Generative AI for Enhanced Engagement in Digital Wellness Programs: A Predictive Approach to Health Outcomes

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ABSTRACT

Users often abandon digital wellness programs due to a lack of system responses that are engaging, personally relevant, and supportive, thus impeding success in achieving desired health outcomes. In response, AI is increasingly being explored as a means to improve user interaction and engagement, ultimately leading to superior health outcomes. A crucial question often left unanswered is how AI should be integrated within health promotion and disease prevention programs to achieve lasting behavior change and improved health outcomes. We anticipate that program effectiveness will be enhanced by taking a predictive approach, wherein AI is used as a generative tool to inform future health states and program adaptations on an individual and group level. Consequently, in this essay, we exploit both qualitative and quantitative research methodologies to explore the alignment between AI and user interaction within a more client-centered, micro, inclusively well-being view: a digital wellness framework built on predictive, generative AI. We suggest several implications for and alliances between different healthcare stakeholders, as well as identify salient areas for future research. This research aims to provide a strategic vision of the role of generative AI within user-based interactions for both digital wellness platforms and the health sector more broadly. The purpose of this study was to showcase the potential and expectations associated with incorporating AI generative tools in the digital health and wellness promotion settings of the future and to explore the impact of this approach on user engagement and health outcomes. To investigate these links, a mixed-methods case was used: the influence of AI within digital health platforms.

Keywords: Generative AI, Digital Wellness, Predictive Health Models, Personalized Health Interventions, AI-driven Engagement, Behavioral Health Insights, Health Outcomes Prediction, Wellness Program Optimization, Data-Driven Health Strategies, Adaptive Health Technology.

1. INTRODUCTION

As digital health continues to gain importance in contemporary healthcare systems, barriers to entry such as lack of trust and perceived benefit have also increased with access and adoption of digital health solutions. As a result, strategies to promote program or product engagement have taken on increasing significance in the realm of digital wellness. This paper presents how generative AI can help to increase participant engagement by dynamically modifying content to be suited to individual preferences for a more personalized user journey. Ultimately, helping increase engagement may help digital wellness solutions achieve results in improved health outcomes.

Engagement with digital wellness solutions is an ongoing challenge, with programs demonstrating high engagement seen to be outliers within the industry. Key challenges include high program dropout rates by week six for digital health behavior change programs, non-adherence rates with mobile health apps, and a general optimism bias resulting in the delay in the adoption of healthful lifestyle changes among an aging demographic. Furthermore, participants of digital wellness programs show noticeably higher intentions of enrolling in a health intervention in a virtual environment if they are given the choice to set aside 90 minutes of uninterrupted work time, demonstrating how trends in digital health beyond intended use also impact overall engagement. These factors coalesce to produce concerning effects on overall engagement, with 79% of participants and 81% of non-participants considering wearables 'a waste of money,' further showcasing low trust in technology to result in health benefits. Such upward trends in participant perceptions of technology further underscore the need for increasingly innovative digital wellness solutions for sustained program engagement and robust health outcomes. This paper discusses how a product of AI can be used to address participant hesitancies and data utilization with interpretative interventions aimed at increasing interest in and perception of digital health benefits.

Fig 1: Generative AI in Healthcare in Digital Wellness Programs

1.1. Background and Significance

Modern healthcare has seen the rapid proliferation of digital wellness programs in medical practices, community health settings, and in response to public health crises. The programs are aimed at promoting a variety of health and well-being practices among diverse populations, such as patient self-management, employee wellness initiatives, and community-based mental and physical health promotion. Importantly, these systems may integrate components of generative AI to enhance program engagement. The ability to generate novel content may hold the promise of breaking the homogeneity of digital health interventions and personalizing the user experience with novel, yet evidence-based applications. As scaled individual user tailoring is not possible through human-based design, featuring AI-generated components is one avenue to enhancing programs through the power of AI.

The failure to engage users is a well-documented limitation of traditional in-person or digital health programs focused on behavior maintenance. The impact of user engagement in digital wellness programs may be substantial. Ongoing data analysis shows that a significant percentage of users rated the AI-generated stories as "captivating, touching, and relevant," and a high percentage reported that the stories were "authentic and relatable" and resonated "a lot" with them. Preliminary results show a notable increase in sessions and a cited increase in year-to-year utilization. Helping modern patients, workers, and furloughed individuals realize the value of technology in their changing lives holds promise for more broadly accepted engagement and adoption of wellness.

