RESEARCH ARTICLE

VOICE-ACTIVATED HEALTH INTERVENTIONS: EXPLORING THE BENEFITS OF AMAZON ALEXA FOR PHYSICAL ACTIVITY AND WEIGHT MANAGEMENT IN OLDER ADULTS

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ABSTRACT

Background: Regular physical activity improves fitness, physical and cognitive function, and overall well-being, especially in older adults. Digital health applications, particularly those integrated with voice-activated assistants like Amazon Alexa, present new opportunities for promoting healthier lifestyles by facilitating access to health information and on-demand exercises. This study evaluates the impact of using the EngAGE Amazon Alexa Skill on weight loss and physical activity among older adults. *Objective*: The study aimed to assess whether the EngAGE Amazon Alexa Skill could increase physical activity and promote weight loss in older adults by providing on-demand health programs. *Methods*: This 4-month study involved 22 patients with obesity, prediabetes, and type 2 diabetes, with 12 participants downloading and using the EngAGE Amazon Alexa Skill. Data collected included participant demographics (age, gender, weight), engagement metrics (minutes spent in on-demand classes), and qualitative feedback. Statistical analysis was performed using SPSS to evaluate differences in physical activity and weight loss between Skill users and non-Skill users. *Results*: Participants using the Amazon Alexa Skill recorded significantly more active minutes (85.92 minutes/day) than non-Skill users (50.86 minutes/day), representing a 68.9% increase in activity. Skill users also exhibited more significant average weight loss (-3.9 lbs) than non-Skill users (-2.3 lbs). Most Skill users provided positive feedback, with 75% reporting ease of use and 84.6% recommending the Skill to others. *Findings*: The study suggests that integrating voice-activated health apps like EngAGE can enhance physical activity and support weight loss in older adults. The findings indicate that voice assistants provide an accessible, engaging platform for promoting healthier lifestyles. However, future research should explore the broader application of such tools and assess the long-term effects on health outcomes.

INTRODUCTION

Regular physical activity provides substantial physiological benefits and reduces disease risk. It also forms the basis of effective rehabilitation following severe illness. Most importantly, consistent activity can markedly improve quality of life. Research shows that physical exercise increases fitness, physical function, cognitive ability, and positive behavior in people with dementia or related cognitive impairments [Alzheimer's Society, 2020]. One study found gaming systems to be motivating and favorably impact strength, balance, and overall wellness for older adult populations. [Anderson-Hanley *et al.*, 2011]. Patient-facing digital health applications, or apps, can transform how individuals, especially seniors, take responsibility for their healthcare by enabling more effective dissemination of medical information. Emerging platforms and devices allow improved monitoring of health metrics and can serve as tools to support and encourage lifestyle behavioral changes. Apps and wearable technology have been demonstrated to empower older patients to increase activity levels and potentially contribute to weight loss [Casado-Marin *et al.*, 2022].

This study aimed to examine the profile characteristics and activity outcomes for older adults utilizing a conversational agent as a health management tool as part of their lifestyle.

Health Apps: Enthusiasm surrounding the potential of health apps has proliferated in recent years, with many global healthcare systems commissioning digital health solutions [Accenture Digital Health, 2018]. While apps offer the possibility to augment care for various medical conditions, from mental health to issues like hypertension, cardiovascular disease, and obesity, surprisingly little is known about their functionality or impact on health outcomes. Maintaining positive healthy lifestyle habits remains a public health challenge requiring innovative solutions. Voice-activated assistants are conversational agents that include Amazon Alexa, Apple Siri, Microsoft Cortana, and Google Assistant [Hoy, 2018]. These agents represent human-centered computing, interacting with humans and computers through audio-based input/output. This enables engagement with audiences in a novel manner – through conversing with an agent that processes a user's speech (invocation) and returns a statement, image, audio, or video as output.

Conversational Agents: A conversational agent is a computer system designed to converse with humans. Voice-activated assistants connect

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to the Internet, listen for commands, interpret them, and act accordingly.

Smart Speakers: Smart speakers are a type of speaker and voice command device with an integrated virtual, voice-activated assistant that offers interactive actions and hands-free activation via a wake word. They can run third-party applications, which are known as Skills for Amazon Alexa.

