JAMA Network Open

Research Letter | Nutrition, Obesity, and Exercise

Business vs After-Hours Use of an Artificial Intelligence–Powered Digital Health Platform Among Insured Patients

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Introduction

Digital health programs powered by artificial intelligence (AI) offer patients and clinicians the convenience of accessing and delivering health care services remotely, enabling patients to manage their health from anywhere, at any time.

Programs powered by AI can augment primary care by improving efficiency, increasing patient engagement, and providing timely support. Although there is considerable conjecture regarding why digital programs are used, and increasing evidence of their benefits, there are gaps in understanding how these programs are used. For example, there is limited evidence of when patients engage with digital health. General mobile application use often occurs in the evening; however, much of this evidence is for gaming and entertainment applications.[1,2] Evidence of health care–specific application utilization patterns is sparse.

Real-time behavioral data from AI-powered programs can demonstrate when individuals are most inclined to seek support. This cross-sectional study assessed utilization patterns of a commercially available digital health platform. The primary hypothesis was that members would engage more often with AI-powered coaching after hours than during business hours.

Methods

This study leveraged data from 79 437 members who participated in 1 464 752 unique coaching sessions from January 2022 to April 2023 on a platform called Lark that offers chronic disease prevention and management programs covered by members' insurance. The protocol received exemption status from Advarra Institutional Review Board (#Pro00047181) for retrospective analysis of previously collected and deidentified data.

This digital health platform offers fully digital, AI-powered programs for diabetes prevention, diabetes care, hypertension care, heart health, and general wellness. Detailed program descriptions are published elsewhere.[3,4]

We analyzed the percentage of coaching sessions that occurred by hour Monday to Sunday. We further categorized coaching occurring during business hours (Monday-Friday, 8 AM-5 PM) vs after hours (Monday-Friday, outside of 8 AM-5 PM, and weekends). We assessed differences in business-hours vs after-hours use and session duration by age and sex using analysis of variance or χ^2 tests, with statistical significance at $P < .05$. Reporting of study results adheres to STROBE guidelines for cross-sectional studies.

Results

The mean (SD) age of the 75 161 members who provided their age (94.6% of sample) was 47.5 (11.5) years, and 73.6% of the 75 648 members who provided their sex (95.2% of sample) were female. Members infrequently provided race and ethnicity; thus, these data were poorly representative and not reported.

+ Supplemental content

Author affiliations and article information are listed at the end of this article.

All age groups exhibited similar utilization patterns, with coaching sessions peaking in the evening (**Figure**). Overall, 35.2% of sessions occurred during business hours and 64.8% after hours. The business/after-hours split differed by age, χ^2(n = 1 435 901) = 504.6, P < .001. Adults aged 50 to 64 years engaged the most after hours (65.4% of sessions), and adults aged 18 to 34 years the least (62.1% of sessions). The business/after-hours split did not differ by sex, χ^2(n = 1 447 504) = 0.2, P = .68.

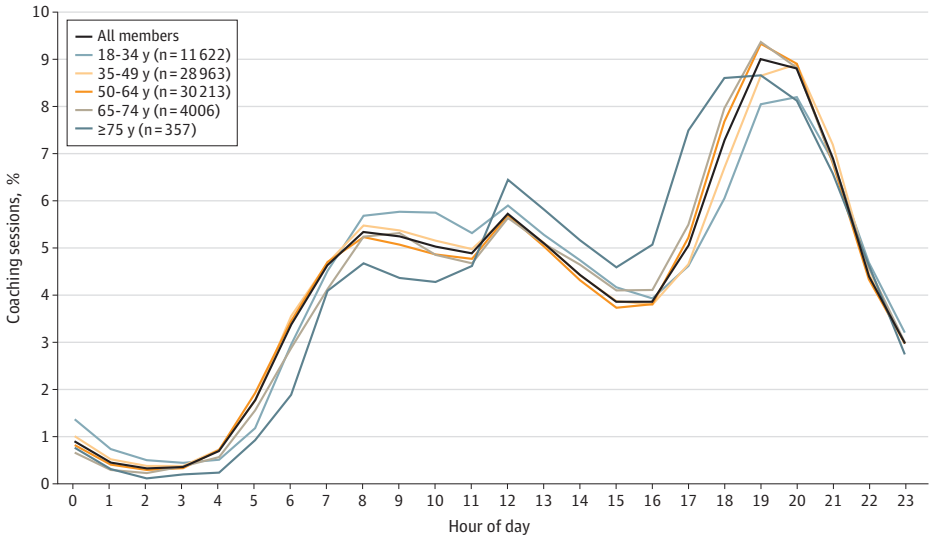
Mean (SE) session duration was 4.78 (0.01) minutes and differed by age, $F_{4,75\,156}$ = 184.2, P < .001 (**Table**), and sex, $F_{1,75\,646}$ = 546.8, P < .001. Female patients had longer sessions (mean [SE], 4.79 [0.01] minutes) than male patients (4.43 [0.02] minutes).