1.2. Research Aim and Objectives

Aim: Enhancing user engagement using generative AI: a predictive approach to health outcomes in digital wellness programs. This study aims to explain how the use of generative AI can lead to a significant positive increase in user engagement in digital wellness programs. Directly, the research proposes a predictive model that accurately anticipates the health of the end users under a predetermined set of parameters. In order to develop a solution to address this problem, we propose data-driven research. Objectives: Specific objectives that address the general aim of the study are to present research questions to guide the discovery. Objectives of the study are as follows: to assess the factors influencing continued engagement in a digital wellness program, to understand the status quo of generative AI use, and to explore how generative AI can be used to enhance user engagement and if it has a positive influence on health. Based on these objectives, the research supports the following hypotheses: H1: Generative AI positively influences user engagement. H2: User engagement positively influences desired health outcomes. This study addresses the gaps outlined in existing research in relation to both the use of generative AI solutions and their potential impact on digital health care. With the advent of innovative health technologies and the policy support to aid their development, refinement, rigor, and appreciation are required to fully explore their capacities and potential areas for intervention.

2. Digital Wellness Programs

Digital wellness programs are programs that use digital technology and engagement approaches to improve patient health. They are typically delivered through web platforms or as mobile applications and provide features that communicate health conditions and help individuals track physical activity, diet, weight, sleep, or other health behaviors. Additionally, they may send reminders, activity suggestions, educational materials, or puzzles. Digital wellness programs are a product of the 21st century, with well-designed digital wellness programs being accessible and usable by people of all ages in their preferred

electronic formats. A driving reason behind their development is that early evaluations show that these digital wellness programs can promote a healthy diet, physical activity, weight management, sleep, and other health-related behaviors and attitudes.

Digital wellness programs are typically developed to provide user-centered, individualized, and personally relevant content that is informed by individual assessments, real-time data, or machine learning from the progress of others. A theoretical assumption of using digital wellness strategies is to better engage people in activities that may not be rewarding or psychologically meaningful to them or of interest to those involved. This oriented engagement is currently a research priority and is limited by ethical and practical issues. In large part due to digital technology and virtual platforms, health and wellness content information and programs have evolved into digital wellness options. This trajectory has afforded outreach to more populations than the traditional digital wellness platforms, with potentially more efficient care provided by reducing the time providers spend on around-the-clock patient support.

Equ 1: Modeling Health Outcomes

$$\frac{dH(t)}{dt} = \alpha U(t) + \beta A(t) + \gamma H(t-1) + \delta W(t)$$

2.1. Overview and Components

In their study on the design and implementation of digital wellness programs, it is proposed that digital wellness programs tend to contain the following system components. The goal setting specifies what the user aims to achieve during the program and potentially beyond. The trend tracking identifies quantifiable changes concerning the initial state. The progress may be quantifiable by repeating measurements of the indicators. The follow-up, i.e., progress control, helps to maintain the directing of the efforts to the right subject. The database helps to store the registrations to make the processing and reporting easier. The connection to the user's electronic personal schedule intensifies the user's engagement with the program. The feedback may intensify the user's engagement as well, to personalize some of the feedback messages.

Digital wellness programs are operated with a database, a collection of electronic forms, and mobile or other digital aids to record diet and/or physical activity and/or physical fitness data. Most programs use one or some type of wearable/wireless device, and many use connections to phones or tablets. Not all programs offer in-app tools or digital push notifications to facilitate weight loss. Most digital wellness programs are free for users or available by compensation. Not compulsory, a portion of programs have a paid version available for purchase without sponsorship or payment incentive. Digital wellness program developers have a variety of strategies to engage the broad consumer base, with different combinations of components and priced options, to increase user participation in optimal content. More cases might be revealed with further research, especially in the context of low-cost and learning groups in protected and/or private settings. Successful case studies show that the digital wellness process lowers healthcare prices, and increased lifestyle has a good return on investment. In the development of health-improvement platforms, consumers do not focus on behavioral science research. Behavioral science shapes the individual components of the digital wellness program. Behavioral science integrates personal content recommendations to maintain the user's interest.