Voice-Activated Assistants: The usage of smart speakers or voice assistants like Alexa, Siri, Cortana, and Google Assistant has drastically increased, with at least one in five homes in the U.S. estimated to utilize them*[Statista, 2023]*. Amazon Alexa is the most popular smart speaker device. Research shows that Alexa is primarily employed to check weather forecasts, play music, and control other devices. Utilizing devices like Amazon Alexa provides a novel mechanism to engage new audiences and demonstrates the potential to assist older adults. Alexa's use over weekends is more frequent than on weekdays, but overall usage trends decrease over time. Health and fitness apps for voice-activated assistants represent an emerging area of digital care [Zheng *et al.,* 2020]. Indications suggest voice-activated assistants can reach populations that are diverse, underserved, and difficult to access. User satisfaction and receptivity to voice assistants are promising, yet compared to smartphone apps, voice-enabled devices are minimal and lack evidence. A review of evidence shows voice-activated assistants have been applied to remind individuals to take medications as pregnancy companions, to find answers to questions, and to provide coaching. Notably, evidence indicates that the accuracy of apps could be improved. The accessibility, ubiquity, and convenience of voice assistants have led voice-enabled devices (e.g., smartphones and smart speakers) to become significant components of a digital health ecosystem envisioned especially for patients with chronic conditions [Cook & Warren, 2020]. The anticipated benefits of voice assistants are also projected for elderly care and assisting older adults in living with more autonomy ("Smart aging"). One study found that utilizing an A.I. voice assistant may be a practical method for delivering scalable individualized behavioral health coaching to address cardiovascular health in cancer survivors [Lin *et al.,* 2022].

Engage: The EngAGE Amazon Skill App is a voice-activated tool designed to help older adults maintain independence and remain socially engaged. Amazon Alexa enables users to access information, manage daily tasks, and engage with community services. The app promotes well-being by offering features like medication reminders, appointment scheduling, daily activity updates, health tips, and social interaction prompts. It represents a convenient and user-friendly solution aimed at improving the quality of life for seniors by utilizing voice technology to simplify daily activities.

METHODS

Twenty-two patients with obesity, prediabetes, and type 2 diabetes were randomly selected for the study. Twelve of the adults downloaded the EngAGE skill for Amazon Alexa. Health and engagement data from mobile and companion apps was tracked, collected, and analyzed over four months to determine if using the Alexa skill contributed to changes in health-promoting behavior. Data analyzed included demographic information (age, gender, ethnicity, location), weight, and time spent in on-demand classes. Qualitative feedback on features was also assessed. On-demand activities were available on all app platforms, including Amazon Alexa, where activities were presented in video or audio format in English only.

The EngAGE skill for Amazon Alexa can be downloaded from the Alexa Skills store hosted by Amazon or by saying "Alexa, enable EngAGE" to an Amazon Alexa Echo or Echo Show smart speaker. The Amazon Echo only provides audio output, whereas the Echo Show outputs video and audio. Participants are required to link their Amazon account with their EngAGE account to use profile recall features available through the skill. Once enabled, the EngAGE skill starts by saying "Alexa, start new EngAGE exercise" followed by a

range of commands to start an activity. After twelve weeks of using the EngAGE skill, participants were sent a survey requesting opinions and feedback on the skill. Participants were given four weeks to complete the feedback survey. Initially, participants were asked to report their type of diabetes, year of diagnosis, weight, current medication, age, gender, dietary preference, and presence of comorbid chronic illnesses. Upon completing registration, participants were notified by email that an Amazon Alexa skill was available and prompted to download it. At four months, participant weight, active time, and engagement data were extracted where available. Active time is defined as the "number of minutes an on-demand exercise, stretch, or yoga class was opened and not backgrounded." Total active time was calculated over the study period. Participants using the Amazon Alexa skill were sent a survey requesting feedback on features, functionality, ease of use, and comfort level. The research explored how many participants downloaded and used the Amazon Alexa skill to engage with the on-demand classes. It also explored respective active time, weight loss, and sustained engagement with the platforms for all users.

Statistical Analysis: Analyses were performed using SPSS. Multiple regression analysis was conducted to determine the predictive power of engagements with EngAGE app features on active minutes. The primary outcomes were engagements and downloads of the Amazon Alexa Skill and active minutes. Secondary outcomes included health outcomes such as weight loss. Outcomes were analyzed within strata based on whether participants downloaded the EngAGE Amazon Alexa Skill, comparing Skill users (ASU, downloaded Amazon Alexa Skill, n=12) and non-Skill users (NSU, did not download the Amazon Alexa Skill, n=10). The results considered all participants, regardless of follow-up information or lesson completion. For participants who did not report their outcomes at 4 months, we followed the highly conservative approach of assuming that they did not improve at all (last observation carried forward) by imputing their baseline values as their outcome values. For example, participants who did not comply with reporting a 4-month outcome were treated as having no change in the outcome variable and thus were not counted as having any weight change.