Discussion

The findings of this study suggest that many people seek support for prevention and management of their health conditions after standard business hours. Patients with chronic diseases are more commonly treated by general practitioners after hours than other patients,[5] indicating that access to after-hours care is important for this patient population.

This study illustrates how AI-powered programs can support patients at the time and location most convenient to them. Regular interactions with health care clinicians improve health management. Unlike telemedicine,[6] AI-powered programs can supplement preventive care and chronic disease management without burdening human clinicians and with cost-effectiveness. This message is important for the medical field, showcasing how digital innovations complement primary care.

Figure. Mean Coaching Session Utilization Curves Monday to Sunday by Age Group



Sample size for each age group shown in legend. Adults aged 18 to 34 years contributed 109 357 sessions; adults aged 35 to 49 years, 435 919 sessions; adults aged 50 to 64 years, 754 214 sessions; adults aged 65 to 74 years, 128 168 sessions; and adults 75 years and older, 8243 sessions.

Table. Mean Session Duration by Age Group

Age group	Mean (SE) session duration, min[a,b]
Group 1: 18-34 y	4.72 (0.03) [4, P = .001; 5, P = .01]
Group 2: 35-49 y	4.66 (0.02) [4, P < .001; 5, P = .009]
Group 3: 50-64 y	4.68 (0.02) [4, P = .007; 5, P = .03]
Group 4: 65-74 y	4.91 (0.05) [1, P = .001; 2, P < .001; 3, P = .007]
Group 5: ≥75 y	5.71 (0.20) [1, P = .01; 2, P = .009; 3, P = .03]

[a] Significant post hoc comparisons between age groups indicated in brackets with numbers representing group number. Although statistically significant, small differences in duration may not be practically meaningful.

[b] Session duration differed by age, $F_{4,75\,156}$ = 184.2, P < .001.

A study limitation is that these results reflect average member behavior; consideration of variables such as seasonality and length of program engagement would further elucidate whether utilization patterns vary over time. Also, employment status was not available for this study but should be included in future investigations of digital health utilization.

Digital solutions cannot address all health care concerns. However, on-demand, personalized support for prevention and management of chronic conditions can address issues before they arise, leading to better health outcomes and lower costs.

ARTICLE INFORMATION

Accepted for Publication: August 6, 2023.

Published: September 13, 2023. doi:10.1001/jamanetworkopen.2023.33511

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Author Contributions: Dr Graham had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Concept and design: Graham, Buch, Dunn.

Acquisition, analysis, or interpretation of data: Graham, Pickus, Lockwood, Paruthi.

Drafting of the manuscript: Graham, Lockwood, Dunn.

Critical review of the manuscript for important intellectual content: All authors.

Statistical analysis: Graham, Pickus, Dunn.

Administrative, technical, or material support: Pickus, Lockwood, Paruthi.

Supervision: Graham.

Conflict of Interest Disclosures: Drs Graham, Lockwood, Buch, and Paruthi and Ms Pickus reported being employees of Lark Health. No other disclosures were reported.

Funding/Support: There was no external funding support for this study; Lark Health provided internal support.

Role of the Funder/Sponsor: Employees of Lark were involved in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, and approval of the manuscript; and the decision to submit the manuscript for publication.

Data Sharing Statement: See the Supplement.

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SUPPLEMENT.
Data Sharing Statement