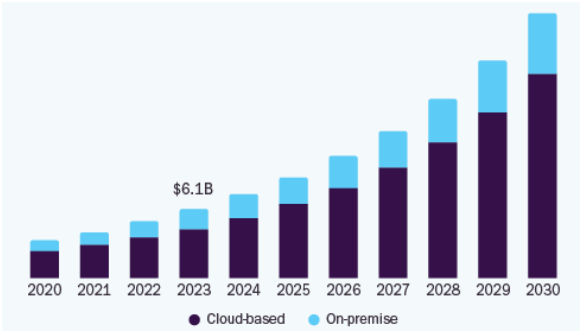

Fig 2: AI In Patient Engagement Market

2.2. Importance in Healthcare

"Personal health care is a part of healthcare delivery and health equity. However, improved personal care alone will not secure the future of countries. Even with concerted personal health efforts, populations

experience gaps and unmet needs. Reduced health-protecting environments, social isolation, anxiety and depression, and behaviors leading to increased rates of pre-chronic, chronic, and life-limiting diseases continue to escalate, along with individual healthcare costs. Digital wellness programs provide a critical bridge for the ever-widening healthcare gaps by reverting to healthcare's most historically effective tool – preventive care. Wellness programs help populations with varied health opportunity gaps by increasing health literacy levels and capabilities, while simultaneously enhancing patient autonomy in personal healthcare decision-making. Digital programs have the distinct advantage of providing healthcare access to individuals who experience barriers to traditional in-office healthcare settings. These may include rural populations, and potential healthcare consumer constraints that accompany self-employment by small business owners and non-traditional workers.

Wellness digital therapy programs have proven to alter health outcomes through engagement and offer populations a convenient, cost-effective transitional step toward seeking additional professional healthcare services. The convenience of digital engagement is further evidenced by the heavy usage of other eLearning platforms, which boast roughly 300 million subscribers. Wellness programs can help to ground the fabric of state healthcare regulations, federal laws, and other healthcare reform legislation including policy based on the public health presentation. Wellness curricula can be provided to patients at VA hospitals, top teaching medical healthcare systems, county hospitals, high schools, juvenile detention programs, HBCUs, and other settings around the United States.

3. Generative AI in Healthcare

Generative AI can autonomously create examples of structures with predefined design attributes. As well as identifying likely clinical outcomes such as the common side effects of a medication, the same approach could be used to create personalized content that adapts and evolves in ways that are particularly relevant to the individual, encouraging their sustained engagement with an aspect of their health. More developed generative systems are likely to be capable of creating increasingly subtle and effective interactions between a program and its participants than existing approaches can.

The high degree of control over patient engagement with their disease enables such systems to operate effectively. The content can be adjusted and personalized as evidence is collected. Typically, such systems need to be provided with a large dataset and require substantial computing power to be implemented successfully. While their ability to generate copy is impressive, they are not currently employed in digital health programs. The prediction of beneficial and adverse events based on user behavior contributes to predictive analysis that supports the operation of AI-generated content systems. Through AI's ability to adjust content to meet the user's demands, further enhancements in patient engagement could be fueled. Unlike human communications, content generated by AI can pull real-time data to empower more intelligent, data-driven interactions.

Equ 2: Integrating Generative AI to Maximize Engagement and Health Outcomes

$$A(t) = \arg\max_{A} \left(\lambda_1 U(t) + \lambda_2 H(t)\right)$$

3.1. Definition and Functionality

Generative AI is a subset of artificial intelligence based on technologies such as machine learning and neural networks that can simulate human-like interactions and generate novel, often highly unrealistic content. While traditional AI systems are typically reactive, relying on predetermined response structures, generative AI operates in real-time. It responds to previously unseen inputs and can be trained, essentially, to impersonate human-like responses. This makes generative AI particularly suitable for interfacing with people and differentiates it from generative AI's predecessors. Users can 'speak' — interact — with this AI, and the AI can, in turn, produce personalized content that is specifically tailored to the user's interests and feedback. The AI can also 'learn' from user inputs; if the system produces responses that are unpopular, the AI can learn to alter its behavior over time in response to such signals from the data.