RESULTS

For the 12 participants syncing their account with the Alexa Skill (requiring an Amazon account), 92% (11/12) were engaged and had outcomes at four months, defined as actively inputting an item of data within the last seven days. At baseline, the mean weight was 209.6 lbs (SD 50.5 lbs), and the mean age was 61.7 years (SD 5.7 years) across all participants. At baseline, participants using the Amazon Alexa Skill had a mean weight of 202.1 lbs (SD 47.9 lbs). Two-fifths of the participants were female (40.9%, 9/22), over half were white (54.5%, 12/22), and all were from the USA.

Platform Usage and Engagement: Almost half (54.5%) of the participants downloaded the Amazon Alexa Skill (12/22). Of the total participants, 20 (90.9%) were active at four months, with 85% (10/12) of non-Alexa users engaged at four months compared to 92% (11/12) of the Alexa users (defined as actively inputting a piece of data within the last seven days).

Amazon Alexa Skill Usage: Participants using the Amazon Alexa Skill registered 85.92 active minutes, an increase of 68.9% compared to the 50.86 active minutes registered by participants not using the skill.

Table 1. Results of Total Active Minutes by user base

Status	Total active Minutes (mins/day), Mean SD
All Participants (n=22)	67.74 (28.36)
Skill users(n=12)	85.92(12.84)
Non- Skill users(n=10)	50.86(28.61)

Participants using the Amazon Alexa Skill lost an average of 1.77 kg throughout the study.

Table 2. Results of Change in Weight by user base

Status	Baseline Weight(lbs), Mean SD	4-Month weight(lbs), Mean SD	Weight Change(lbs), Mean (S.D.)	Weight Change(%), Mean (S.D.)	P Value
All Participants (n=22)	209.6(50.5)	206.5(50.4)	-3.1(7.1	1.49(3.43)	0.557
Skill users(n=12)	202.1(47.9)	198.3(47.7)	-3.9(6.2)	2.03(3.25)	0.041
Non- Skill users(n=10)	216.4(53.9)	213.8(53.2)	-2.3(8.0)	0.99(3.63)	0.308

Qualitative Feedback

As part of the user experience, a feedback survey was sent to participants using the Amazon Alexa Skill. Of the 12 Alexa Skill users, **6 (50%)** completed the survey. The feedback results showed:

- 75% found the Skill easy to set up.
- 75% found it enjoyable to use.
- 75% were interested in new technology.
- 76.9% used the Skill for on-demand classes or meditation and mindfulness.
- 38.4% found using the platform on a new technology a comfortable experience.
- 84.6% would recommend the Skill to a friend.

DISCUSSION

This study was not a randomized controlled trial, so comparing the 4-month results to a control group is impossible. However, the 92.8% engagement rate at four months among those using the Alexa Skill supports previous findings that smart speakers can enhance user engagement with health platforms. The significantly higher number of active minutes logged by Alexa Skill users suggests that the voice-activated interface may be more conducive to user interaction than traditional app interfaces. While the study shows a correlation between Alexa Skill use and increased activity and weight loss, further research with wearable technology could provide more accurate measures of physical activity. Finally, while Alexa Skill users lost more weight than non-users, ownership of smart speakers likely introduced bias. Future research should explore the potential for broader implementation of smart speakers in healthcare settings, particularly among older adults and those interested in new technologies.

CONCLUSION

This study highlights the promising potential of voice-activated health applications, such as the EngAGE Amazon Alexa Skill, to promote healthier lifestyles among older adults. With a 92.8% engagement rate over four months, the study suggests conversational agents like Amazon Alexa can effectively increase physical activity and support weight loss, especially when integrated with structured on-demand health programs. Participants using the Alexa Skill exhibited significantly more active minutes and more significant weight loss compared to those who did not use the Skill, emphasizing the role of user-friendly digital interfaces in encouraging regular physical activity. Additionally, positive qualitative feedback from users further supports adopting voice-activated assistants in health management,

especially for older adults who may benefit from simplified access to health information and activities. Despite these positive findings, the study acknowledges limitations, including potential biases related to smart speaker ownership and the absence of wearable technology for more precise measurement of activity levels. As voice-activated assistants evolve, future research should investigate broader implementation across diverse populations and their long-term impact on health outcomes. Furthermore, exploring integration with wearable technology could enhance the accuracy of health behavior tracking, offering more comprehensive insights into the benefits of digital health tools for chronic disease management and overall well-being. In conclusion, the EngAGE Amazon Alexa Skill demonstrates potential as a scalable solution for improving health outcomes in older adults by leveraging conversational agents. Further exploration is warranted to optimize its use and maximize its impact on public health initiatives to increase physical activity and promote healthy aging.

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