A better approach for future studies would be to administer pre-tests and post-tests to measure knowledge gain. Additionally, there was a lack of live chatbot interaction, as responses were displayed rather than allowing people to interact with the chatbot directly. Future research should examine more diverse demographics of participants, incorporate interactive functionalities and real-world tasks, and utilize pre- and post-assessments of understanding to increase the robustness of the findings.

Acknowledgement

- **Funding or Grant**: This material is based upon work supported by the National Science Foundation under Grant No. 2153509.

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