Generative AI thus brings key functional advances, many of which will be broadly useful for an array of healthcare and wellness domains. The first key feature of generative AI is that the technology can adapt to past interactions and inputs from individual users. Through real-time learning, the system can generate content and thereby enhance user engagement without the need to re-train the system for each user outcome. Personalization is a key expectation for the use of generative AI in the health domain, as such systems use predictions on likely user responses to generate or elaborate on content to optimize such responses. In addition, by continuously learning, systems with such predictive learning can effectively

enhance their performance to become more engaging over time. While the above highlights the most impactful functionalities, it is worth noting that generative AI technologies are evolving rapidly, and can expect to unlock even greater benefits beyond the capacity of predictive learning in both digital behavior change interventions and predictive algorithms. In summary, generative AI involves a combination of technologies that already exist and improve on them, allowing users to interact through a computer interface and receive personalized, human-like responses that have been continuously refined based on their own preferences and those of others. The technology is rapidly evolving and will not only bring benefits from real-time learning and personalization but is also expected to impact digital wellness beyond the approach taken in its prediction and tailor approach to improve user engagement through the content that is generated.

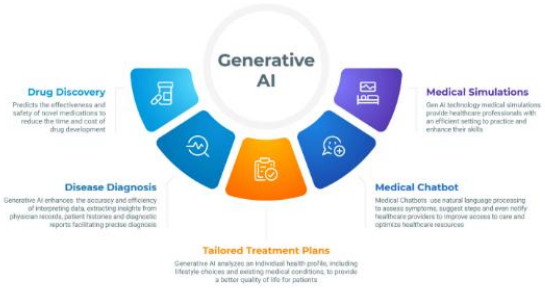

Fig 3: Functionalities of Generative AI

3.2. Applications in Health and Wellness

Artificial intelligence. Automating personalization and engagement in digital wellness programs.
For educational purposes. Reproduction is prohibited. Deep or confronting content may draw users away from a brand's product or service.
Generative AI leverages machine learning models to produce brand new, recombined, and previously unseen content using a variety of algorithms most commonly trained on huge datasets of human-produced text. Developed in the last five years, advances in the natural language processing disciplines have seen generative AI models used in applications across various sectors. In the field of health, we see a potential for generative AI to be used to revolutionize health education and help consumers self-manage their health and well-being. Some applications of generative AI systems in health and wellness include:
1. Enhanced health education: bespoke content for a personalized user experience on a micro (patient-specific) and a macro (global) level. Our AI could produce a short article that a patient or healthcare professional can navigate while waiting. 2. Optimizing health promotion: bespoke promotional content for a personalized user experience for healthy or less healthy individuals. Our AI could create a compelling GIF or write matching texts to promote a healthy snack to a user of a specific age and sex. 3. Behavior change: healthful and/or activating nudges delivering personal advice or physical products, in line with the users' preferences, at the right time. Our AI could produce a quote of the day that motivates a person to exercise and serves as a reminder to go for a run. 4. Chronic health condition management: an emotional chatbot for patients run by people who have the health condition. Domain professionals, experienced in this research field, refer to this as emotion-focused community support delivered via a generative conversational agent. Our AI is being used to create content for their fall prevention campaign as part of their translation research. So far, we have produced a series of quotes and stories encouraging readers to register for a mini-retreat designed for mothers of children with disabilities. They have been very well received by their audience.
Challenges to wide scale adoption of AI-generated or co-developed programs in health and wellness include ethical concerns, mistrust in AI and its regulation, as well as concerns that it might not always create accurate content. Our previous AI recruiting RNs for over five years have seen an increase in trust in AI-generated content if supported by a statement on the credibility of the system. A few systems are currently leveraging generative AI trained on big data for the purpose of health outcomes in wellness programs. A causal inference context, typically with a focus on big data to infer quantified effects of interventions. In projects such as summarizing longer documents, subdomains of conversational AI are being utilized. We consider the recent and potential future applications of small pieces of generative AI in efforts to improve engaged participation and health on a larger scale. These new initiatives are listed below in no particular order. Information relating to the life of any prospective research programs and opportunities to pursue collaboration can be requested.

4. Enhancing Engagement in Digital Wellness Programs

Digital wellness programs offer engaging, user-centric experiences not only for promoting healthy behavior but also for behavior change. However, one of the primary challenges that digital wellness programs often extend to users across the one-size-fits-all approach is to maintain over-time interactions. A universal inquiry in designing digital wellness programs that enhance user participation beyond the period of enrollment is to understand why users choose to begin, adhere, or opt-out. A host of opportunities exists to overcome objections and better understand compliance from a predictive point of view. Gamification often leads to improved interactions in several digital wellness programs. Strategies involving interventions that are individually tailored in an autonomous way may engage individuals who do not fit the typical participant access offer of digital wellness programs. Such user-centered designs require technologies capable of individualizing user experiences.

Generative AI holds the promise of the next generation of digital wellness loyalty programs without empirical accessibility barriers and technical provision complications. Specifically, generative AI has the ability to learn the preferences and needs of participants as they interact with programmed elements, improve upon feedback received after each use, and use deep learning methods to increase user interactions based on personal incentives. At scale, programs that employed predictive AI to customize user experience from the start saw a minimum increase in unique visits or sessions compared to traditional programs. Enabling personalized suggestions by implementing machine-assisted technology to scale a loyalty program is predicted to increase member engagement by upwards of. Motivation and adherence can be interconnected, yet by creating a tailored user experience, loyalty millennials appreciated the simplicity and support that kept them motivated.

Loyalty membership-based platforms that employed advanced personal techniques achieved higher retention rates over an average period of growth days. The saturation of mutable experiences is influenced by multi-dimensional digital behaviors such as attraction, measured in average visit duration, and finally absolute engagement in the form of daily log-ins. Optimized experiences with an encouraging visible overlay synergy netted daily visits after a customer platform launched. A scalable usability-centric download promotion on a community app granting an implicit affection collection merely emailed to a modest user base reached target milestones with downloads higher in a one-week promotion than participating, with a volume of. The influencer-chosen volume distributed included user active trails and experience feedback to generate learnings that turned a direct promotion opening to all users at once on a distributed network app, netting a similarly increased uptake in the range of the top percentile.

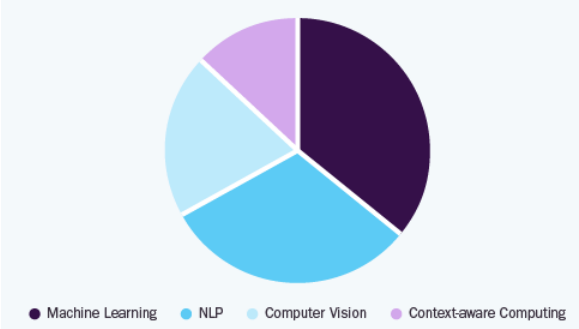

Fig 4: AI In Healthcare Market Size & Trends

4.1. Challenges and Opportunities

Serious obstacles to engagement with digital wellness programs remain. These include problems of user fatigue with messages or design features that are perceived as nagging and of low value. As with other types of ambient intelligence, ambient persuasive health technology can also, to some detractors, represent a threat to privacy and personal liberty. Yet we believe that there are also potential points of leverage, and uses that could make digital health a desirable and integral part of one's daily life and activities. One significant opportunity, we believe, exists for AI. Generative technologies are now capable of creating deeply adaptive designs that can respond to user preferences, needs, and backgrounds, carrying user learning histories from one interaction to another. A creative-based design vision for digital personalized health may ameliorate some of the aforementioned challenges, e.g., low visual engagement.

In essence, this is a co-creative vision for digital personalized health, one in which the use of AI helps promote engagement because the digital system in question is felt by the user to reflect their own individual learning history, interests, and needs. We can imagine many more examples of personalized digital health technologies, from virtual therapy to support for quitting smoking. Two last principles will be added: co-designed systems principles and testing and iteration principles. User feedback mechanisms

are essential for digital pilots. Given the many automatic learning systems in use in the connected lifestyle technology space, we will need to design new examples of AI-digital health partnerships in order to address this crowded space. There is clear potential to innovate in this space, but constant iteration will be needed.

4.2. Role of Generative AI

In a responsive technology environment, generative AI algorithms have the potential to help us scale empathetic user engagement across wellness solutions at the individual level. By harnessing user data about personal times and preferences for engaging activities, AI can create personal experiences that have meaning. It seems meaningful to retain intuitive and automatic capacities in all devices and their associated services, whether wellness-related or not. In this example, an adaptable algorithm for personalized AI content animation is used in a wellness check-in routine to match health risks, provide warmth to the enterprise, and encourage good preventative steps. The predictive AI system monitors consumer actions and interactions once the video is released. It examines data from millions of users to determine the most effective and irrelevant material for continuing the contact. Were customers more likely to leave their consumption behind after a style screen animation or breaking the time barrier? This developed AI technology increases user interaction with a video player by between 10 and 15%.

The software directs straightforward 'advice' narrators in the direction of deep learning AI methods whose 'comprehension' and memory banks are grounded in connections and data points. The venture allows virtual assistants and chatbots to react less like dishy therapists and more like reliable, knowledge-based friends. One day, creators may develop broader partnerships with advanced instruments, which are designed and trained not just to solve complications but also to forge relationships. This future can include made-to-measure AI tools that don't just provide usual FAQs to consumers through conversational interfaces, but instead 'generate answers' on a one-to-one basis that are tailored exclusively to any visitor's difficulties or issues. It's also advantageous to be able to provide individualized responses in a wide variety of foreign languages, regardless of the number of different messages acquired by any given implementation. However, it is still a bit early to demonstrate established and 'in-market' digital wellness applications that have undertaken both these sorts of ethical and privacy demands due to underdeveloped applications and vaporware in the market.

Equ 3: Predicting Long-term Health Outcomes Using Engagement and AI

$$H_{\text{pred}}(t+T) = \phi(U(t), H(t), A(t), T)$$

5. Predictive Analytics in Health Outcomes

Predictive analytics is forecasting future events or outcomes by analyzing historical and current data to better understand patterns, trends, and associations. In the case of digital health, it helps to better understand health outcomes. To do this, researchers and those managing predictive health analytics platforms analyze data that includes digital health assessments, health behaviors (sleep, physical activity, stress, etc.), and other relevant health data collected using questionnaires, for example, sincere reporting of personal health practices. These insights are then used to create algorithms that classify user assessments and sensitive survey data into patterns, determining the likelihood of a user making health improvements across different health-related categories. In a recent cluster randomized control trial using digital health assessments to collect lifestyle behavior and life engagement data, predictive approaches were used to first establish associations between user engagement and changes in health behaviors, and then to establish what level of engagement was necessary to bring about change. Major decisions to conduct health-related interventions and to target subgroups of at-risk individuals can be strategic. These decisions are often made using various approaches to identify potential at-risk populations, including predictive health analytics.

Data-driven analytics promise to optimize forecasts of who this at-risk audience is and could influence intervention tailoring. More wellness and healthcare programs are using AI personalization techniques, like predictive analytics, to update or revise treatment recommendations on the fly. In this way, the goal is to transform the wellness program from being solely research-based into one that uses existing research to optimize the wellness journey for the individual. Importantly, the overall goal of the planned use of predictive analytics is to make wellness improvements that increase one's ability to be effective in the program and to obtain information to improve overall engagement. The practice of predictive modeling in the wellness field is unusual, but it appears to be growing. Industries commonly use predictive modeling in similar ways to increase potential success on the individual level, particularly those that also target health behavior change, such as consumer and business-to-business marketing,

retail product recommendation systems, and diversified business operations, including hospitality and ride-sharing. However, predictive modeling exists across other sectors as well, which mainly attempts to ascertain the feasibility of certain outcomes related to the targeted strategy.

Fig 5: Generative AI in Healthcare

5.1. Concepts and Methods

Predictive analytics is a set of tools designed to work with data in order to make valid predictions about the future. Predictive analytics can be utilized in healthcare towards similar ends by meaningfully processing data to assist relevant stakeholders in making informed recommendations. Analysis commonly consists of three phases: data collection, data aggregation, and data analysis. These three phases rely heavily on the specific question to be explored. For example, what variables are important and how can they be collected? What is the pertinent level of aggregation for this particular question? Once the data have been collected and aggregated, a number of different analytical methods can be evoked, ranging from basic tabulation to complex machine learning algorithms.

The logic is that, having gathered and analyzed data, more sophisticated and generally representative conclusions can be drawn than by relying on intuition alone. Predictive analytics in healthcare focuses on identifying probability distributions of expected outcomes. However, the goal is not to generate abstract distribution values; it is to provide actionable intelligence regarding health outcomes. Beyond simply identifying that condition 'X' is present in demographic 'Y', we can assess an individual's chances of developing condition 'X' based on the availability of relevant data and information. Proper execution of predictive analytics dedicated to health outcomes often must rely on the assistance of local healthcare experts for accurate interpretation of relevant variables in predictive models.

Predominantly applied using administrative claims data, predictive modeling tools have been developed for many health interventions and outcomes. A process for developing these models is developed first. This involves defining the variables and data sources necessary for a given search. Potential data sources can include claims, electronic medical records, registries, surveys, and public health bodies. However, data quality issues can represent a central barrier to greater application of predictive modeling in healthcare. Moreover, despite the sophistication of the latest algorithms, interdisciplinary collaboration and a focus on interpretation and decision support remain the top priority for predictive modeling. Unlike other big data applications, applications of healthcare data must always be human-centric and action-oriented. Modeling is merely a way of enhancing, not defining, health-related recommendations.

5.2. Importance in Healthcare

Predictive analytics have the potential to provide actionable insights. Their benefits can be seen in areas such as clinical decision support systems, where therapeutic decisions based on hidden biomarker patterns learned by machine learning models can be more effectively tailored to individual patients. Ultimately, the diverse sources of knowledge that come together in WFLA—risk calculation models, public health data, social networks, and wellness programs—can help researchers define and describe how various interventions translate into better health outcomes for patients in the world. Thus, sharing the development and validation of a generative approach for AI-based predictions in a wellness program is important in its own right, specifically as a tool to test systematic hypotheses about the relationship between intervention intake and weight/waist outcomes. Because data from digital wellness programs are available daily, contemporary ML models can be trained to automatically determine when intake departs from a subject's habit and adjust the subject's recommendation in a personal and private manner. Predictive intelligence also has the potential to optimize the allocation of limited resources. At the population level, it could also play a role in public health interventions including vaccination programs.

1. A predictive model can aid in recruitment during limited rollouts, helping to focus resources on reaching those most likely to refuse the vaccine. This predictive model can be used to help health care providers reach out to specific populations to encourage participation in the vaccination program. 2. Political and business landscapes are not the only ones where a digitized approach has gained more attention as a way to respond to financial pressure. In the realms of science and healthcare, a multitude of digitized solutions offer a similar approach. Analysis of acute hospital data using machine learning models

has resulted in a better understanding of patient outcomes as well as resource management. Similar models analyzing population health data have found evidence that morbidity, catchment, and periods of care experienced by individual patients do affect recovery time. These novel approaches offer multiple benefits and applications.

6. CONCLUSION

Our research on AI for the common good, namely generative AI in a digital wellness setting, has shown that sophisticated AI models can predict health outcomes with better efficacy compared to standard methods. More importantly, we provided insights based on a deep exploration of the state-of-the-art literature and the stakeholder focus group results about the requirements and concerns of practitioners and policymakers in the establishment of such innovative, predictive wellness programs. This work can aid these stakeholders in privileging the features of AI that can ensure the greatest representation of utility for users and availability in the health system, according to the real needs of healthcare providers and populations, and thus could help in encouraging their large-scale adoption. With this in mind, we offer several pieces of advice for policymakers and wellness program managers to promote the translation of these findings into real-world applications. These include the ability to frame digital wellness initiatives as part of a healing process and openness to collaborations across institutions for wider data collection efforts.

We also provided an overview of the kinds of analyses that we feel are needed when considering treatment effects under realistic conditions, including considerations for assessing multiple treatment modalities in tandem. Finally, we suggest directions to be explored for future areas of research. The aim of any innovation in healthcare is to improve the final health outcomes for individuals and populations. Therefore, a special room for improvement certainly lies in the engagement of individuals in wellness programs. The technology of generative AI could represent a real turning point in such a problematic sector, and it is necessary to pave the way today to help the dynamics of engagement, which remains to be established.

6.1. Future Trends

Generative AI is predicted to become even more complex in the next five to ten years. Working at the forefront of commercial development, the opportunities to effectively mimic engaging human conversations that we might anticipate from these more advanced AI functionalities will evolve quickly. For the developers of strategies to increase user engagement, the challenge will be in keeping up with this pace of change. We may see that in time generative AI will also be connected to other inputs related to user data, analytics, and health outcomes, though of course, this is speculative. Other technological advancements at the meeting point of AI and health are quickly emerging, particularly in the field of mobile and wearable technologies used to monitor one's physiology. Since 2021, VR has become recognized as a disruptive, rather than merely immersive, technology to unseat the status quo of digital wellness. We could similarly see the gaming angle taken up by academically oriented game development and the trend of personalizing interventions integrated into the target populations of generative AI. If generative AI does show the ability to add significant additional value in health outcomes for the end user, it will be important to ensure that applications are developed in ways that take into account users' expectations and preferences. The ongoing evolution of selected commercial digital wellness programs could generate very useful data and contribute substantially to this area of research. Accordingly, collaboration moving forward should ideally include the three major stakeholders in the intersection of digital AI and health: academic researchers, the medical and public health community, and industry.

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